DOCTORAL DISSERTATION

Evaluating the attractions of regional attributes on talents: Application of conjoint analysis on graduates, entrepreneurs and tourists

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ABSTRACT

The main purpose of this research is to promote regional economic development through the introduction of talents and new technological innovations. A constant supply of novel ideas and contributions from all economic sectors is required to further the sustainable development of regional economic. Therefore, there is a growing need for talents and innovation to activate the regional development.

Improving urban environmental attributes has been proved as a efficient approach to attract graduates from Northeastern China and water pollution was the most critical attribute with the highest relative importance (43.6%).

Similarly, it was explored that entrepreneurs' preferences on entrepreneurial ecosystem which is always regard as a special kind of region located in a city. Small and medium-sized enterprises are willing to give up funding subsidies to start businesses in areas with high per capita deposits. On the contrary, large companies will choose areas with high government subsidies to establish companies.

Moreover, an innovation that applied tourists' social media data to improve souvenirs has been proven to effectively improve the sales of souvenirs in the region and further promote regional economic development.

Chapter 1 is the research background and purpose of the study. Research background was conducted to reveal the international and domestic background, and purpose of the study was addressed.

Chapter 2 is the review of previous literature. It has been analyzed that the research on talents attraction stragies of different countries, regions and cities. It is notable that there are still some research gaps that need to be studied.

Chapter 3 is the research methodology. The designing process and the experimental process of the conjoint analysis were shown in this part.

Chapter 4 is attracting graduates for cities by improving urban environmental attributes. Water pollution was regard as the most important urban important environmental attribute for graduates from Northeast region of China.

Chapter 5 is attracting entrepreneurs for entrepreneurial ecosystem (EE) by improving the attributes of the place where EE is located.

Chapter 6 is promoting regional economic development through enhancing tourists willingness to purchase souvenirs. The behavior of tourists on social media proved to be a reference for commercial strategies used in souvenir sales.

Chapter 7 is the conclusion and policy implication. The results in every chapter were summarized and some reliable strategies were proposed to the policy makers and governments.

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Chapter 1

RESEARCH BACKGROUND AND PURPOSE

1.1 Research background

1.1.1 Regional economic development

All human economic activities are inseparable from a certain geographical space-region. The combination of economic activities and specific space has produced regional economy whose development is the eternal goal pursued by regional economic activities. Futhermore, economic growth is the foundation of economic development which reflects that the scale of economic development is diverse. Coordinating economic growth and effective use of resources, in other words, combining environmental protection and improving the quality of life with the realization of social, economic, and ecological goals can be used as a standard to reflect the sustainability of economic development capabilities. In addition, differences in regional economic conditions often lead to large regional differences in economic development, and it is impossible to achieve simultaneous development, but the continuous expansion of regional economic gaps should be avoided.

Development is different from growth. Regional economic development cannot be evaluated only by comparing the scale of regional economic growth. Regional economic growth is an increase in the number of various products and total labor output value in a certain area within a certain period of time. The development of regional economy means the progress of regional structure based on regional economic growth, and the progress of this structure is concentrated in the progress of regional industrial structure and spatial layout [1]. Generally, economic growth is only an increase in economic quantity, while economic development is an improvement in economic quality. Growth focuses on quantity, while development encompasses both quantity and quality. Economic growth is the foundation of economic development, but economic growth alone cannot achieve economic development. For example, due to institutional reasons, the fruits of economic growth are acquired by a small number of people, leading to a widening gap between the rich and the poor. This situation does not belong to economic development; in addition, if the price paid in the process of acquiring economic growth is higher, it will cause the people to the quality of life is declining, environmental pollution is increasing, and the waste of natural resources is increasing. The degree of such economic development is low [2]. Under normal circumstances, underdeveloped areas pursue economic growth. After the economic level has improved, they will pay more attention to the overall economic development and further promote economic growth. This is a gradual process. Therefore, regional economic development and regional economic growth are related to each other, promote each other, and coordinate with each other, and they work together in the process of social and economic development.

The increase in the total economic volume is one of the goals pursued by economic growth. However, we should not blindly pursue the economic growth rate. We must also pay attention to the quality of economic growth and the overall development of the society. Otherwise, it will lead to the imbalance of economic growth, economic ups and downs, social injustice, and social injustice. Violent turbulence. Therefore, it is necessary to transform from economic growth to economic

development and take a path of economic development with a moderate growth rate, continuous optimization of the structure, and good economic benefits. At the same time, economic growth has a close relationship with resources and the environment. The resources and environment can be continuously transformed into use value and value. However, the excessive dependence on resources and the environment in the process of rapid economic growth has also led to some negative problems such as resource depletion and environmental pollution. When the losses caused by environmental problems exceed the newly increased profits each year, the regional economy will stagnate or decline. Because of this sense of crisis, the idea of sustainable development has gradually formed. Sustainable development is regard as an economic growth model that focuses on long-term development.

Economic growth is the foundation and core of development. Without economic growth, economic development cannot be achieved. The most widely used modern economic growth theory is mainly the neoclassical economic growth theory represented by Solow and the new economic growth theory represented by Paul Romer and Robert Lucas. Based on the Cobb–Douglas production function, the neoclassical economic growth theory points out that the growth of GDP is the result of the long-term effects of capital accumulation, labor force growth, and technological changes. The technological change is reflected through the organic combination of two major production factors-labor and capital. On this basis, labor and capital are transferred from low-productivity sectors to high-productivity sectors to promote economic growth. In addition, the geographical concentration of production factors is an important factor in promoting economic growth.

The new growth theory points out that knowledge is increasingly important in economic growth, and the trend of physical investment shifting to high-tech commodity production and services is becoming more and more obvious. With more and more investment in research and development, human resources with development potential have become the cornerstone of economic growth. The most representative of the new growth theory is the Arrow model of economist Paul Romer [3]. Its main point is that technology is an endogenous variable and the only source of economic growth. The main point of Lucas model [4] is that the speed of economic growth in a region is directly related to the human capital status of the region. Similarly, the main point of Joseph Schumpeter's innovation theory is that after human capital has become the most important factor of economic growth, innovation has become a key element of economic growth [5,6]. This innovation is manifested in five aspects: the application of new technologies, the development of new products, the use of new processes, and the exploration of new markets and new organizational forms. The new growth theory has become the theoretical basis for economic growth in developed countries and regions.

1.1.2 The important influence of talents on the driving force of regional economic development

Regional economic development is affected by the comprehensive effects of nature, economy, society and many other factors. In-depth analysis of the role of these factors in regional economic

development is helpful to enhance the understanding of the process and law of the formation of regional economic development models. It needs to be pointed out that although this article discusses economic development, since the measurement of economic development is a complex and systematic project, it is difficult to have a universally recognized standard; and Gross domestic product (GDP) is a measure of the level of economic development. The most important indicator, therefore, this article chooses GDP as the main indicator to measure the level of economic development.

Todaro pointed out in a study of developing countries that there are eight initial conditions, including material and human resources, per capita income and GDP, climate conditions, population, national standard population replacement, international trade, scientific and technological research and development capabilities, and political and social systems (7). It is the basic condition for regional economic development. The important enlightenment of this research is that it emphasizes regional basic scientific research, the stability and flexibility of political and social systems; but the research also ignores the influence of history and cultural traditions on regional economic development (8). Some scholars have supplemented and improved Todaro's research results. Zhang Yulin pointed out that natural conditions and resource conditions, urban development and economic and social structure, traffic and information conditions, historical background, geographical location and other aspects have different effects. The model of regional development (9). In addition to emphasizing natural and economic resources and historical traditions, Wang Guichen and Zhang Liuzheng also elaborated on the importance of productivity and government behavior (10). Zhang Dunfu made a generalization and synthesis on the basis of the research at the time and proposed that the choice of regional economic development mode should consider factors such as natural resources and geography and climate, population, capital, technology, transportation, and communications (8). Five factors will affect domestic policies, Cultural and historical traditions, and regional interactions have an impact on the choice of regional development models. However, he ignored the influence of globalization on the choice of regional economic development mode under the background of economic globalization.

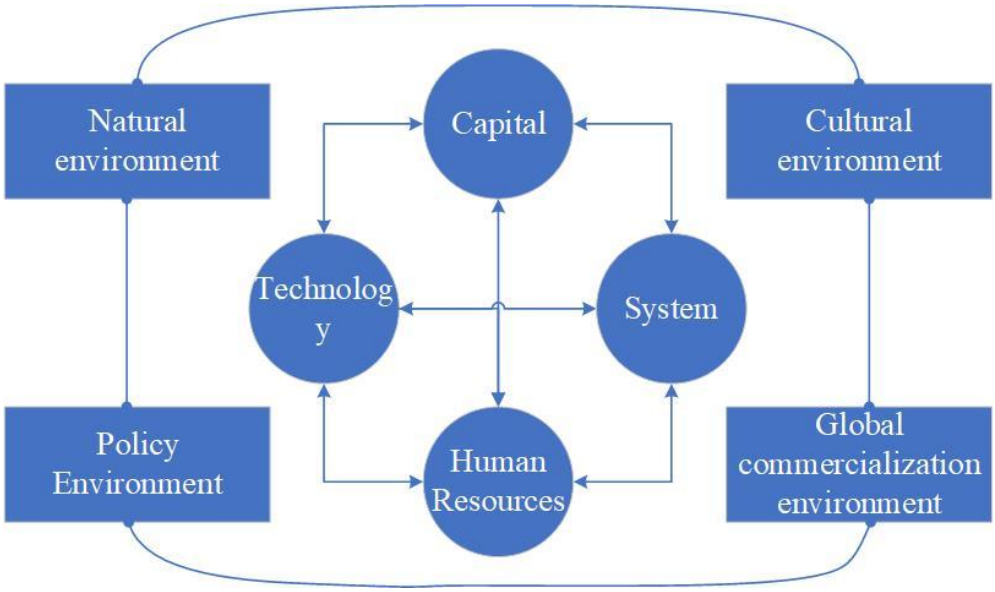

Figure 1-1 Framework of Regional Economic Development Model

Since different regions are affected by different factors, it is difficult to use a universal analysis framework to cover all possible factors. In any case, the possible factors still need to be analyzed in detail, summarized and integrated, and strive to establish a more scientific analysis framework, which is helpful to analyze the law of the formation and selection of regional economic development models. According to the relevant theories of regional economic development, the economic development of a region is mainly affected by the four elements of capital, technology, labor and system, and the regional economic development model is the configuration and operating characteristics of various production factors and production relations in a certain region; It can be seen that the discussion of regional economic development models should also start from the four major factors that determine economic development; in addition, the formation of a certain economic development model is also affected by the local and external environment. Factors are the decisive factors that determine the formation of the model, and the environment is the external condition that affects the formation and development of the model. For this reason, this article proposes an analysis framework to analyze the formation and operation of the regional economic development model based on the theoretical thinking of regional economic development, as shown in Figure 1.

Resources and human capital, as the two major elements of regional economic development, play an important role in the start and development of the economy. When studying the economy of developing countries, Rosenstein Rodan believed that the development and utilization of natural resources was a potential and important catalyst for economic development. Before the 1960s, people held a positive attitude towards the role of natural resources in regional economic development. With the emergence of industrial bases reduced to "problem areas" and "Dutch Disease", the resource-based economy has been questioned by people (11). Whether resources play a role in promoting or hindering regional economic development has become a question in the

academic community. As the regional economic development model is formed on the basis of a certain era background, regional production factors, and production relations, the regional economic development model has era and regional limitations, and the scope of application has certain restrictions. From the point of view of factors, the short-term economic effects of the resource-driven model are more obvious, especially in the initial stage of industrialization in the need for natural resources. The long-term economic effects of the human capital-driven model are more obvious, especially in the early stages of industrialization. In the middle and late stages of industrialization or post-industrialization, its superiority gradually emerged.

Academia generally believes that human capital accumulation is the key to the transformation of a resource-based economy. Hu Y.C and Xiao D.Y believe that human capital investment plays an important role in economic development, and this needs to overcome the threshold of the "resource curse". The threshold depends mainly on the proportion of local high-quality and high-capacity talents; they also believe in raising the level of education. Retaining high-quality talents and attracting talents is the key to solving the problems in the resource-based economy (12). The mechanism of the role of human resources on regional economic development is as follows:

(1) Human resources promote the change of economic growth mode.

People have realized that economic development is closely related to talent development. Especially in today's era of knowledge economy, the production and creation of knowledge are the main manifestations of economic development, and human resources have become the decisive factor of economic development and the most critical link in social development. At the same time, economic development promotes industrial development, which in turn places higher demands on talent development. Talents are active in social production practices, manifested as a result of human physical and mental work. At present, the knowledge, technology, and intelligence of talents are materialized into technical capital in material capital, the production structure has also begun to transform from labor-intensive industries to capital-intensive and technology-intensive, and the economic growth mode of the society has been gradually improved.

(2) Human resources promote the adjustment of industrial structure.

Talents promote the adjustment and optimization of the industrial structure, and a sufficient and effective supply of talents will accelerate the transition from the industrial economy era to the knowledge economy era. This process of transformation has changed the way of contact between the original industries to a large extent, causing tremendous changes in the industry and the market environment. Compared with ordinary labor, talents can adapt to the new production environment more quickly, conveniently, and effectively. High-level talents lead the development of high-tech industries. High-quality and high-level talents will help catalyze the birth of high-tech and high-tech industries, guide the flow of general resources to high-tech industries, and promote the growth of high-tech industries. At the same time, the overall advancement of the industrial structure requires the advancement of the quality of talents and changes the knowledge structure of talent needs.

(3) The accumulation of human resources to promote economic clusters.

Economic clusters are manifested in that each enterprise only focuses on its most advantageous production links, so professional and technical personnel are relatively concentrated. In the cluster area, each enterprise is responsible for a link or part of the industrial chain, and each enterprise complements each other and cooperates with each other to form an industrial chain. The role of human resources has been upgraded from a single enterprise to a larger cluster, and the aggregation effect of human resources has been significantly improved. The accumulation of human resources is conducive to enhancing the competitiveness of the cluster, the socialized collaboration of cluster regions, and the promotion of the integrated development of talents.

(4) Human resources promote the market-oriented development of the economy.

The promotion of economic marketization by human resources is reflected in the marketization of human resources. The marketization of talents is conducive to establishing the property rights of talent capital and promoting the construction of a clear property right system and an independent enterprise system in the process of economic marketization. The marketization of talents is essential for clarifying the main body of talent capital investment, clarifying the property rights of talent capital, deepening the reform of talent use, management and flow system, income and distribution system, welfare and security system, education system, etc., and maximizing the use of talent capital. Effectiveness, protecting the rights and interests of all parties, is of utmost importance. The marketization of talents is conducive to breaking up the gap between urban and rural areas, providing a strong guarantee for improving the factor market and increasing the degree of marketization of the economy.

1.1.3 The importance of talents to regional innovation

Regional innovation capability refers to the ability of a region to transform knowledge into new products, new processes and new services, and to promote local economic development and produce certain economic performance. The difference between technological progress and innovation capabilities is the main reason for the economic gap between developed countries and regions and underdeveloped countries and regions. Improving regional innovation capabilities can narrow this economic gap (13). Regional industrial innovation promotes the creation, application and allocation of new technologies and knowledge by talents through organization and institutional arrangements, and further supports and generates more regional innovations (14).

At present, there are not many literatures on the role of human resources in the development of regional innovation capabilities. More scholars are studying the development of regional innovation capabilities from the perspective of human resources, exploring the relationship between human resources and the development of regional innovation capabilities. For example, in the classic endogenous economic growth theory, one of its basic views is that human capital firstly plays a role in innovation and knowledge diffusion, and then indirectly affects economic growth. Foreign

scholars Patrick Rond and Caroline Hussler [15] on the development of regional innovation capabilities in France Carry out empirical analysis, and clearly pointed out in its research results that human resources and educational resources are the most basic and important conditions for the formation of the French regional innovation system.

David Doloreux also gave his basic view through empirical analysis, that is, human resources are the key factor to promote innovation activities (16). Bai J.H considered the influencing factors of innovation efficiency in my country's 30 main provinces and municipalities, especially environmental factors, and believed that there is a clear positive correlation between the basic quality of human resources and regional innovation efficiency (17). Qian XY takes China's provinces and municipalities as the research object, first introduces the spatial lag model and the spatial error model to evaluate the promotion of human resources on the level of regional innovation capabilities; and uses the second-order regression model to estimate the indirect promotion of human resources on economic growth and try to quantify this promotion effect (18). In the end, his conclusion is that there is a positive correlation between the educational level of the personnel and the regional innovation ability, and the relationship is significant, but the impact on economic growth is not obvious. Ma Y.X research has obtained similar results, but the method is slightly different (19). Pan X.Y discusses the optimization of innovative talents from the perspective of human resource structure (20). Cheng Z.Z analyzed the current situation and problems of the talent resource structure of Zhongguancun enterprises from a practical point of view and believed that the talent accumulation effect of Zhongguancun Science and Technology Park is obvious, which promotes the improvement of enterprise innovation capabilities (21). In general, the research of various scholars believes that the basic quality of human resources is positively related to regional innovation capabilities, and in fact it is also an indirect discussion of the positive correlation between human resources and regional innovation capabilities. The mechanism of the role of human resources on regional innovation and development is summarized as follows:

（1）The gathering of scientific and technological talents promotes the improvement of regional innovation capabilities.

Regional innovation capability is the main element of the regional innovation system (universities and research institutes, enterprises, governments, and intermediary institutions). On the basis of making full use of modern information and communication technology, with the help of policies, systems, and laws, mobilize and organize regions. Innovative resources, the ability to continuously incorporate knowledge, technology, information, talents, and other elements into the social production process, and to coordinate and promote regional innovation activities (22). The key to innovation is talents, and scientific and technological talents are an indispensable element for the improvement of regional innovation capabilities. The scale and quality of talent groups determine the operating efficiency of the regional innovation system (23). Innovative talents provide the driving foundation for regional innovation, which is conducive to enhancing regional independent innovation capabilities and creating a regional innovation cultural environment. The gathering of scientific and technological talents has a strong correlation with regional innovation capabilities, and

the talents and their gathering effects can effectively promote the development of scientific and technological innovation (24). Technological talents increase innovation investment and optimize the innovation environment in the innovation process, which will help to improve the innovation of scientific and technological talents.

(2) Innovative management talents enhance the overall efficiency of regional innovation.

The level of innovation efficiency depends not only on the performance input of a single factor, but also on the reasonable level of convergence between various factors. Effective management of the entire innovation elements has become a key link in improving innovation capabilities and levels. However, the innovation management of many companies is still limited to R&D management, lacking long-term strategic planning, innovation management cannot cover all links of the entire innovation chain, and innovation efficiency is low. As a result, the investment in innovation has not only failed to improve the core competitiveness of the enterprise but has further reduced the motivation of the enterprise to promote technological innovation to a certain extent. Innovation is becoming more and more complex, and innovation management is becoming more and more difficult. Enterprises need to have a professional role to monitor, analyze, and research technological development in a timely, systematic and effective manner, analyze market opportunities, and implement and promote technological innovation with a strategic vision. This requires innovative management talents to participate in the innovation process. Innovative management talents consciously use innovative thinking to solve problems in their work, which not only effectively improves their own innovation capabilities, but also improves overall innovation efficiency and realizes innovation management. Effectively integrate the various elements participating in the innovation system behavior, form a mechanism of division of labor and cooperation, a good innovation atmosphere and a situation where everyone participates in innovation, promote the establishment of a technological innovation system, and improve the overall level of regional innovation capabilities (25).

(3) The structure of human resources determines the development direction of regional innovation capabilities.

The structure of human resources can be divided into general talents, technical talents and management talents. Technological talents are the main body of regional innovation capabilities, which directly affect the ability of various subjects in the region to create, acquire, absorb and apply, and are the main force in the construction of regional innovation capabilities. Managerial talents have a management and guidance role in the construction of regional innovation capabilities. They can effectively integrate various resources and transform potential regional competitiveness into actual competitiveness. In regions without sufficient management talents, the level of regional innovation capabilities is generally not very high. General talents, technical talents, and management talents not only unilaterally act on regional innovation capabilities, but within a region, the distribution ratio of these three types of human resources will also affect the overall development direction of regional innovation capabilities.

The foundation of China's innovative economic development is to continuously improve the domestic regional economic development level and regional innovation capability development level, and the level of regional economic development and regional innovation capability development level depends on the quantity, quality, and structure of human resources. Layout, and its effectiveness. The level of innovation capability of a region and even a country is fundamentally determined by the high-level innovative human resources of this region and the country. With the continuous accumulation and gathering of high-level innovative talents in a region, as well as the scientific and reasonable layout of various talent resource structures, different talents in the region coordinate with each other in many aspects, and the overall humanistic quality in the region has gradually improved and changed. The distribution of knowledge, technology, and human resources in the region will promote the improvement of innovation capabilities in the region, speed up innovation, and improve innovation efficiency. The scientific and reasonable layout of human resources structure is not only conducive to the development of regional innovation capabilities, but the improvement of regional innovation capabilities, in turn, contributes to the effective allocation of human resources, thereby promoting the healthy and effective development of the regional economy.

1.1.4 Definition of talent

Talents are generally considered to be human capital capable of carrying out high value-added or high-value creative production activities (26). There are some differences in the detailed definition of talents in different countries in the world. Since the discussion areas of this article are all located in mainland China, we adopt the definition of talents in the "National Medium and Long-term Talent Development Plan Outline (2010-2020)" (27). The outline points out that talents have certain professional knowledge or expertise. Those who perform creative work and contribute to society are those with higher ability and quality in human resources. In the research on the correlation between regional economic development and innovation ability development and human resource structure, this article further restricts personnel who meet one of the following three conditions to be included in the scope of talents, and collects relevant data accordingly: (1) Have a college degree or above Personnel with academic qualifications, including those with technical school and vocational education; (2) Personnel with elementary level or above professional technical positions; (3) Personnel with intermediate or intermediate level technical qualification certificates, including production-skilled personnel, such as senior technicians, Technician, senior worker, intermediate worker, etc.

According to the current research, the acquisition of talents mainly includes two ways of training within the region and absorbing foreign talents. In China, the most important regional internal talent training process is completed through the construction and development of colleges and universities in the region. The growth of talents requires good education, especially higher education. Education requires a certain teaching infrastructure and knowledge transfer environment, and higher education institutions are an integrated body with talent training and knowledge transfer as the link. The transfer of a large amount of accumulated experience and knowledge, as well as scientific research and academic creation are the distinguishing characteristics of universities. Research by Yan C.F et

al. showed that the more universities, the higher the clustering degree, the higher the academic research level and the economic level of the region (28). After a large number of universities gather, they will become a combination of knowledge competitive advantage and economic competitive advantage. With the development of higher education and social economy, college clusters will expand their own scale to further transport more talents, knowledge and new technologies to the region.

Regions generally absorb foreign talents by enhancing their attractiveness to foreign talents. Research on attracting foreign talents mainly focuses on regional factors which are highly attractive. Gao G.L pointed out that the economic motivation of population agglomeration is not only the pursuit of high income, but also the pursuit of ideal employment opportunities (29). Cai F studied the impact of the system on population agglomeration. His research conclusion is that the traditional development strategy and the arrangement of the household registration system limit the potential population agglomeration behavior (30).

High-skilled personnel tend to flow to areas with high levels of science and technology, liveable environments, sufficient funding for research and good salaries (31), which means that the developed countries (DCs) are the major destinations, while the less developed countries (LDCs) are major sources. Numerous studies have discussed the flow of talent in different regions such as: the United States (32, 33, 34, 35), British (36), Germany (37), Austria (38), and China (39;). Regional economic development attracts HC and, as economic growth stimulates the levels of individual HC and average regional HC, HC agglomeration drives regional economic development, which produces technological externalities (40). This leads to an increased number of jobs (41) and higher overall wages (42), which help to increase HC agglomeration. In addition to economic factors, excellent environment, infrastructure construction, and public service levels also have important attractions for talents (43).

1.1.5 The formation process of talent cluster

According to economic laws, whether human resources or material resources, their reasonable allocation is not a one-time static process, but a dynamic process of constant adjustment and reconfiguration. The so-called human capital migration investment refers to the realization of the migration and flow of population and labor between regions or industries by spending a certain cost and changing employment opportunities in order to better meet their own preferences and create higher income. Because the migration of population and labor improves the efficiency of human capital allocation, improves the quality of labor force and the state of competition, it also belongs to an important form of human capital investment. Talent is the carrier of human capital investment, and the accumulation of human capital is a long-term process, which is often achieved through study and further study or change work, that is, human capital has already flowed in the process of formation. Therefore, the accumulation of human capital itself is a dynamic process, which is completed in the process of constant flow and migration. When the scattered human capital that has been accumulated and being generated in the society is concentrated in a specific area through flow,

thereby forming a larger group of human capital, this process can be regarded as human capital agglomeration, that is, talent agglomeration. It can be seen that the flow and migration of talents brings about the agglomeration of talents. The demand for talents in the ever-changing production process is achieved by the high mobility of talents. The allocation of human capital is also continuously optimized in this process. The pattern of talent agglomeration It is also formed in the process of talent flow and migration.

1.1.6 The origin of talent gathering

Talent agglomeration is a complex social phenomenon. There are many factors that affect talent agglomeration, and talent agglomeration has its own regularity. Economic environment, institutional conditions and technical conditions will affect the formation and development of talent agglomeration. What are the specific factors that promote the formation of talent agglomeration? It needs to be based on specific circumstances, seek the source, and analyze it from multiple angles. In economics, resources generally include various economically valuable natural resources, capital, labor, technology, various systems, etc. Resources are the basis of social production and development. The early agricultural agglomeration was mostly manifested in a strong dependence on the degree of natural resource enrichment. For example, the agricultural clusters developed in areas with sufficient sunshine, abundant rain and pleasant climate, such as the Mesopotamia in ancient Central Asia, the Ganges River in India, the Yellow River and the Yangtze River in my country were once the birthplaces of the most famous agricultural civilization in the world. In the industrial era, areas rich in mineral resources are mostly smelting or heavy industry clusters, such as the Ruhr Industrial Zone in Germany, the Steel Belt in the United States, and the Iron and Steel Heavy Industry Zones in the three northeastern provinces of China. It can be seen that the regions with good natural resources have generated related industrial clusters, which in turn brought population density, and further attracted talents to gather here, which formed the initial talent clusters. The initial agglomeration of talents is formed spontaneously, but the region and timing of the agglomeration are not blind. The original resource allocation has enabled certain regions to obtain a good foundation for development. The demand for talents is also increasingly strong, and abundant resources have laid a good foundation for the comprehensive development of economy and society, and gradually developed into a place where talents yearn for, and the gathering of all kinds of talents naturally arises.

The talent environment refers to the complex of social and material conditions that talents rely on for survival and development, including the sum of various external factors that affect the growth of talents. According to the theory of external environment promotion, the talent environment is one of the important incentives for talent gathering. This dependence of talents on the environment makes those regions and organizations that have a better natural, economic, political, and scientific research environment, but also a good working environment and interpersonal relationship, become the first choice for talents. In the market economy, fierce competition and the pursuit of efficiency are increasingly simplifying and regulating the relationship between people. The more mature the market economy, the better the legal system, the more standardized the credit contract, and the

stronger the binding force of rights and obligations. On the contrary, the more backward the market economy is, the more difficult it is to improve the system, and the more corruption and arbitrariness will prevail, which is not conducive to the construction of harmonious interpersonal relationships and the formation of a superior external environment. The promotion of the external environment has become one of the reasons for the flow of talents. The talent environment is an objective condition and place for cultivating talents, absorbing talents, and giving full play to the energy of talents. Its pros and cons directly affect the success rate of people, the efficiency of the role of talents, and the status of talents in scientific and technological development, economic construction and social progress. And effect. A region with a good talent environment can not only retain local talents, but also attract talents from other regions to flow here, forming a kind of "pull" for talents from other regions. If there is a lack of a good talent environment, and sufficient development opportunities are not available for talents, it will form a "push" for local talents and encourage talents to flow to areas with a good talent environment. It can be seen that the construction of the talent environment is particularly important. A good talent environment often gives talents more employment opportunities and greater development space, which not only affects the expected income of talents, but also provides them with a broad space to display their professional expertise and realize their own value. Under the conditions of market economy, talent as a kind of capital, like other capital elements, will constantly seek opportunities for value-added. However, in terms of high-level needs, the motivation that affects the agglomeration of talents is the driving force of spiritual needs to realize their own value. As a special kind of capital, talents are different from ordinary capital. They are rational in their choice of mobility, which means that not all talents only pursue material treatment, realize their own value, get a sense of accomplishment in their careers, and are respected by society. The sense of belonging is more attractive to it. It is the driving force of talent demand that determines that talents must gather in places that can not only provide abundant material treatment, but also realize their own value. It can be seen that the talent environment does not only include the hardware environment, but more importantly, the environment where talents can achieve sustainable development. In this environment, talents can get more opportunities for improvement and channels to realize their self-worth, and naturally, a yearning and desire for this environment are born.

The talent environment is a complex complex, including not only the natural environment, geographical location, but more importantly, the humanistic environment. The author defines the humanistic environment as a narrow cultural environment. The so-called cultural environment refers to the sum of various spiritual and cultural conditions that exist around the human subject and affect the activities of the subject. The main elements of its composition are education, science and technology, literature and art, morality, religion, philosophy, national psychology, traditional customs, etc. . Culture is a kind of soft environment. It is a long-term accumulation of the behavior and thinking styles of the endless regional agglomeration groups. It is a manifestation of the cultural heritage and environmental affinity. A local culture with its own characteristics, compatibility, and a sense of the times will have a strong attraction to talents. Because talents are very sensitive to culture. First, they are the gathering point of culture. They are always pursuing the integration of external culture and their own culture. Once they find a culture that is similar to their own values and spiritual concepts, they will The second is that they have been looking for a place to realize the value

of human capital. A favorable and progressive culture will carry forward their human capital value, and a backward and unfavorable culture will eclipse their own value. It can be seen that the culture of a place is like a corporate culture, which has a continuous gravitational and conserving power for talents at all levels, and this "pull" has a more lasting power. Relying only on high-income and image projects can only leave a good impression on talents for a while. If you want to retain people for a long time, you must establish your own brand, cultivate a high-quality characteristic culture, and create a high-quality environment for talent cultivation.

In the era of knowledge economy, universities and scientific research institutions engaged in knowledge research and innovation have become important regional knowledge assets, and the advantages of the scientific research environment are gradually becoming the main source of power for the development of countries and regions. The scientific research environment mainly refers to the dense environment of scientific research institutions. The scientific research institutions mainly refer to universities and research institutions, which are the cradle of talent growth. The concentration of universities and research institutions in a region not only provides rich human resources for local economic development, but also provides a broad space for talent development and lays a resource foundation for talent gathering. In addition, this resource advantage will produce brand effects, which will attract more talents to surround universities and research institutions. The agglomeration of scientific research institutions makes the scientific research hardware environment more excellent, and at the same time the scientific research atmosphere will be stronger. For all kinds of talents who desire to produce results, it is like a duck. The impact of the scientific research environment on the agglomeration of talents is mainly achieved through two effects. The first is the clustering effect. A university has introduced a number of extremely outstanding talents, such as academic leaders, whose knowledge and reputation can attract more outstanding talents. Leaders can effectively guide and help other talents to improve their own level and lead outstanding talents to climb new heights. After the agglomeration reaches a certain scale, it is like a magnetic field, attracting a large number of talents from abroad or other regions. The second is the comprehensive effect. Bringing all kinds of outstanding talents together, brainstorming, it is easy to develop unprecedented new results. This effect is accompanied by the clustering effect. With the expansion of the agglomeration scale, the division of labor within the agglomeration team has become increasingly mature. With the refinement of the division of labor, the collaboration has become more tacit, the degree of specialization has gradually increased, and the rate of results has greatly increased, which will inevitably attract more talents to gather.

The scientific research environment is like a high-level talent incubator, which produces batches of high-quality talents and attracts a large number of talents at the same time. With the deepening of the knowledge economy, scientific and technological progress plays a pivotal role in economic and social development, and the improvement of the scientific research environment will inevitably become one of the important factors leading to the future development of talent gathering. According to the laws of economic development, the gathering, dispersion and reorganization of all factors of production are aimed at creating the greatest benefits with the smallest investment. Under the conditions of a market economy, the law of value plays a role in the allocation of talents, and the

value of talents is reflected through the market. The salary level of talents actually not only reflects the price of the special resource of talents, but also reflects the income expectations of talents for their own contributions. The main purpose of labor mobility is to obtain higher economic income than before, and to obtain more opportunities to exert individual talents. The massive migration of laborers to the southeast coast in the 1940s and the return of a large number of migrant workers in rural areas in recent years should be attributed to changes in income. The well-known development economist Arthur Lewis believes that as long as the non-agricultural production sector can pay higher than the actual wages of agricultural production, the difference in personal income before and after the transfer of labor can compensate for the higher living costs in the city and the departure from the well. Without the psychological cost of the original familiar living environment and social relations, a large amount of agricultural labor will flow into the urban non-agricultural sector. According to Maslow's hierarchy of needs theory, human needs can be divided into five categories from low to high, namely, physiological needs, safety needs, social needs, respect needs and self-realization needs. Pursuing the satisfaction of one's own needs is the internal motivation for the flow of talents. From the perspective of basic needs, studying the motivation of talent agglomeration, we know that the profit drive caused by material needs is a vital factor, and the income factor is the original profit driving factor that triggers the talent agglomeration.

When studying income factors, the concept of time value should not be ignored. The income factor includes not only current income, but also the expectation of future income. American economist Michael Todaro believes that the main reason for the influx of agricultural labor into cities is not the immediate urban-rural income gap, but the goal of maximizing expected income in the future'. With the rise of family economics and the development of individual behavior, the category of "income maximization" has expanded from individuals to families. The maximization of family income has become the primary goal pursued by laborers, and the maximization of personal income has become a secondary goal. Therefore, regions with faster income growth have greater regional attractiveness, and regions with higher current incomes but not much future income growth will gradually lose the attractiveness of talents. The continuous and steady increase in income levels is the income factor that attracts talents.

1.1.7 The basic attribute of human capital is the driving force for the formation and development of talent agglomeration

The dependence of human capital on other capitals determines that human capital cannot play a role alone. It is necessary to find suitable other capitals for optimal combination in dynamic migration, and other high-quality capitals also form regional agglomerations with the deepening of development. Therefore, human capital will form a certain degree of agglomeration in the process of optimizing and matching other capitals. According to the theory of human capital, pure human capital investment cannot form production capacity anywhere. Only when a certain amount of human capital is matched with physical capital and matched with other appropriate human capital can productivity be produced, and human capital can truly be brought into play. That is to say, the human capital possessed by any individual needs to be combined with specific physical capital, and

it needs to take advantage of a certain organization's human capital group to make a difference. This attribute of human capital will inevitably cause human capital to flow in. It has strong physical capital, advanced production factors, rich cultural accumulation, talent gathering is beginning to take shape, resource allocation is reasonable, efficient operation, and it can provide better quality for its own unique human capital stock. Comprehensively match the conditions of the region and organization, in order to maximize the conversion of their ideal value into actual value. It can be seen that human capital agglomeration and material capital agglomeration have similar agglomeration trajectories. To a certain extent, the two co-exist, cannot be separated, and influence each other. The formation, development and use of human capital are all subject to time, which is time-effective and attritional. On the one hand, the timeliness of human capital refers to a person who exists in the form of a biological organism as a carrier of human capital. , Skills, experience, etc. have their life cycles in the current era of accelerated knowledge renewal, and the stage with the greatest benefit is getting shorter and shorter. The depletion of human capital is similar to material capital, including not only the physical depletion caused by the aging of the human body, but also the intangible depletion caused by the aging of knowledge, skills, and experience. The difference from the loss of physical capital is that human capital is a kind of active intelligent capital. With the abundant production and practice activities in normal use and various forms of additional investment activities of human capital, a series of self-reinforcing, self-enriching, The unique process of self-developed human capital stock compensation and incremental addition, which greatly reduces the intangible loss of human capital. The timeliness and attrition of human capital lead to the tendency of human capital to flow to regions or organizations that can only employ people in a timely manner, realize their potential, and have the conditions to continuously invest in additional human capital. In such a region or organization, the loss of human capital of talents can be continuously compensated and increased, so that the limited human capital can be transformed into greater actual value in time.

All in all, the timeliness and attrition of human capital determine the golden age of talents in their own human capital stock. In order to maximize the value of their own human capital and realize value appreciation, rational choices flow to high-quality gathering places. And migration. The above three basic attributes of human capital drive talents to agglomeration and promote the development of talents agglomeration to advanced.

1.2 Purpose of this study

1. This research discuss the theoretical basis of the promotion on regional economic development by introduction of talents and innovations. Explaining how the talents and innovation promote regional economic development, proposing the practical application of improving regional attraction to introduce talents and combining innovation with existing technology to benefit regional commerce.

2. This research conducted an on-site questionaire survey to analyze the Northeastern graduates' preferences on urban environmental attributes, and disscuss relative importance of the different urban environmental attributes for graduates.

3.This reasearch also conducted an online questionaire survey to examine the entrepreneurs' preference on regional attributes (entrepreneurial ecosystem). In addition, it was explored that their willingness to pay (WTP) for improving the level of these attributes.

4. This research introduced an innovation of appling the social media data in analyzing the tourists' WTP for improving various souvenir attributes and indicating how to develop the regional economics by establishing a proper souvenir commerce reffering to our results.

5. This research proposed some strategies to help specific regions to attract talents and inroduce technological innovation which is benificial to regional economic development.

1.3 Research structure

The research object of this study is regional economic development (RED), the research content is the approach to attract talents and introduce innovation which promotes RED. Other than the introduction part of the first chapter and the conclusion part of the last chapter, the main part can be devided into three sections, which follows the research flow of previous literature (Chapter 2), methodological study (Chapter 3), and experimental study (Chapter 4-6) .

The first part is the part of theoretical ground, including the second chapter. This section mainly combed and reviewed the regional economic development, conjoint analysis method (CAM), and the theory of attracting talents and introducing innovation. For the aspect of economic valuation of RED, this study mainly discussed the approaches to promote RED, along with related economic principles including entrepreneurial ecosystem, regional cluster, and willingness to pay. For the conjoint analysis method, we mainly explained its economical basis, its developing history, and possible bias that may occur along with their remedies. For the theory of attracting talents and introducing innovation, we explained its theoretical development process and connotation, then the application of this theory in related fields was discussed.

The second part is the previous literature. Based on the literature review of RED research. In addition, the research design of conjoint analysis method is studied and discussed. Firstly, this research analyzes experimental subjects and experimental design of previous CAM researches. Secondly, this study analyzes the main academically controversy with regard to the CAM research, summarizing and discussing the possible errors along with their remedies.

Thirdly, this study summarized the main influencing factors that affecting the respondents' preference. This section will provide evidence for experimental research design in section three. The third part is the experimental part, including the chapter four to the chapter six.

Chapter four explained the formulation of questionnaire, the details of on-site interview, and data processing method. The study applied face-to-face interview to collect data, double-bonded dichotomous choice format was chosen to elicit respondents' preferences, and the SPSS 24 and R language was used to process data. The study also applied the Baidu index (big data) to improve the

attribute selection process of the conjoint analysis method. The improvement reduced the cost of the conjoint analysis method and enhanced its objectivity.

Chapter five focus on eliciting entrepreneurs' willingness to pay for improving the attributes of entrepreneurial ecosystem, which is a specific regional cluster for entrepreneurs. The attributes included market potential, government size, physical infrastructure and financial captial. Sawtooth software was utilized to process data for this part of research.

Chapter six explained innovation of establishing conjoint analysis model based on social media data from tourists. In this experimental process, tourists' preferences on souvenir attributes were examined to formulate appropriate production and sales strategies.

Based on the conclusion of previous research, the seventh chapter provides suggestions on how to attract talents (graduates and entrepreneurs) for regions and apply innovations to promote RED. The importance of different attributes for talents and tourists has been clearly expressed through their WTP.

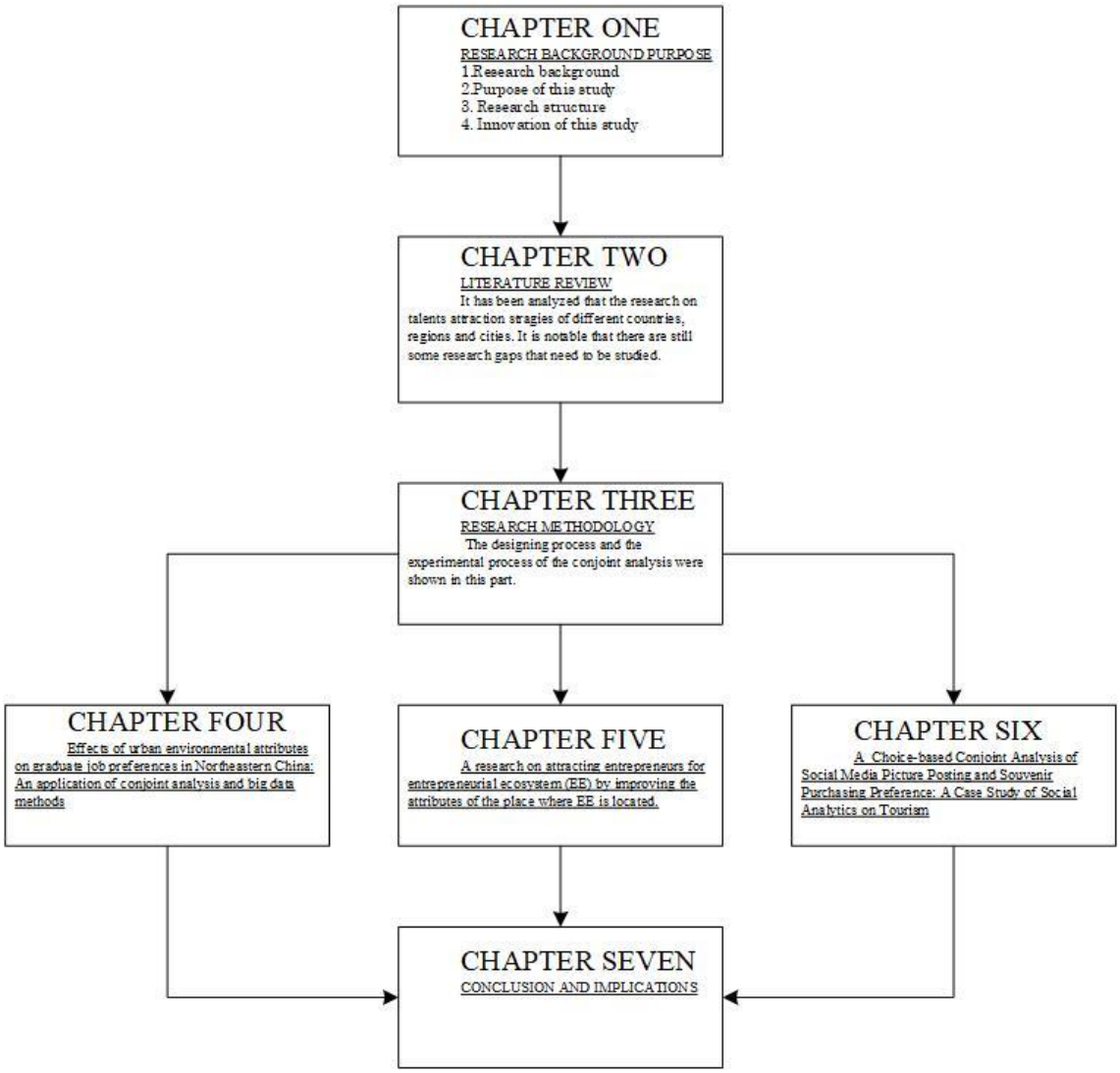

Figure 1-2. Research flow chart of the thesis

1.4 Innovation of this study

In terms of research object, this paper utilized conjoint analysis method to analyze the preferences of different groups of people to help regions attract talents and apply innovation to achieve the purpose of promoting regional economic development for the first time. In addition, it introduces respondents' willingness to pay to show their preferences on the improvement of attributes.

From the theoretical perspective, this study explained the theoretical basis of economic evaluation of regional attributes and defined its content and connotation for the first time.

From methodological level, this study summarized the research design of related CAM research through literature review, along with the factors that affecting respondents' WTP, and the possible bias along with their remedies. These information may provide new evidence for CAM research with regard to regional economic in the future.

From experimental level, compared with previous studies, this research introduced and tested Baidu index (big data) to to improve the attribute selection process of the conjoint analysis method. The improvement reduced the cost of the conjoint analysis method and enhanced its objectivity. As for factors that affecting respondents' WTP, this research extended their social media performances as new variable of tourism business concern, which is an important part for regional economic.

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Chapter 2

PREVIOUS LITERATURE REVIEW

Within the resource-based view of the firm there are three types of resources that act as sources of competitive advantage: physical capital, organizational capital and human capital (1). Increasing levels of technological sophistication and the speedy transfer of information have diminished the competitive advantage that was once available through the first two resource bases. Products are now more readily copied, and processes replicated so differentiation now rests with the people who generate new ideas or with those who deliver the product. There is increasing recognition therefore of the potential of the latter of the three resources, human capital, to make a substantial and lasting impact on sustainable competitive advantage (1, 2).

2.1 Talent shortage worldwide

As noted above the search to add value through the management of human resources comes at a time when the people resource is becoming scarcer. Over the latter half of the 20th century, population trends across OECD countries indicate almost static populations and declining birth rates. In the period between 1990 and 2003 the population growth rates for all OECD countries averaged 0.6 per cent per annum. From 1990 to 2000 average birth rates for the OECD countries fell from 14.3 per 1000 population to 12.4 (3). This reduction has occurred as the first wave of baby-boomers reaches retirement. As a result, under current employment and retirement strategies, more people in many OECD countries will be leaving the workforce than will be joining it (4). A global study by the Boston Consulting Group in 2003 estimated a shortfall in skilled labor worldwide of the order of 60 million by 2020. The US will face a labor shortage of 17 million; Japan 9 million; China 10 million; Russia 6 million; Germany 3 million; France 3 million; Spain 3 million; the UK 2 million; and Australia 500 thousand. In 1998, research by McKinsey and Coauthored by Michaels, Handfield-Jones and Axelrod, 2001, involving 77 companies and almost 6,000 managers and executives in the US highlighted the importance of the coming skill shortage crisis (5). Michaels et al. identified that the principal corporate resource in the next two decades would be talent. They warned that this resource would become more difficult and costly to find, pointing out that 75 per cent of organizations in their survey either did not have enough talent or were chronically short of talent. These scenarios have been challenged in the academic literature. Cappelli (6, 7) and Critchley (4) for example, acknowledge the changing demographics but argue that the critical flaw in the scenarios suggested above is that they assume employment strategies and relationships will not adapt accordingly. As Cappelli argues: Many of the studies that foresee labor strategies in the future assume retirement patterns will be unchanged, and that people will retire at the same age even as life expectancy and the ability to work longer go up. Surely this is unrealistic for other reason than financial resources for retirement may not allow it (8).

2.2 Talent attraction and retention

Critchley argues that a fundamental rethink of the retirement concept in advanced market economies is required to re-engage the post-50 age sector of the workforce (4). What both Michaels et al., and their critics (i.e. Cappelli and Critchley) do agree upon is the need for more creative (or resource intensive) human resource practices to attract and retain this talent. At the individual level, a further

issue emerging in the academic literature linked to tightening labor markets is the changing psychological contract within the employment relationship (9). Increasingly the academic literature is observing that employees with transferable (in demand) skills will look for employability not employment and will want to change jobs often (10, 11). These workers, also known as gold-collar workers because of their status in the labor market, are characterized as having high level specialist skills with the ability to apply these skills to issues and problems critical to organizational sustained advantage (12). The fundamental characteristic with these workers in the changing labor markets is that they own the means of production, in the form of knowledge, and have the ability with these specialist skills to attract large rewards. As such they are career focused, potentially highly mobile, and lured by jobs that offer challenges or opportunities for self-development (13). The management of these critical resources therefore assumes greater significance. As Newell, Robertson Scarbrough and Swan note, the term 'gold-collar worker' implies that these workers need to be managed carefully and be provided with excellent working opportunities (14). Newell et al. have also argued that it is not possible to develop competitive advantage without consideration of these human resources that form the core of a firm's knowledge base (15). From a human resource perspective the management of these human resources throws out particular challenges to organizations that base their advantage on these 'managed' resources and the knowledge they embody. Reflecting the resourced-based view perspective it is argued that organizations need to thoroughly reconsider their employment systems, practices and organizational structure to ensure they capture and retain this unique resource (16, 17, 18).

In addition, there is an expectation that an organization will play a part in not only securing employment but in upgrading employees' knowledge, skills and ability, so that these workers remain in demand in the wider employment market. Whilst the concept of job-hopping may become the norm, paradoxically it may be a factor in at least reducing the turnover (through on-going skill acquisition) and making the organization an 'employer of choice' to return to or recommend to other highly skilled workers as organizations that provide on-going development opportunities for these increasingly discerning workers (19, 20, 21, 22). From a resource-based perspective, the way organizations attract, develop and retain these human resources will have to change. Research indicates that organizations that are prepared to focus on developing talent will be in a stronger position to retain key employees as the so-called 'war for talent' intensifies (23, 24). The need to develop talent and become an employer of choice. Therefore, places the human resource professional and their policies and practices at the center of organizational systems to achieve these outcomes and promoting the organization as an employer of choice.

2.2.1 Talent attraction

This area includes three major activities: developing human resource reputation; attracting individuals with interest in international work; and recruiting vis-a-vis positions. Studies on human resource reputation, which refers to a shared evaluation by stakeholders of an organization's human resource philosophies, policies, and practices (25), have examined why an organization's human resource reputation has become an increasingly significant aspect of building organizational

capabilities (26). A few studies have focused on how organizations develop a compelling recruitment brand or human resource reputation necessary for attracting talent from diverse populations (16, 27, 28).

In addition to human resource reputation, research in this category has looked at a similar concept of organizational attractiveness and how this concept has become an important action for most organizations with respect to attracting talent (29). Several studies have focused on identifying and examining factors at the organizational (e.g., size) and individual (e.g., personality) levels that influence potential applicants' attraction to multinational enterprises (MNEs) (30).

Another possible policy for MNEs is to attract individuals interested in international work as well as those interested in permanent international careers (31). Scholars in the area of international careers (32, 33, 34) as well as in global staffing (35) have identified antecedents, covariates, and consequences of attractiveness to international work/careers such as self-efficacy, marital status, and family attachment (36, 37).

Finally, research in this category has examined how organizations use a talent pool strategy: the company recruits the best people and then selects them for positions rather than trying to select specific people for specific positions. Following the talent pool strategy MNEs remain committed to being very selective in hiring (38).

2.2.2 Talent retention

Articles in this category have focused on two major policies: reducing repatriate turnover and increasing employee engagement. Several studies have examined how global assignments have become an integral part of individuals' careers and, for most companies, an indispensable tool for attracting, developing and retaining talent – the issue of repatriate turn-over continues to be an important concern for many MNEs (39, 40, 41). Other studies in this area have focused on identifying factors that can facilitate the retention of individuals when they return back. These factors can include satisfaction of repatriates with the repatriation process (42), perception of justice (43), and availability of repatriation practices perceived important for successful repatriation (44). Finally, research on employee engagement has examined how and why increased levels of engagement in global firms promotes retention of talent, fosters customer loyalty and improves organizational performance and stakeholder value (45). Furthermore, studies have looked at universal practices to effectively promote engagement such as the need to be aware of country, regional and cultural differences when designing employee engagement and commitment initiatives (45).

2.3 Talent policy development status in different countries

2.3.1 Talent Development Practice in U.S.A

After more than 200 years of foreign expansion, the United States has taken a leading position in the economic, military, and cultural fields. The United States' national competitiveness ranks 31st in the 2014-2015 Global Competitiveness Report released by the World Economic Forum, and its economic aggregate has long been the largest in the world (46). At the same time, the US market economy is very mature, with a relatively complete welfare system, higher education and income levels, and a better foundation for talent development (47).

2.3.1.1 Talent competition strategy

As one of the most developed countries in the world, the United States has different talents at different stages strategy. For example, the talent strategy in the early immigration stage of the United States is "all people are talents"; the talent strategy in the Western Development Period is to attract people with property rights, subsidies, and legal protection benefits on the one hand, and use optimized systems to encourage them (48). People give full play to their talents; the talent strategy during the “World War II” was to concentrate and support the use of talents and resources for intensive scientific and technological research. The “Manhattan Project” implemented in this period was an important sign; the talent strategy after the “World War II” was to pay attention to scientific and technological talents including Veterans training (49). In the competitive stage after the successful launch of the Soviet Sputnik satellite, the US’s talent strategy is “highly concerned about the country’s support for science and technology”. The talent strategy from the 1990s to the beginning of the 21st century is to rely on the private sector strengthening the national competitiveness of automobiles and electronics. After entering the global competition for innovation and entrepreneurship, the United States has continuously increased its emphasis on science, technology, engineering, and mathematics (STEM) talents, and expanded the introduction of foreign STEM talents (50). The "STEM Education Strategic Plan (2013-2018)" was formulated, and the "U.S. Innovation Strategy" was released in 2009, 2011, and 2015, respectively, to deploy the training and reserve of talents in the STEM field to maintain and improve the United States’ international Competitiveness.

2.3.1.2 Talent training system

As early as the 1960s, the United States has paid great attention to scientific and technological innovation theory and innovation.

Cultivation of new talents. The first is to focus on establishing a sound talent training model, adhering to the concept of education prioritizing development, strengthening legal and institutional guarantees that are conducive to the development of education, and promoting innovation in the university education system. It aims to realize the combination of in-class and extra-curricular, science and humanities, teaching and research, forming a systematic and complete practice system including engineering practice and entrepreneurial practice, effectively improving students' independent innovation ability. The second is to increase the reserve of young innovative talents. For example, the Navy established the "Young Researcher Program", the National Science Foundation

established the "Presidential Youth Research Award," and supported universities and private research institutions to establish funds (51). Through these talent training programs, we will train young researchers with doctoral degrees and guide the best talents to enter the fields of science and engineering that are urgently needed by the country. The third is to increase funding for scientific and technological talents. In 2009, the U.S. government substantially increased the budget of the three basic research funding agencies of the National Science Foundation, the Office of Science of the U.S. Department of Energy, and the National Institute of Standards and Technology. The patent approval cycle further strengthens the ability of basic research to attract talents.

2.3.1.3 Talent introduction policy

In the development history of the United States for more than 200 years, the government has always based on national interests and requirements.

To formulate, promulgate, revise, and adjust immigration policies, and determine the principles for dealing with immigration. The immigration system of the United States pursues flexible and diverse immigration policies, and at the same time has distinctive pragmatism and utilitarianism. For example, the United States has not only set up temporary work visas to respond to short-term talent needs and the circulation of talents, but also set up labor visas to ensure that immigrants and local talents complement each other, and at the same time prevent some "temporary residents" from becoming permanent residents becoming a burden for national development. The American scholar Aristide Zorberg pointed out, “According to the myths rendered by the country, the United States has been opening its doors to people all over the world for many years, providing everyone in need with a harbor and various opportunities to escape the storm. However, Various social and economic interest groups manipulate immigration policies to meet the needs of serving 'a designed country'. As for the world's top "outstanding talents" in various fields and talents in the US "national interest", there are no restrictions (52). Getting a green card directly reflects the original intention of the United States’ policy of “only welcoming talented immigrants”. At the same time, the US immigration policy focuses on combining "educational qualifications" and "skills" screening, and differentiates treatment according to the level of talents, reflecting the values of freedom, openness, and diversity.

In the United States' immigration policy, there are three ways to learn from: first, the continuous improvement of the immigration legal system. Since the 1952 edition of the US "Immigration Act", it has begun to favor highly-educated and outstandingly needed talents, stipulating that 50% of the immigration quota should be used to introduce such talents. In the subsequent revisions of the "Immigration Law" in 1965 and 1990, immigration priority levels were also delineated to meet market demand in a targeted manner. The second is a strict professional immigration examination and approval system. The United States does not implement a point-evaluation immigration system, but it has detailed identification standards for talent categories, strict approval procedures, and a labor certification system. It ensures that the immigration policy introduces “outstanding talents”, talents who can create job opportunities, and Talents whose national interests are helpful in the

United States may form complementary talents with native American talents. The third is an efficient temporary work visa. Temporary work visa (talent visa) is the most important category in the US visa system. In order to cope with the growing shortage of talents, the US government continues to increase the number of talent work visas issued. In recent years, the United States has issued 85,000 talent work visas (H-1B) each year. Non-US employees holding talent visas account for about 8% of the total US employees. The main source countries are India and China and cover 80% of the world. In countries, 75% of these certificate holders graduated from American universities.

For foreign students studying science, technology, mathematics, and engineering who have obtained a master's degree or above in the United States, even if the temporary work visa quota is full, 20,000 places can be specially approved each year. The fourth is to open world-class universities to attract top students from all over the world. According to statistics, the United States invests in higher education accounting for 40% of the total global investment in higher education (53). The quality of higher education and the number of world-class universities rank first in the world. It has always been the country with the largest number of foreign students in the world. The National Science Foundation (NSF) has established various awards to attract international students, and various academic committees have set up corresponding scholarships helps international students concentrate on learning and scientific research.

2.3.1.4 Talent laws and regulations

The national laws of the United States are relatively complete. As early as the 13th Amendment to the Constitution in 1865, the provisions are made to prohibit forced labor. Since then, the labor law in the United States has gradually been completed and has continuously adapted to the mobility and employment of various types of talents within the country (54). The current laws related to the mobility and allocation of talents mainly include National Labor Relations Act, Social Security Act, Fair Labor Standards Act, The Law on Equal Pay for Equal Work and the Age Discrimination Law have guaranteed the rights and obligations of employees through national legislation. On August 2, 2007, the United States Congress passed the America Creating Opportunities to Meaningfully Promote, Excellence in Technology, Education, and Science. The content of the bill focuses on maintaining the basic areas of American innovation, focusing on "technical innovation" and "talent training", and invests in federal and state government funds and research foundations from increasing research investment, which increased educational opportunities, and built a foundation for innovation (55). Detailed regulations on facility construction support, etc. are of great significance to the future foundation of American scientific and technological innovation and the cultivation of high-level talents (56).

2.3.2 Talent Development Practice in Canada

As a traditional economically developed country, Canada has a good economic foundation. Its GDP ranks around 10th in the world over the years, and its productivity is second only to the United

States. Its economy is resource-processing, technology-intensive, highly internationalized in the market, and industrial layout. High concentration and other characteristics. At the same time, Canada has a relatively high social tolerance and a relatively complete social security system (57). It has certain advantages in terms of public security environment, high welfare level, developed education system, beautiful ecological environment, and harmonious labor-management relations. The governance of talent development in Canada is as follows.

2.3.2.1 Talent competition strategy

The Canadian federal government and local governments have launched a series of overall and long-term strategies and plans for talent cultivation, attraction, and residency. Due to the difference between government operations and administrative management concepts, the Canadian federal government and local governments have not formulated planning documents under the name "talent development strategy". However, this does not conclude that Canada does not have a talent development strategy (58). In 2002, Canada formulated an "innovation strategy" to maintain its strategic advantages in science and technology in the world. This strategy proposed to build Canada into a country with the most innovative capabilities and spirit of innovation. The strategy is based on "Canada's Advantages: Building a Strong Economy for the People", "Pursue Excellence: Investing in People, Knowledge and Opportunities", "Knowledge Is Essential: Canadian Skills and Learning", "Promoting Science and Technology: Demonstrating Canada's Advantages", etc. Supported by the document, the goals and paths of Canadian elementary education, higher education, vocational education, and immigration training are planned, which constitute an action plan for guiding the development of technology and education in Canada and are also an important strategic plan for talents in Canada.

2.3.2.2 Talent training system

Canadian governments and institutions at all levels attach great importance to labor at all stages of development. Power’s international competitiveness. As early as 1980, in the National Training, it was clearly stipulated that the federal government would help the unemployed and skilled workers to improve their skills by purchasing courses, paying tuition fees, and providing subsidies, and provided support for industrial training organized by employers. Since then, Canada has initiated the implementation of a national training strategy, uniting with the private sector to focus on providing training to people with the most urgent needs for skills. In 2008, Canada launched the "Learning Canada: 2020" plan to further build a pillar system for lifelong learning in Canada, which is divided into 4 categories according to "early childhood-elementary and middle school-post-secondary higher education-skills development and adult education" Stage push Active lifelong learning. At the federal government level, “Canada’s Economic Action” was implemented Plan", Youth Employment Strategy, Aboriginal Human Resource Development Strategy, etc. (59). At the same time, the Council of Ministers of Education, the Ministry of Human Resources Development and other institutions have jointly participated to form a full chain and all-round talent training and development system (60).

2.3.2.3 Talent introduction policy

As a traditional immigration country, Canada is mainly descended from Europeans such as Britain and France.

Multi-ethnic integration and multi-cultural integration have become Canada’s advantages in attracting talents from different ethnic groups and cultural backgrounds. In recent years, Canada's fertility rate has remained at a very low level, but the population can maintain a steady growth, mainly relying on the rapid growth of the number of immigrants. One is to implement the points system for immigration (61).

Canada is the first country to adopt the points system to accept immigrants. The federal government adjusts immigration policies in a timely manner based on market needs. Immigration agencies score applicants based on immigration policies to ensure that the immigration work is objective and fair, and can effectively meet development requirements. Canada has created a provincial nominated immigration system and implemented a provincial nominated immigration plan according to the different conditions of its provinces to ensure that the talents introduced are needed by the provinces.

The second is an export-oriented skilled migration policy. Canadian immigration policy is based on public opinion and humanistic environment (62). Applicants only need to meet the requirements of the points evaluation standard set by the Canadian Citizenship and Immigration Department, and do not need to obtain a work permit in advance; however, applying for a non-immigrant work visa requires a work permit; at the same time, staying resident students and outstanding foreign workers also set up experience category immigrants.

The third is a complete set of talent introduction institutions. Canada’s departments for talent introduction include Citizenship and Immigration Canada, Employment and Social Development Canada, and Industry Canada. Among them, "Citizenship and Immigration Canada" is responsible for managing the immigration of foreigners to Canada, visiting, working or studying in Canada, and immigrating into Canadian society; "Employment and Social Development Canada" is responsible for making statistics and formulating standards and instructions for hiring overseas talents; "Industry Canada" Responsible for the management of research awards and scholarship programs (63). For example, Canada Research Chairs Program, Canada Excellence Research Chairs Program and Vanier Canada Graduate Scholarship are regulated by Industry Canada.

The fourth is a precise recruitment policy. The key groups accepted by Canadian immigrants are highly skilled talents, investors, and foreign students. Scientific research talents and entrepreneurial talents are the top priority. Canada’s talent introduction policy reflects six characteristics: protection of the rights and interests of domestic scientific research talents, preferential treatment of high-level and urgently needed scientific research talents, open and fair competition mechanism, benefiting top talents and tomorrow stars at the same time, strict dual exit mechanism, human nature an integrated review process. Canada publicly published Hiring Foreign Academics description and Special hiring

criteria on the website of the Ministry of Employment and Social Development and formulated a tax deduction policy for overseas scientific research talents. For example, in Quebec, where taxation is relatively high, foreign university professors and foreign postdoctoral researchers are subject to special income tax reductions. The maximum exemption period for foreign postdoctoral researchers is five years, the first two years are exempt, and the third year is reduced by 25% each year (64). In addition, Canada has also set up awards and special programs to attract talents. Because Canada is adjacent to the United States, the high income and career prospects of the United States have caused the loss of Canadian technicians, high-tech talents and international students. For this reason, the Canadian government established the "Prime Minister's Scientific Research Excellence Award" to reward Outstanding scientist returning to serve in Canada.

2.3.2.4 Talent laws and regulations

Canada has formed a relatively complete legal support system in terms of talent introduction and protection. In terms of ensuring the peace of mind for foreigners to work and life, the "Canada Immigration and Refugee Protection Regulations" and "Foreigners Temporary Entry Work Plan" were issued; the Canadian Labor Code, the Employment Equality Act, and the Employment Insurance Act were formulated to protect the employment rights of workers (65). "Trade Union Law" and so on. However, because each province has the right to formulate relevant labor policies, inter-provincial employment still faces barriers. In order to break the problems of inefficiency and high transaction costs caused by local protectionism, the Federal Government and the provincial governments signed an Agreement on Internal Trade in July 1994 to regulate activities such as inter-provincial labor transfer (66). On June 20, 1996, the Canadian Parliament passed the "Domestic Trade Agreement Implementation Act", which further clarified the issue of labor mobility and ensured the free flow of talents in various provinces and regions in Canada (67). In August 2009, Canada further revised the "Domestic Trade Agreement", and the smooth flow of talent between provinces was finally fully realized.

2.3.3 Talent Development Practice in Japan

2.3.3.1 Talent competition strategy

Japan has always attached importance to the reserve of international talents. In the 1980s, the Japanese government established the 21st Century International Student Policy Committee (68). In 1983, it proposed the goal of accepting 100,000 international students in the 21st century. In 2008, Japan also proposed the "300,000 International Student Program". The goal is to increase the number of international students to 300,000 by 2020, with the focus on strategically attracting outstanding international students from Asian countries; subsequently, Japan implemented the "30 International Universities" project (referred to as the Global 30 project), which selected 30 universities Build an international university base, subsidize universities to carry out English teaching, improve the system for accepting international students, promote international cooperation and cultivate international talents, and use these universities as carriers to introduce outstanding scientific and

technical personnel and international students (69). In addition, Japan emphasizes the goal of attracting talents through cooperation with foreign scientists. In 1988, Japan's Science and Technology Agency established the Science and Technology Promotion Agency to implement the Science and Technology Agency Fellowship system to support national scientific undertakings and research institutions in hiring outstanding foreign talents (70). In May 2007, Japan promulgated a strategic plan to promote innovation by Innovation 25, focusing on establishing basic research projects to attract world-class high-level talents, strengthening international scientific research cooperation in the environment and energy fields, and promoting Japanese scientists to participate in international project research. A series of measures aimed at making Japan an advanced and innovative country in the world by 2025 in order to cope with aging and international competition (71).

2.3.3.2 Talent training system

This Constitution stipulates that all citizens have the equal right to receive education. In 1943, Japan established the Scholarship Foundation and began to implement the scholarship system. At the same time, local public organizations, public welfare corporations, schools, and enterprises also developed a scholarship system for cultivating talents. In terms of vocational education, Japanese schools undertaking vocational education include post-secondary vocational schools, junior colleges at the higher education stage, technical colleges, vocational schools, and full-time graduate schools (72). At the same time, Japan attaches great importance to higher education, continues to increase its degree of internationalization, and puts forward the goal of doubling the investment in the next generation. These educational investments are used to increase educational cooperation with other Asian countries and provide more for Japanese students. Get more exposure to foreign education opportunities (73). At the same time, many projects have been vigorously established to fund scientific and technological talents.

2.3.3.3 Talent introduction policy

In terms of funding for the introduction of talents, Japan has implemented the "Foreign Special Researcher System" to attract young foreign PhD researchers to conduct research in Japanese academic research institutions and provide generous research fee subsidies (74). For example, the "Free Research Program" of the Japan Science and Technology Association provides 200 scholarship programs for foreign postdoctoral fellows and 70 scholarship programs for senior foreign scientists each year. Similar programs include the "Strategic Research Program" of the Japan Science and Technology Agency. However, such projects are relatively few, mainly funding projects that are consistent with national strategies such as low-carbon society, advanced materials, and cutting-edge immunology. In terms of improving the environment for scientific research and entrepreneurship, as early as the 1960s, Japan had built a science city to attract and retain talent (75). For example, the Tsukuba Science City has played a role in attracting overseas talents in Japan, but the Tsukuba Science City is not ideal in the integration of production, education and research and the transformation of scientific and technological achievements, and the effect of gathering

entrepreneurial talents is not obvious (76). In terms of attracting international students, Japan pays attention to attracting international students through the use of schools and enterprises and increases investment in undergraduate and graduate education in the higher education sector to make its software and hardware facilities more international. In June 2011, the Japanese government invested 1.3 billion yen in launching the "Asian Campus Project", which established a cooperative education project for mutual recognition of tuition, unified management of academic performance, and unified degree award among high-end educational institutions in China, Japan and South Korea, and promoted the development of students from the three countries. Cross-border movement. By the end of 2011, there were 5 Japanese universities including the University of Tokyo and Nagoya University, and 8 Chinese universities including Tsinghua University and Peking University.

Eight Korean universities including students from Seoul University and Korea University participated. In terms of talent introduction management, Japan implements a foreign talent scoring system. In January 2010, the Ministry of Justice of Japan proposed a preferential treatment system for attracting foreign senior talents (77). In July 2012, it officially issued a scoring policy for attracting outstanding scientific and technological talents, focusing on attracting science, technology and medical treatment. Senior talents. At the same time, Japan has simplified the foreigner management and entry-exit system, extended the residence period of talents, and enjoyed the relaxation of permanent residence permit restrictions for foreign professional and technical personnel working in enterprises and research institutions.

2.3.3.4 Talent laws and regulations

From 1945 to 1947, Japan successively enacted the "Trade Union Law," "Labor Relations Adjustment Law," and "Labor Standards Law." To ease labor-management conflicts, the "Minimum Wage Law", "Employment Measures Law", "Domestic Labor Law", and "Gender Equality Law" were issued. In terms of promoting the employment and free flow of scientific and technological talents, the "Research and Exchange Promotion Act" was enacted in 1986, and the "Research and Development Capability Strengthening Act" was promulgated in 2008, which made detailed provisions on the promotion of Japanese talent strategy, with special emphasis on ensuring the rational allocation of capital investment (78). Government focused on financial support for large-scale scientific research institutions, providing young and outstanding talents with convenient research, development conditions, and promoting talent exchanges between scientific research institutions and universities.

2.3.4 Talent Development Practice in South Korea

2.3.4.1 Talent competition strategy

In the early 1980s, South Korea formulated the strategy of "building a country through science and technology", planning technological development through science and technology plans. The implementation of these plans created sufficient jobs and indirectly played a role in attracting talents.

In 1999, South Korea launched "Brain Korea 21". Through the reform and improvement of the higher education system, it concentrated human, financial and material resources to support a group of universities to build world-class graduate schools and local excellent universities, so as to improve the quality of higher education and scientific research capabilities and cultivate the goal of high-level talents and national pillars. World Class University was implemented in 2005, and 165 billion won was invested annually from 2008 to 2012 to hire internationally renowned foreign scholars to teach (79). In 2012, the "Intellectual Return 500 Talents Program" was launched. After 4-5 years of hard work, it plans to attract about 500 overseas high-level talents, including the world's top scientists, to return to work in Korean research institutes around 2017 (80).

2.3.4.2 Talent training system

South Korea has continuously adjusted the focus of its national personnel training policy. For example, in the 1960s, South Korea focused on talents in the light industry field, in the 1970s it focused on high-level technical personnel in the fields of heavy industry and chemical industry, and in the 1980s, it focused on the intensive field of cutting-edge industrial technology. High-level scientific and technological talents are needed as the focus, and in the 1990s, high-tech talents who can develop new technologies will be the focus (81). 6 In 2002, South Korea invested 224 trillion won and launched the "National Strategic Talent Training Comprehensive Plan". The goal is to train and develop 400,000 high-quality talents in the six fields of information, nanotechnology, aerospace, bioengineering, environmental engineering, and cultural industries. Talents, including 220,000 current students, scientific research talents from research institutions, and 180,000 new talents (82). South Korea also organizes research talents in domestic universities through the implementation of the "Project for the Establishment of Excellent Research Centers", strengthens basic research, and trains senior talents. In addition, South Korea is vigorously strengthening elite education based on the high school stage and cultivates top-notch innovative talents through the establishment of professional elite high schools and strengthening of English education (83).

2.3.4.3 Talent introduction policy

South Korea has continuously launched employment and scientific research-oriented talent recruitment programs. In terms of attracting talents to return to China, as early as 1968, the Korean government provided living allowances such as transportation and lodging expenses for returning scientists and engineers. Subsequently, South Korea focused its talent recruitment policy on labor employment environment and salary increase. In 1994, the South Korean government implemented the "Talent Reserve" project to support research institutions to hire overseas scientists and engineers with high salaries and encourage universities and research institutions to return to the country. Doctors provide post-doctoral positions, and later include domestic post-doctoral fellows working overseas to cultivate and reserve a group of young scientific and technological talents. The “World-Class Research Institutions Program” was launched in 2009, and 12.2 billion won was invested in recruiting high-end talents from abroad to serve as heads of Korean scientific research institutions. It is stipulated that 50% of the researchers in these funded research institutions must

have an international background. With funding from this project, South Korea has hired three research institute directors from Harvard University, Duke University, and University of San Diego. In terms of attracting international students, the Ministry of Education and Technology of South Korea formulated the "Learning in South Korea" project in 2004, aiming to make South Korea an education center in Northeast Asia by attracting international students. In 2010, South Korea concentrated the scholarships provided by the central government into the "Global Korean Scholarship Program" and selected outstanding students for scholarship funding through overseas Korean representative offices and university admissions processes (84). In 2012, the Ministry of Information and Communication Industry of South Korea launched the "Korea Government Information Technology Scholarship Program" to attract IT majors to study in South Korea. 7 In terms of visa and residence policies, it is stipulated that international students can stay and work in South Korea after graduation. The main career directions supported include university lecturers, foreign language teachers, researchers, technical support personnel, professional skilled personnel, art and entertainment, or special design talents.

2.3.4.4 Talent laws and regulations

In 2003, with the continuous influx of foreign workers, South Korea passed the "Law on Employment of Foreign Workers, etc.", allowing Korean companies to legally use foreign workers for the first time. The "Health Insurance Law Amendment" was passed in June 2005, and the "Law on Employment of Foreign Workers, etc." was revised and improved in 2012. It was proposed to establish a special agency to deal with the employment of foreign workers and to ensure employment opportunities for domestic workers. Basic prerequisites, compiling a directory of foreign job seekers, stipulating the rights and obligations between employers and employees, etc.

Regarding the entry of foreign high-tech talents, South Korea's revised Nationality Law in 2011 allows foreign nationals to have dual nationalities at the same time and stipulates those foreign talents are no longer subject to the requirement of staying in Korea for more than 5 years and the naturalization test restrictions and can apply for naturalization at any time (85).

2.3.5 Talent Development Practice in UK

2.3.5.1 Talent competition strategy

The UK is one of the most important technological powers in the world. Its talent competition strategy is not a system, but is scattered in different periods of education, technology, innovation, research and development, talent attraction and retention policies and strategic planning. Since the 21st century, the UK has formulated a series of strategies and policy measures on talent development (86). The British talent competition strategy focuses on basic scientific research, an open and relaxed immigration policy, attracts high-tech talents, and focuses on the division of labor between the government and enterprises and agencies.

2.3.5.2 Talent training system

British talent training is divided into five stages: early education, elementary education, secondary education, continuing education and higher education. The UK is one of the most developed countries in the world with higher education. It has a relatively clear orientation for talent training. Expanding the scale of education and creating a more efficient and diversified education system are the current strategic priorities of higher education in the UK. Undergraduate education in the UK highlights specialization and vocationalization. Universities have a high degree of autonomy and can flexibly design and adjust undergraduate education majors and courses; postgraduate education takes both academic and professional training into account (87). The United Kingdom is regarded as the birthplace of global innovative scientific research and has always attached great importance to the cultivation and development of innovative scientific and technological talents. From the perspective of talent structure, the proportion of scientific and technological talents and professionals in the fields of biology, finance, medicine, education, etc. ranks among the top in the world. The United Kingdom actively participates in EU scientific and technological cooperation, establishes a global innovation network to gather global scientific research talents, actively establishes national-level supporting plans and measures, implements the "University Pension Plan" to provide pensions for scientific researchers working in the UK, and establishes the "Athena Swan" "Bonus" to encourage women to participate in scientific research. The British government also encourages and promotes the joint development of scientific research and technology by researchers in government laboratories and universities, attaches importance to technical training for SMEs, and subsidizes technological progress, product upgrades and technological development of SMEs, so as to promote the transfer of scientific research and technological achievements to SMEs (88). Relying on sustained and stable investment in scientific and technological research and development, coupled with its central position in the economy and technology of the European Union, the United Kingdom has become an important gathering place for scientific researchers in the European Union.

2.3.5.3 Talent introduction policy

In terms of talent introduction agencies, the main departments related to talent introduction in the UK include the Ministry of the Interior and the Ministry of Foreign Affairs and Commerce. Home Office is responsible for the management of immigration affairs. Its subsidiary UK Border Agency is the source agency for management of international talents. It is mainly responsible for border security, immigration management, immigration policy formulation, immigration approval, residence, naturalization and refugee protection, etc. Migration Advisory Committee, as a non-statutory and non-contractual non-governmental organization, provides advice to the government on immigration policies (89). In addition, UK Trade & Investment indirectly participates in foreigners' trade and investment in the UK, helping foreign investors provide information and suggestions including human resources. In terms of the policy system, the United Kingdom introduced the "British High-skilled Immigration Policy" and implemented a new "Points and Points System (PBS)" immigration system based on market demand, dividing entry visa categories into: Highly Skilled Persons, Skilled people, low-skilled people and temporary jobs. In

August 2011, the United Kingdom launched the "Outstanding Talent Visa", entrusting a world-renowned evaluation agency to jointly monitor and review with relevant departments (90). Those nominated by the evaluation agency and able to obtain the "Outstanding Talent Visa" can travel to the UK without obtaining a guarantee. This policy encourages and guides outstanding talents in the fields of science, humanities, engineering and art to develop in the UK. In terms of attracting international students, although the UK has world-renowned universities such as Oxford and Cambridge, and many international students, it still adopts various measures to attract more international students to study in the UK. The government has established a special national committee to analyze the share of the domestic international student market in the world market and national capabilities and interests; it has established a series of talent awards and funding schemes to attract outstanding foreign students to the UK for higher education and attract outstanding foreign young and middle-aged talents to the UK. Academic research covers the whole process of supporting innovative talents; and encourages companies to provide as much sponsorship as possible to attract high-level overseas talents through scholarships.

2.3.5.4 Talent laws and regulations

The UK attaches great importance to the construction of national legislation. In terms of improving the skill level of the labor force, a series of laws and white papers have been formulated and released successively, including the Further Education and Training Act 2007, Education and Skills Act 2008, etc.; in terms of regulating the labor market, Employment Equality (Age) Regulations 2006, which is right The "Labor Law" and the "Employment Promotion Act" have been further improved, and a strict legal system has been formed with the Equality Act, which has promoted employment and the flow of skilled personnel between England, Scotland, Wales and Northern Ireland (91). In terms of the introduction of overseas scientific and technological talents, in 2009, Parliament passed Borders, Citizenship and Immigration Act 2009, which is the fourth UK immigration law. This law stipulates that even if you study in the UK and find a job and stay in the UK for 10 years, you must meet high-level requirements. Talent standards can be used for naturalization (92).

2.3.6 Talent Development Practice in France

2.3.6.1 Talent competition strategy

At the beginning of the 21st century, affected by the international and regional economic situation, the French economy continued to decline, and the entire society's R&D investment was insufficient, resulting in a relatively high level of unemployment and a trend of outflow of some high-quality talents. In this context, in 2001, the French government formulated the "Scientific Recruitment and Prediction Ten-Year Plan (2001-2010)" to promote the joint collaboration of industry, university and research among universities, scientific research institutions and enterprises, and enhance the attractiveness of talents by improving scientific research competitiveness. At the same time, France has gathered top talents by taking the lead in the implementation of large scientific projects. In 2003,

France established the world's largest particle accelerator, the Large Hadron Collider, has more than 3,000 scientists from nearly 80 countries and regions participating in the project (93). In 2005, the "Nano International R&D Cooperation Program" organized by the French National Research Center attracted France, Switzerland, and Germany. Many high-end talents in the nano field from universities and research centers in Japan, South Korea, and Finland participated; in 2005, the French National Research Center and the European Organization for Nuclear Research reached an agreement to attract and use the intelligence of international organizations through the mutual recruitment of research talents between the two organizations resource. In addition, the French National Center for Scientific Research (CNRS) has established strategic partnerships with third-world countries in the seventh round of the European framework plan, inviting top scientists from relevant countries to go to Europe for collaborative research, and providing scholarships and funding for scientists participating in project exchanges (94). Job opportunities to promote the flow of high-level talents between France and these countries.

2.3.6.2 Talent training system

From the perspective of educational philosophy, France has unified teaching methods in the pre-school, elementary and junior high school stages, prohibiting any form of talent education; high school stages have begun to differentiate, allowing students to choose talent education; comprehensive universities for popular education and universities for elite education coexist at the same time, higher education Education is completely dual-track (95). With regard to the development of high-level talents, by intensifying the reform of scientific research institutions, increasing the autonomy of colleges and universities, and increasing the enthusiasm for scientific research and academic activity of talents (96). French National Center for Scientific Research is the largest national research department in France and maintains very close collaboration with universities and other higher education institutions. Three-quarters of the laboratories are located in universities and half of the staff work in universities. In terms of financial investment, the French government has set up the "National Reward Fund for Returning Overseas Researchers" under high financial pressure. Top academic leaders who return from overseas can receive a special reward of 200,000 euros. In 2007, the French National Agency for Scientific Research and the Supreme Science Council were established. In early 2009, France further launched measures to attract outstanding overseas scientific research personnel (97). It selects 130 young researchers and teachers each year and grants 6000-15000 Euros per year for five consecutive years.

The funding and part of the scientific research funding to attract outstanding talents to devote themselves to education and scientific research.

2.3.7 Talent Development Practice in Germany

The population of Germany has continued to grow negatively since 1985. At present, we are facing problems such as the declining birth rate, the worrying quality of youth education, and the

reduction of the attractiveness of high-level talents. There are mainly the following measures in the development of talents.

2.3.7.1 Talent competition strategy

Germany's talent strategy has always been closely linked to the international situation and the country's demographic changes. In the 1950s, Germany ushered in a wave of immigrants. The main motivations for immigration were escape, asylum, work, family reunion, and education. By 2009, the number of foreigners in Germany reached 7.1 million (98), and 8.4 million had immigrant backgrounds. Some institutions predict that with the aging of the economy and the transformation of the economic structure at the beginning of the 21st century, there will be a gap of 480,000 German professionals. According to this, the German Federation implemented a "high-tech strategy" in 2006, focusing on attracting innovative senior talents from all over the world. In July 2010, Germany promulgated the "Thinking, Innovation, Growth and German High Technology Strategy 2020" to meet the demand for talents and cutting-edge technologies in important key fields through personnel training and introduction. In 2002, the government published a national strategy on sustainable development under the title "Prospects for Germany" (99). At the same time, reform the old immigration policy and introduce overseas talents by adding skilled immigration categories, encouraging investment immigration, and recognizing dual citizenship. It will also attract international students as part of the national strategy to enhance Germany's R&D and innovation capabilities and increase its attractiveness to research talents in the BRICS countries.

2.3.7.2 Talent training system

It is a German tradition to attach importance to and develop education. At the beginning of the Second World War

In the early days, basic education in Germany was restored and rebuilt. In 1949, the Federal Government promulgated the Basic Law, established the Education Committee to be responsible for the overall study of German education, and formally stipulated the implementation of a decentralized education management system. In terms of the educational system, Germany is the first country to implement compulsory education. It implements 12-year compulsory education. While continuously introducing new policies in the field of basic education, it vigorously develops vocational education and higher education to train professionals and senior talents, especially in vocational education. It is relatively mature, and the dual education system implemented has gone through hundreds of years of development, laying a decisive foundation for maintaining Germany’s innovation capabilities and supporting economic growth. In order to ensure that the country reserves sufficient human resources and eliminate the talent bottleneck, under the framework of the high-tech strategy, to further increase the investment of talents, Germany has successively implemented the "Employment and Stability Package" to achieve take-off through education (100). "Work migration is a guarantee for German professionals. A series of talent development and mobilization plans such as "Basic Contributions". In order to support the growth of scientific and technological talents, in order to mobilize the

enthusiasm of scientific research and innovation of universities, scientific research institutions and corporate researchers, and promote the transformation of scientific research results, Germany has successively faced universities, society, and large public scientific research institutions. With private for-profit technology transfer intermediaries, patent information service agencies, and technology transfer service departments, as well as a large number of innovation and entrepreneurship centers, incubators, and technology parks, continuously improve the technology transfer system that combines government guidance and market promotion. In addition, the Germany implementation of the special plan to promote and protect the marketization and industrialization of talent innovation achievements and the "Commercial Creative Protection Plan", provide consulting services and financial support for patent application protection for universities, scientific research institutions, small and medium-sized enterprises and independent inventors, and optimize talents Development environment. In terms of lifelong education, German continuing education focuses on practicality and participation by all citizens (101). According to statistics from the German Federal Ministry of Education, in 2000 only about 25% of German citizens received continuing education internships or training, aged 19-64 Nearly 43% of German citizens have participated in organized continuing education programs.

2.3.7.3 Talent introduction policy

In terms of institutional settings, Germany's international talent management functions are relatively scattered, and there is no government department that specializes in foreign affairs. The government entrusts different departments to be responsible at different periods, and it pays attention to the decision-making reference and cooperation role of social organizations. The Immigration Policy Steering Committee was established in 1975. In 1979, the Ministry of Education and Research cooperated with the Foundation to fund outstanding foreign scientists. In 2000, 21 individuals from the political, scientific, economic and social organizations formed the German Immigration Committee. The Office of Refugee Affairs was renamed the Federal Office of Immigration and Refugee Affairs, and the Department of Labor Affairs also has some related functions. In terms of talent introduction carriers, Germany has established high-level scientific research awards to attract top talents (102). In 2001, the German Federal Ministry of Education and Research established the Paul Prize as a component of the "German Government Future Investment Project Fund". The prize is managed by the Humboldt Foundation and the German Academic Exchange Service, with the purpose of "attracting the best minds in the world" ", to provide scholars with a three-year funding of up to 2.3 million euros for free research in German research institutions. Through the implementation of the Paul Prize, Germany has attracted back some of the top talents from the past to the United States. In addition, Germany has extensively participated in regional scientific and technological cooperation in Europe to attract international talents and has also established corresponding funds to carry out bilateral and multilateral research cooperation with many countries in the world, such as the multilateral research cooperation agreement plan with the G8 Group Science and Technology Association and the open research area of social sciences. project. In terms of attracting immigrants, the 2005 "New Immigration Law" stipulates that: only need to invest 25,000 euros to register a company, you can apply for a one-year residence permit; if the company

has been in good operation for 3-5 years, investors can apply for an indefinite period Residence permit. At the same time, Germany revised its nationality law in 2000 to relax restrictions on the naturalization of foreign talents, and further stipulated that even if they did not become German nationals, as long as they meet the requirements of those who have been legally in Germany for more than 8 years and have obtained German permanent residency for more than 3 years, their children After being born in Germany, you will automatically obtain German citizenship, and you will be allowed to have dual or multiple citizenship as an adult. In terms of attracting foreign students, the German Academic Exchange Center was established in 1925. It has become the world's largest fund organization for funding international students and scholars. Since its establishment, more than 1.5 million German and foreign scholars have received funding from it (103). At present, it has become the primary consulting and funding agency for students studying in Germany. Germany also encourages joint courses with foreign universities, selects outstanding students for scholarships, encourages them to study in Germany, and provides opportunities to learn German to lay a solid foundation for permanent retention of these talents.

2.3.7.4 Talent laws and regulations

In terms of vocational education, the "Federal Vocational Education Act", the "Federal Vocational Education Promotion Act", the "Handicraft Industry Regulations", and the "Federal Labor Promotion Act" have been issued successively, "Enterprise Constitution", "Federal Youth Labor Protection Act". The current legal framework for vocational education is the "Vocational Education Law" passed in March 2005, which regulates important issues in the vocational education system (104).

In terms of immigration policy, Germany promulgated the "Re-adjustment of the Rights of Foreigners Act" in 1990, which tightened the regulations on foreigners entering Germany, residence in Germany, long-term residence, and naturalization. In 1993, Germany revised the provisions of the asylum law, resulting in a significant drop in the number of asylum applicants. Since the beginning of the 21st century, the German government has gradually revised the current "Foreigners Act" from the legal framework to relax immigration restrictions. In 2005, Germany promulgated the "Law on Controlling and Restricting Immigration and Regulating the Residence and Integration of EU Citizens and Foreigners" (the "New Immigration Law"), which provides for the "Residence Permit for Senior Professionals" and "Approval of Employment for Foreigners" Make regulations. In March 2011, the "Foreign Residency Law (Draft)" was promulgated, and it was decided to give full employment rights to the spouses of foreign scientific researchers in order to increase the attractiveness of foreign scientific researchers (105). In April 2012, the EU "Blue Card Act" was passed to lower the minimum income threshold for foreign professionals and encourage professionals from outside the European Union to work in Germany. In October 2012, the "Science Freedom Law" was passed, which enabled German scientific research institutions to gain more autonomy in financial, personnel decision-making, and investment, and effectively changed the situation of the loss of scientific and technological talents overseas.

2.3.8 Talent Development Practice in BRICS (Brazil, Russia, India, China, South Africa)

BRICS refers to five emerging market countries with promising growth prospects: Brazil, Russia, India, China, and South Africa. The economic development of these five countries generally started later than the developed countries, the economic development foundation is relatively weak, the standard of living is relatively low, and they have been in a state of brain drain for a long time in the international talent competition (106). Although with the rapid economic development of these countries, the talent environment has changed and the return of talents has gradually increased, there are still many challenges in the practice of talent development governance. Since a special chapter on China's talent development will be introduced later, this section will summarize the talent development governance practices in Brazil, Russia, India, and South Africa (107).

2.3.8.1 Talent competition strategy

At present, BRICS' talent competition strategy focuses on improving technological innovation, industry. In terms of talent development environment such as development, prevent further loss of talents. Since the 1970s, Brazil has put forward a strategic policy of "defending nationalism" and technological self-reliance. It has introduced a series of information industry policies using information technology as a pilot. The "Silicon Valley of Brazil" has formed a trinity of science, technology, and industry to optimize the industrial environment to retain talents. At the same time, Brazil has continuously reformed its job title classification, evaluation and salary and welfare systems, and established high scholarships and allowances. Stable retention of high-end talents. Russia has continuously improved the talent development environment by increasing investment in scientific research (108). In 2002, the "Basic Policy for Scientific and Technological Development of the Russian Federation before 2010 and in the Future" was promulgated to prevent the loss of talents through measures such as establishing incentives for scientific and technological talents, reforming the salary system of scientific research institutions, awarding outstanding scientific and technological achievements, and supporting young scientific researchers; especially in 2011. The "Russian Federation 2020 Innovative Development Strategy" was promulgated in 2012, setting the country's innovation capability as an important strategic goal. India has established many high-tech parks, introduced preferential policies, and established government risk funds to attract talents from the technology industry to return or circulate. In 1987, India launched the "Software Technology Park" plan, and built 8 software technology parks in Bangalore, known as the "Silicon Valley of India" and other places, realizing industry-based talent gathering. In 2013, India released the "Science, Technology and Innovation Policy 2013", through increasing investment in scientific and technological research and development, strengthening the role of private enterprises in innovation, etc., to increase the number of full-time research personnel by 2/3. In order to compensate for the loss of scientific research talents caused by economic and social factors (109). Africa has successively launched the GODISA National Innovation Incubation Action Plan for Small and Medium-sized Enterprises, the South Africa Center for Excellence Creation Plan, and the South African Ministry of Science and Technology Key Technical Skills Training Action. 2002)" and "Ten-Year Innovation Plan (2007)" and formulated in 2008 the "Long-term Strategy for the Development of Scientific, Engineering and Technical Talent Resources in the Next 20 Years

(2008-2028)", which outlines the overall route of South Africa's science and technology talent strategy.

2.3.8.2 Talent training system

The level of higher education in Brazil is relatively poor, and the number of people receiving higher education is insufficient.

In order to improve this situation, the American-style modern higher education model was introduced as early as 1968. In 1988, the constitutional reform clearly gave universities the autonomy in academic, financial, and management, forming a tripartite government, associations, and universities. The advanced management model of higher education (110). In 2001, the "Doctoral Rooting Program" was launched, focusing on supporting doctoral and senior researchers working in the fields of biology, information, and agriculture at home and abroad. By raising wages and salaries, improving scientific research support conditions, and encouraging participation in international scientific activities, encouraging those who have obtained a doctorate degree in Brazil to stay in Brazil, and encourage those who have obtained a degree abroad to return to Brazil. In 2011, the "Science Without Borders" Youth Study Abroad Two-way Dispatch Program was promulgated to fund and encourage 100,000 Brazilian students to study in top universities in the United States, the United Kingdom and other countries to ease engineering (111).

There is a shortage of talents in the fields of health, life sciences, and technology. While reforming higher education and increasing investment in education, Russia is cultivating talents in a market-oriented manner, while paying attention to investment in scientific research and improving the environment for talent development. In 2006, Russia established the first national venture fund, and on the basis of injecting funds into the state budget in installments, the participation of private enterprises has been sought (112). The bonuses were increased to 5 million rubles, 1 million rubles, and 500,000 rubles, and a cumulative investment of about 25 billion US dollars was made from 2008 to 2010 to increase the average salary of domestic scientific researchers from 20,000 rubles to 30,000 rubles per month; regulations 3% of the federal science and technology budget will be used to support the research of young scholars, and strive to establish an economic and market incentive mechanism for scientific and technological talents. At the same time, reform the government appointment system for civil servants. In 2009, the "Golden 100" talent pool was established to select candidates for key government positions; and a talent pool of 5,000 candidates and a talent pool of 16,000 candidates were established respectively for selection. Federal and local government positions. South Africa focuses on strengthening the training of talents in short supply in society. In January 2007, the "National Plan for the Development of Human Resources in Health" was promulgated. Through the adjustment of the medical education structure, the training of backbone talents such as surgeons, nurses, pharmacists, and secondary professional talents was increased, and the government's funding for medical education and research was increased. Invest, improve the conditions of public medical institutions, strictly restrict the employment of foreign medical personnel and other measures, and strive to change the flow of medical personnel from rural areas to

cities, from public hospitals to private institutions, and from their home countries to developed countries in Europe and North America (113). In 2008, the goal of increasing the enrollment rate and graduation rate of science and technology students was proposed. To this end, the relevant departments have organized national science and technology weeks and science festivals, mathematics and science summer camps and tutoring training activities by increasing student scholarships and increasing financial support for master students (114).

Provide employment services for science and technology graduates to promote the realization of these goals. South Africa also attaches great importance to promoting cooperation and partnerships between private research departments, scientific research councils, and research institutions of higher research institutions to promote the growth of scientific and technological talents; through the establishment of the Global Youth Academy of Sciences and the South African Youth Academy of Science and Technology to promote cooperation and exchanges among young scientists, comprehensive Participate in science and technology related affairs of the country and the world. Since its independence, India has always believed in rejuvenating the country through science and education and implemented a higher education priority policy (115). In 2009, India declared 2010-2020 to be India's 10 years of innovation. During these 10 years, 14 national innovation universities will be established across the country to cultivate innovative talents. In 2010, India established the National Innovation Council to promote the implementation of the national innovation 10-year (2010-2020) goal. In the "2020 Science and Technology Vision Development Plan" promulgated, the goal of becoming a world economic power and a major power in information, biology, and nuclear technology by 2020 has been established. According to India's 11th Five-Year Plan, the Indian government plans to establish 50 centers of excellence in the six years from 2012 to 2018, with research areas covering life technology, nanotechnology, mechatronics, high-performance computers, etc.

2.3.8.3 Talent introduction policy

Brazil, as a material distribution center in Central and South America, has good infrastructure and has the advantage of spreading to North America. It has always been able to attract foreign capital and foreign intelligence. At the same time, as a typical developing country, the immigration application threshold is not lower than that of developed countries. Since 1995, Brazil began to recognize dual citizenship, allowing foreigners who applied for Brazilian citizenship to have dual citizenship. India regards the Indian elites who have immigrated to other countries as India's "smart banks". These talents can not only bring back capital and knowledge but also modern business management experience when they return to the country (116). Therefore, since the 1960s, India began to build the "Overseas Expert Talent Database" in some developed countries. In 1990, the "Overseas Indian High Commission" was established under the leadership of the Ministry of Foreign Affairs. Then, at the end of 2001, the Indian Ministry of Internal Affairs, The Ministry of Overseas Indian Affairs, the Overseas Indian Development Foundation, the Overseas Indian Technology Experts Contact Center, the Overseas Indian Promotion Center and other departments and organizations and organize the Overseas Indian Festival and the selection of the Overseas Indian

Awards, "Overseas Indian Citizenship" Activities such as issuing and setting up scholarships for overseas Indian children. And set up an overseas Indian promotion center to promote the inflow of overseas Indian funds, establish a global Indian knowledge network to introduce advanced science and technology, and prepare for the establishment of an overseas Indian exchange base to provide a fixed exchange place for overseas Indians. Russia attracts talents by giving tax incentives and relaxing visa restrictions. In 2007, the Russian government launched the "Measures on Assisting the Voluntary Return of Russian Compatriots Living Abroad to Russia", promising to provide maximum assistance and support to those who voluntarily return to the country and their descendants; to implement preferential tax policies for those who return to invest in small and medium-sized enterprises (117). In 2010, Russia simplified immigration procedures, stipulating that the annual salary of highly qualified experts should not be less than 2 million rubles, with a 90-day first immigrant visa registration, the work permit and visa period is 3 years and can be extended, and enjoy a lower rate than other foreigners in Russia tax rate.

2.3.8.4 Talent laws and regulations

Brazil promulgated the "Information Industry Law" in 1984, proposing a series of measures to stimulate the development of the information industry, and promote economic growth through high-tech science and technology. In terms of attracting foreign investment, Brazil's Basic Law No. 60 promulgated in October 2004 provides that those with an investment of more than US$50,000 can apply for investment immigration and obtain permanent residency status. And implement national treatment and reward measures for foreign investors (118). Russia promulgated the "Law on the Legal Status of Foreign Citizens in the Russian Federation" in 2007 for immigrants from CIS countries, shortening the time for foreigners to obtain labor permits to 10 days. In April 2011, the "Law on the Administration of the Entry and Exit of Foreigners" and the "Russia" were revised. The Law on the Legal Status of Foreigners in the Federal Territory stipulates that "foreign citizens invited to work or teach in scientific research institutions and state-recognized institutions of higher education can continue to work in Russia even if they have not obtained a work permit; even if the employer does not obtain a permit for employment of foreigners , it is also possible to hire such foreign citizens, which greatly facilitates foreign high-level talents to work in Russia (118).

2.4 Talent status in China

This section selects actual cases of talent development in different regions of China to further explain the current status of talent attraction and maintenance management in China and related research introduction.

2.4.1 Research on Talent Flow in China

Chinese scholars have done a lot of research on labor mobility, a typical socio-economic phenomenon, but they have paid relatively little attention to the mobility of talents and regional

mobility of talents. In many cases, the two types of research also have similarities. In summary, it mainly focuses on the following aspects.

2.4.1.1 The mechanism and influencing factors of labor and talent mobility

Many scholars believe that China's agriculture has no advantages in the world, and farmers are facing poverty and bankruptcy (119). Cai Fang used Western economic analysis methods to explore the mechanism of labor mobility (120).

As a complex social phenomenon, labor mobility is not only conducive to improving the status quo of my country's agriculture, but also plays an important role in economic development and population distribution. Qiu Weizhi revealed two ways of provincial migration, namely organized migration and spontaneous migration, and plotted the migration flow (121). Yang Yunyan calculated the changes in the migration scale since the reform and opening up based on the census data, and pointed out that the migration flow, mechanism and types have undergone a major reversal after the reform and opening up (122). Wang Guixin divided the rural-urban population migration into three stages according to the intensity: the first is the stable development stage (1978-1983), the second is the gradually increasing stage (1984-1994), and the third is the highly active stage (1995-2000) His conclusion pointed out that non-hukou migration has always been the mainstream in rural-urban population migration (123). For factors that affect labor mobility. Zhao Yaohui's analysis concluded that the education level of rural labor is positively correlated with the incidence of migrant workers, and the education level of immigrants is higher than that of non-immigrants in the place of emigration (124). Based on the analysis of the spatial model, it was confirmed that distance plays a significant role in migration (125, 126). Yan Shanping and Wang Guixin used variables such as the inter-regional migration model and the level of regional per capita income to test the difference in the stock of inter-provincial migration and the level of economic development. The mutual influence of other factors (127, 128). De Brauw, AD, Rozelle, SD and Taylor, JE. C. After estimating the impact of Chinese immigrants on family income, they found that most of the decision-making behaviors of labor migration among Chinese rural families are It is considered from the maximization of the income of the whole family and the risk of the income of the whole family (129). Many scholars have found when studying employment choices that the lower the education level, the more unstable the employment of migrant workers in the city, and the more often they change jobs, which leads to less willingness to stay in the city for a long time (130). Li Qiang and others have studied the ways and means for migrant workers to find jobs and pointed out that when migrant workers enter the city for employment for the first time, their social capital has played a significant role, but after a period of time in the city, the original social capital has gradually played a role in employment. Decrease (131). From the perspective of human capital, many researchers have studied the relationship between the size of human capital and migration motivation. These studies believe that when human capital does not reach a certain level, such as illiteracy, elementary school education, etc., people often lack comprehensive judgments about themselves and the outside world and are deeply unfamiliar with the outside world. Therefore, these people have little willingness to migrate, the liquidity is also very small. At the same time, it is difficult to improve

one's economic situation through migration to work (132). Under normal circumstances, people with a high level of education in rural areas are more willing to migrate. The income of these people going out to work is much higher than that of staying in the countryside, so the return rate is also low (133). This happens because the higher the human capital, the higher the salary and the more decent job you find after entering the city (134).

The impact of labor mobility mainly includes social, economic and ecological effects. In terms of social effects, population migration directly changes the total population, population structure, and fertility behavior in the immigration and emigration areas (135). In terms of economic effects, the regional mobility of population and labor can have an impact on the speed of regional economic development (136). Some scholars have analyzed the employment of migrants and their impact on the urban labor market, and believe that the impact of migrant labor on the local labor market is limited. Of (137, 138). The research on ecological effects mainly focuses on the environmental impacts and resource constraints faced by development migration, environmental migration, reservoir migration, etc. (139, 140, 141). He Junjun took Ningbo as an example to study the innovation of the government talent introduction system. Starting from the operating mechanism of the talent market, it analyzes the cost of talent flow and the failure of the talent market, and proposes that to solve the market failure, the government should make the correct role positioning, that is, through the transformation of functions and the formulation of talent policies and laws and regulations, the talent market should be improved. Effective macro-control (142). After analyzing the laws and characteristics between the talent market and talent mobility, Su Zhaohui argued that the talent mobility should be reformed from three aspects: the personnel management system, the household registration management system, and the social security system (143).

2.4.1.2 Research on the influence and mechanism of talent, education, and human capital in the study of regional gaps

Empirical research on the issue of regional gaps in my country generally points out that one of the reasons for the formation of regional economic gaps is the selective flow of labor between regions. Under market conditions, labor always flows from regions with low marginal labor productivity to high regions, which helps to increase the utilization rate of labor resources and narrow the gap in labor pay and per capita GDP between regions (144, 145). Labor mobility not only provides abundant labor for the inflow areas, so that they can maintain lower wage costs and higher international competitiveness, but also increase the per capita output level of migrants and outflow areas and improve the efficiency of resource allocation. Empirical analysis also found that the degree of labor market development directly affects the economic growth rate of various regions (146).

There are internal convergences in the three regions of my country's east, middle, and west, but the gap between regions has continued to widen. After controlling for variables such as initial human capital and investment rate, there is conditional convergence between regions (147). Yao Zhizhong believes that precisely because regional disparity itself is the cause of labor mobility, it is the direct consequence of labor mobility that constitutes regional disparity (148). Brown believes that labor

mobility is essential to reduce the urban-rural income gap (149). Fan Gang's research results show that labor mobility affects the regional economy through the "denominator" and therefore has an impact on regional convergence (150). Card. D believe that accelerating urbanization and accelerating the flow of population to cities can also be the most effective way to resolve regional disparities (151). Some regions (such as the three municipalities) have entered the late industrialization or post-industrialization period, the eastern coastal areas and the three northeastern provinces have entered the mid-industrialization period, while the central, southwestern and northwestern regions are still in the mid- and early-industrialization period (152). The results of Wei Houkai's research show that there is a significant growth convergence between regions in China (153). Cai Fang, Wang Dewen, and Du Yang also pointed out that the degree of labor market distortion is one of the factors that affect the convergence of economic growth conditions between regions in China (154). Liu Qiang's research results show that the interregional migration of large-scale labor is an important inducing factor for the convergence of economic growth between regions in China (155).

2.4.1.3 Human geography related research

In the regional development strategy, the regional talent development strategy is an important part of it. To scientifically formulate a regional talent development strategy, it is necessary to study the phenomenon of regional talents and reveal the law of regional talent growth.

Xu Baofang believes that talents are closely related to the geographic environment, and the relationship between the talent system and the geographic environment is affected and restricted by the relationship between man and land (156). Talent geography is to start with a certain region's talent phenomenon and talent issues and conduct a comprehensive survey of the regional natural geographic environment and humanistic geographic environment. It can find out the law of talent growth in a specific area, and then find out that it is applicable to the general area. Conditions for talent growth and explore and master the objective laws of regional talent growth and development. This can provide theoretical guidance and scientific basis for creating good talent growth and development environmental conditions and provide a scientific basis for formulating regional talent development strategies. Ye Zhonghai's "Introduction to Talent Geography" establishes the basic theoretical framework of talent geography, reveals the internal mechanism of the formation and development of talent spatial distribution and the internal mechanism of talent spatial displacement, and puts forward the scientific zoning talent and its index system for the first time. On the basis of zoning, my country is divided into eight talent development zones (157).

2.4.1.4 Research on regional talent integration and rationalization of talent flow

Le Xin and others analyzed the current situation of talent flow in Sichuan Province through questionnaire investigation and analysis, and proposed that talent flow must be guided by the scientific development concept, strengthen the construction of talent intermediary service agencies, accelerate the construction of talent supply and demand information system, and improve talent flow.

Policies, while adapting to the needs of market laws, actively formulate relevant laws and regulations to effectively protect the legitimate rights and interests of migrants and units (158). Zhao Zhengbing analyzed the current talent mechanism of universities and believed that it is necessary to improve the understanding of the reform of the distribution system of universities, strengthen the reform, stabilize the talent team and optimize the talent structure, so that the flow of talents in universities tends to be reasonable (159). Jiang Huaiyu and others used qualitative analysis combined with quantitative methods such as GIS, correlation analysis, multiple regression, and path analysis to analyze the spatial change characteristics, influencing factors, and mechanism of China's talent distribution since 1990 and its impact on the regional economy. Empirical Research (160). It is believed that the spatial pattern of talent distribution has undergone a fundamental change during the study period, and the distribution center of gravity has shifted from the northern inland areas to the southeast coastal areas. The relative change of regional talent density is mainly affected by urbanization and regional higher education training ability; the influence of systems and policies on talent distribution is also obvious; high wages have an attractive effect on talents; natural environment has an indirect effect on talent distribution. Talents have a considerable degree of direct impact on the regional economy. Urbanization is the main driving force of regional economic growth, which has a direct impact on the regional economy and can indirectly promote regional economic growth by attracting talents. The effect of education on the economy is mainly through talents. The impact of the regional economy is reflected. For the underdeveloped areas in the central and western regions, Huang Liping proposed to strengthen the adjustment of urban and rural industrial structure, improve regional economic strength, and improve the return of talents to the economic environment: strengthen education and training, improve the quality of the population, and create a good environment for the return of talents (161).

2.4.2 A historical review of the regional flow of talents in China

Since the founding of China, it has experienced four major climaxes in the flow of talents. With the trend of economic globalization, in-depth and wide-ranging participation in global economic competition is also reflected in the flow of talents, and a new round of talent flow is quickly formed.

2.4.2.1 Regional mobility of administrative talents between 1960s with 1970s

Beginning in the mid to late 20th century, under the impetus of the technological revolution, the population of most developing countries flowed from the primary industry to the secondary and tertiary industries, thus driving the process of urbanization. However, the flow of talents in our country began to flow in the opposite direction in the 1950s. The specific manifestation was that under the intervention of the government and administration, the movement of intellectual youth "going to the mountains and going to the countryside", which reached its climax in the 1960s and 1970s, emerged in the 1950s. In 1955, in order to resolve the contradiction between the low quality of rural productivity encountered in the national cooperative movement and the mutual aid and cooperative movement, the central government and the government mobilized educated primary school graduates to return to their hometowns to participate in the agricultural production

cooperative movement (162). According to the Guangming Daily on September 11, 1957, nearly 2 million primary and secondary school graduates across the country have gone to rural areas to participate in productive labor.

The "Great Leap Forward" from 1958 to 1963 increased the influx of labor into the cities from 20 million to 60 million, and these labors were mainly used by the whole people or collectively owned units. This has also brought about a series of social problems such as over-urbanization of the population (163). However, with the frustration of the "Great Leap Forward", the state began to streamline urban workers. These urban laborers flowed back to the countryside, with 26 million people flowing to the countryside (including a large number of educated youth).

According to statistics, during the first national population reversion from 1962 to 1966, more than 10 million “educated youths going to the countryside” were decentralized across the country. During the "Cultural Revolution" period (1967-1978), the activities of intellectual youths going to the mountains and going to the countryside all over the country reached a climax. In December 1968, Mao Zedong issued a call: "It is necessary for intellectual youths to go to the countryside to receive re-education from poor and lower middle peasants." The movement of intellectual youths to go to the countryside to the countryside was organized and carried out rapidly across the country on a large scale. In this movement, there are educated people in various cities and towns in all provinces, municipalities and autonomous regions across the country who go to the mountains and the countryside. In the two years from the end of 1968 to the end of 1970 alone, more than 4 million young intellectuals went to the mountains and the countryside. According to statistics, during the ten years from 1968 to 1978, more than 12 million educated youth went to the mountains and the countryside, accounting for 11% of the urban population. During the nearly 25 years of going to the mountains and going to the countryside from 1953 to 1978, about 27 million educated youths across the country were successively sent to rural areas (164).

However, the movement of educated youths to go to the countryside and the mountains did not ultimately solve the employment problem of urban youth. Many educated youths do not adapt to the rural environment, are not motivated to work, and lack incentives, resulting in low efficiency. The resettlement funds allocated by the state each year are also not properly used, but a large amount of limited funds is wasted. The problem of educated youth has gradually become a burden on the countryside and a factor of social instability (165). The party and the government have gradually realized that the fundamental solution to the employment problem of urban and rural youth lies in economic development and adjustment and reform of the social and economic structure.

During this period, due to the low degree of industrialization in China, the process of urbanization was relatively slow. Therefore, the educated young people’s activities in the mountains and the countryside are artificially carried out by the government to solve the employment pressure in the city. This administrative intervention is not the result of the spontaneous flow of talents. It is arbitrary and coercive, and in fact severely restricts it (166). The economic development and urbanization process at that time.

2.4.2.2 Regional mobility of repositioning talents between 1970s with 1980s

On October 21, 1977, the country officially restored the college entrance examination system. On the one hand, the restoration of the college entrance examination system has enabled a large number of teachers and researchers to work in colleges and universities, adapting to the changing requirements of teaching and research; on the other hand, a large number of talented people have passed the college entrance examination to enter professional colleges and universities for further study, which is the successor of the national economy (167). Development reserves talents. According to statistics, the 5.7 million young intellectuals who participated in the college entrance examination that year formed a large-scale return of talents in the future.

In December 1978, the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China was held. The main purpose of the conference was to use practice as the criterion for testing truth, established the idea of seeking truth from facts, shifted the focus of work from class struggle to economic construction, and initiated reform and opening up. The convening of the National Science and Technology Conference in 1978 gave new impetus to the booming talent return (168). The climax of this round of talent flow has fully opened the prelude for Chinese talents to break through the political shackles of the left and adapt to the shift of the focus of the party and the country's work to economic construction. This is a talent flow with remarkable restorative characteristics.

On August 26, 1980, the National People's Congress formally approved the establishment of the Shenzhen Special Economic Zone. The new systems, mechanisms, and preferential policies piloted in Shenzhen accelerated China's domestic reforms and opening up to the outside world, and further expanded space for the flow of talents and capital and took the lead in achieving economic take-off. On May 4, 1984, the central government officially announced the further opening of 14 coastal port cities including Tianjin, Shanghai and Dalian. With the deepening of the degree of reform and opening up in space and the support of the government, township and village enterprises have sprung up. At the same time, the addition of allowing enterprises to have the autonomy of employment has further stimulated the development and employment rate of the non-public sector of the economy, thereby accelerating the flow of talents. The labor market is gradually formed to meet the needs of economic development, and the talent intermediary mechanism is gradually established under the advocacy of the government (169). The internal personnel department of the enterprise has also initiated the system reform process, and the flow of talent has become the main channel for the allocation of human capital. All in all, at this stage, at the beginning of reform and opening up, the relaxation of policies has made the flow of talents spontaneous and blind. Reform and opening up and economic development have not led to the simultaneous growth of population migration. The population migration in China as a whole still mainly continues the basic trend before the reform and opening up. It is developing steadily, and the population migration volume remains roughly between 14 and 23 million. The number and migration rate of inter-provincial annual migration are basically below 1 million and 1‰ respectively. However, the next round of open mobility swept across China and spread to the world, and its impact was unprecedented (169).

2.4.2.3 Regional mobility of market growth talents in the 1990s

After entering the 1990s, new characteristics appeared in the flow of talents, which were as follows:

(1) The center of talent density growth shifts to the southeast coast

From 1990 to 1997, the top five with the highest relative growth rate of talent density were Beijing, Xinjiang, Liaoning, Jilin, and Heilongjiang. From 1997 to 2000, the top five cities with the highest relative growth rate of talent density were Beijing, Shanghai, Tianjin, Jiangsu, and Shandong. From 2000 to 2002, the cities with the highest relative growth rate of talent density were Xinjiang, Shanghai, Beijing, Zhejiang, and Shandong. It can be seen from the above that before 1997, the focus of the increase in talent density was Beijing, Northeast China and Xinjiang. Since 1997, with the exception of Xinjiang that has maintained a relatively high growth rate, the growth rate of talent density in northern and western provinces has declined, and the growth rate of talent density has accelerated in the eastern coastal areas, and the Yangtze River Delta provinces and cities have become key areas for talent gathering (170).

(2) There are obvious zonal differences between the eastern coastal areas and the central and western provinces

In 2002, among the 11 provinces with above-average density, the eastern coastal provinces accounted for 7 and the central and western regions accounted for only 4.

(3) The role of spatial polarization has been strengthened, and the difference in talent density and growth rate between provinces has increased significantly. According to calculations, the relative growth rates of talents in 1990-1997, 1997-2000, and 2000-2002 were 3.39 and 2.01 respectively. The difference in growth rates after 2000 was significantly greater than that in the 1990s (171).

(4) The regional inflow and outflow of talents is obvious

During the period from 1990 to 1997, only Tibet in the country was the net export area of talents. During the period from 2000 to 2002, there were 8 areas of net outflow of talents across the country, namely Liaoning, Heilongjiang, Hubei, Shaanxi, Yunnan, Tibet, Qinghai and Jiangsu. It can be seen from this that the regional mobility of talents in the 1990s was deeply affected by the market economy and regional development differences (172). The speed and quantity of talent mobility increased rapidly, with obvious imbalances. In China, the higher the educational background of talents, the stronger the central orientation of their distribution and flow. The level of urbanization has a positive impact on the distribution of talents.

When talents can cross the regional system or economic threshold and make the choice of residential location relatively freely, capital cities and urban dense areas are more favored. In 1995, the number of inter-provincial migrants and the migration rate were about 3.5 million and 3‰ respectively (173).

By 2000, they had rapidly increased to more than 10 million and more than 8‰ in just a few years, both increased by about 2 times.

2.4.2.4 Regional mobility of talents driven by globalization and coordinated regional development since the 21st century

Since the beginning of the new century, with the increasing competition between my country's domestic and international markets, a new situation has emerged in the regional mobility of my country's talents.

(1) The Chinese government attaches great importance to planning human resources from the policy level

From the perspective of the overall situation, the Chinese government has paid more and more attention to the work of talents and has accordingly introduced a series of policies and measures to plan the rational use of talent resources. On December 19-20, 2003, the Central Committee of the Communist Party of China and the State Council held a talent work conference in Beijing. This was the first conference on talent work in the history of New China (174). The meeting discussed and passed the "Decision of the Central Committee of the Communist Party of China and the State Council on Further Strengthening Talent Work." Under its guidance, for the first time, it is proposed that morality, knowledge, ability and performance should be the main criteria for measuring talents under the principle of adhering to the principle of having both ability and political integrity. Special criteria are proposed: do not compare academic qualifications, job titles, qualifications, and identities separately (175). The policy encourages everyone to contribute and grow, which embodies the development, diversity, hierarchy and relativity of the "talent view" of talents.

(2) Local governments have strengthened their sense of cooperation, and the trend of domestic regional integration is increasing

From south to north, two strong "economic circles" are formed, namely the "Pearl River Delta Economic Circle" and the "Yangtze River Delta Economic Circle". At the same time, the regional economic integration of Beijing-Tianjin-Hebei, the three eastern provinces, Jiaodong Peninsula, Liaozhong, and "Changzhutan" has already started (176). In recent years, the talent cooperation trends that have significant impacts in various regions mainly include:

The Yangtze River Delta 6 was held in Shanghai in April 2003 at the "Yangtze River Delta Talent Development Integration" forum. 19 cities from Shanghai, Jiangsu and Zhejiang jointly announced to the outside world that they would jointly build a new mechanism for talent development in the "Yangtze River Delta" region (177). This means that in the near future, the three places of Shanghai, Jiangsu and Zhejiang will share human resources and mutual recognition of qualifications, and finally realize the free flow of talents in the region and achieve a win-win situation for the regional economy. The Pearl River Delta region held the third joint meeting of talent service cooperation in

Changsha on June 18, 2005 and reviewed and approved the "Pan-Pearl River Delta Region Personnel Service Cooperation Joint Conference Charter". The Pan-Pearl River Delta region includes: 9 provinces and autonomous regions including Guangdong, Guangxi, Hunan, Hainan, Fujian, Jiangxi, Yunnan, Guizhou, and Sichuan (178). At the meeting, consensus was reached on the sharing of human resources, the recognition of talent qualifications, the sharing of talent policies, and the joint operation of the talent market, marking the entry of a substantive stage of talent cooperation among the 9 provinces and regions. The Three Northeastern Provinces signed the "Three Northeastern Provinces and the "Yangtze River Delta" Talent Development Cooperation Agreement" in Harbin on March 20, 2005, from the personnel departments of the six provinces (cities) of Shanghai, Jiangsu, Zhejiang, Liaoning, Jilin and Heilongjiang Participated in the discussion of this cooperation. It marks that talent development has moved from geographic regional cooperation to cross-regional strategic cooperation and is a new leap in talent development cooperation and exchanges (179).

In 2005, Zhejiang Province and Heilongjiang Province signed the "High-level Talent Intelligence Development Cooperation Agreement" and jointly held the "First Online Talent Exchange Conference". According to the agreement, Zhejiang and Heilongjiang provinces will strengthen exchanges and cooperation in talent training, joint recruitment of post-doctoral fellows, civil servant training management, introduction of foreign talents and intelligence, reform of public institutions, public services for talents, and technical project docking of scientific research institutions in universities and colleges (180).

On June 8, 2005, the personnel departments of Beijing, Tianjin, and Hebei jointly signed the "Beijing-Tianjin-Hebei Talent Development Integration Cooperation Agreement". Mutual recognition of technical post qualifications and international vocational qualifications, continuing education and resource sharing of professional and technical personnel, mutual exchange and study of civil servants, introduction of foreign intelligence, preparation of talent development plans, and personnel dispute arbitration systems, and other ten aspects of cooperation have accelerated Beijing-Tianjin-Hebei The pace of regional talent integration and cooperation. The development of regional economic integration has promoted the further formation of the integration of talent development. These regions have begun to coordinate the flow of talents across regions, realize resource sharing, and jointly promote the coordinated development of regional economies through a brand-new cooperation mechanism. Take the Yangtze River Delta as an example to discuss its talent development strategy and achievements under the trend of globalization. The Yangtze River Delta region plays a decisive role in the overall economic situation of China. In recent years, the Yangtze River Delta has become a "hot spot" for domestic and foreign investors with its good infrastructure, advanced technology and education, and increasingly perfect investment environment. In the first half of 2004, this region accounted for 2% of the country’s land area and about 10% of the population, creating 26% of the country’s GDP, completing 37% of the country’s foreign trade exports, and attracting 52% of the country’s total (181).

The total economic volume of the paid-in foreign capital of China is ahead of the other two major urban agglomerations in my country-the Pearl River Delta and the Beijing-Tianjin-Hebei region. In 2005, the region's top 100 counties (cities) in comprehensive strength accounted for nearly half, and the top ten accounted for eight seats. Private enterprises and township and village enterprises are extremely dynamic (182). Since the new century has been gathered in this region, with the increasing competition between my country's domestic and international markets, a new situation has emerged in the regional mobility of my country's talents.

(1) The central government attaches great importance to planning human resources from the policy level

From the perspective of the overall situation, the party and the government have paid more and more attention to the work of talents, and accordingly introduced a series of policies and measures to plan the rational use of talent resources. On December 19-20, 2003, the Central Committee of the Communist Party of China and the State Council held a talent work conference in Beijing. This was the first conference on talent work in the history of New China. The meeting discussed and passed the "Decision of the Central Committee of the Communist Party of China and the State Council on Further Strengthening Talent Work" (referred to as the "Decision"). Under the guidance of the "Four Respect" major policy, the "Decision" proposed for the first time that morality, knowledge, ability and performance should be the main criteria for measuring talents under the principle of adhering to the principle of having both ability and political integrity (183).

(2) Local governments have strengthened their sense of cooperation, and the trend of domestic regional integration is increasing

From south to north, two strong "economic circles" are formed, namely the "Pearl River Delta Economic Circle" and the "Yangtze River Delta Economic Circle". At the same time, the regional economic integration of Beijing-Tianjin-Hebei, the three eastern provinces, Jiaodong Peninsula, Liaozhong, and "Changzhutan" has already started. In recent years, the talent cooperation trends that have significant impacts in various regions mainly include:

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The Yangtze River Delta region plays a decisive role in the overall economic situation of China. In recent years, the Yangtze River Delta has become a "hot spot" for domestic and foreign investors with its good infrastructure, advanced technology and education, and increasingly perfect investment environment. In the first half of 2004, this region accounted for 2% of the country’s land area and about 10% of the population, creating 26% of the country’s GDP, completing 37% of the country’s

foreign trade exports, and attracting 52% of the country's paid-in foreign investment. Its economic aggregate is ahead of the other two major urban agglomerations in my country-the Pearl River Delta and the Beijing-Tianjin-Hebei region.

In 2005, the region's top 100 counties (cities) in comprehensive strength accounted for nearly half, and the top ten accounted for eight seats. Private enterprises and township and village enterprises are extremely dynamic. This area is home to nearly a hundred industrial parks with an industrial output value of more than 10 billion yuan, as well as thousands of giant enterprises (188). 400 of the world's top 500 companies have settled here, and the total output value of contracted use of foreign capital exceeds 150 billion U.S. dollars. In 2008, the GDP of 16 cities in the Yangtze River Delta reached 5,395.6 billion yuan.

In 1982, some scholars first proposed the economic integration of the Yangtze River Delta. In 1983, Vice Premier Yao Yilin recognized the Yangtze River Delta Economic Zone in the "Preliminary Ideas for Establishing the Yangtze River Delta Economic Zone". The historical evolution of talent cooperation also began at that time. After more than 20 years of exploration, it has gradually been recognized and strongly promoted by the government, achieving a leap from spontaneity to consciousness.

At the beginning of the 21st century, cities in the Yangtze River Delta proposed a strategy of "integrating into Shanghai and integrating into the Yangtze River Delta", and carried out large-scale government-led "economy, technology, and talent" integration activities and multi-form and multi-field market cooperation. In April 2003, the Zhejiang Provincial Party and Government Delegation and the Jiangsu Party and Government Delegation completed their inspections to Shanghai within 10 days. In December, the Shanghai Party and Government delegation also went north for a return visit. Subsequently, the leaders of the government personnel departments of the three regions and cities in the Yangtze River Delta gathered in Shanghai to open the "Yangtze River Delta Talent Development Integration Forum" for the first time. 19 cities in the Yangtze River Delta signed the "Joint Declaration on the Integration of Talent Development in the Yangtze River Delta". Under the guidance of the "Common Declaration", various localities have signed agreements on talent service cooperation with each other (189). For example, six cities including Shanghai, Nanjing, Hangzhou, Ningbo, Suzhou, and Wuxi signed the "Agreement on Establishing a Training Center for Scarce Talents in the Yangtze River Delta" and jointly initiated the establishment of the "Training Service Center for Scarce Talents in the Yangtze River Delta"; November 2003 to In March 2004, various parts of the Yangtze River Delta held talent recruitment activities in Shanghai. These marks the beginning of a new phase of regional talent cooperation.

As a programmatic document for talent cooperation among cities in the Yangtze River Delta, the "Joint Declaration" points out that through the sharing of resources for talent development in the Yangtze River Delta, a new mechanism for talent development in the Yangtze River Delta region will be established to gradually form a unified personnel system framework, a large talent market,

and personnel services (190). System, and finally realize the free flow of talents in the region. Under its guidance, talent cooperation in the Yangtze River Delta is mainly manifested in:

(1) Leading talent cooperation with system

A joint conference system for the cooperation of talents in the Yangtze River Delta with the participation of the personnel in charge of the two provinces, one city and the municipality of the Yangtze River Delta was established, which was jointly confirmed and implemented in Nanjing on June 21, 2004. Joint meetings include formal meetings and informal meetings. The former is held once a year, and the latter is held from time to time as needed to implement and resolve issues of mutual concern. At the same time, 6 system-level cooperation agreements and 3 agreements to promote the flow of talents were also signed. Including mutual recognition of qualifications for professional and technical positions, remote talent services, sharing of intellectual resources for senior talents, and mutual assignment of civil servants, etc.

(2) Promote talent cooperation with project development

Under the framework of institutional cooperation, cooperation projects between various regions have been fully developed, showing that cities, regardless of size or number of projects, have gradually matured. The more successful ones are as follows: First, the "Yangtze River Delta Training Service Center for Scarce Talents" has been established. Introduce scarce talents from each other and set up training institutions. The second is to sign a "cooperative project", and cities in the Yangtze River Delta will share regional advantages with each other. The third is to jointly develop and establish the "Shanghai 21st Century Jincai Network", which provides an information platform for the Yangtze River Delta to carry out online personnel and talent interactive services. The fourth is to jointly promote certification examination projects, establish unified professional qualification certification standards, unified examination outlines, unified examinations, and issue unified certificates. The fifth is the post-doctoral cooperation project, which initiates high-level intellectual cooperation. Sixth is the arbitration of personnel disputes. The region will strengthen agreements on policies and regulations, off-site investigations and evidence collection, delivery and so on (191).

(3) Promote talent cooperation through two-way interaction and multilateral docking

Two-way and multilateral cooperation is an important way to promote regional cooperation. It can amplify the social benefits of the achievements of talent cooperation in the Yangtze River Delta. The current two-way interaction and multilateral docking have promoted special cooperative relations and met the need to handle routine affairs of the flow of talents between regions at any time. In order to be in an advantageous position in the competition of products, markets and service quality, cities in the Yangtze River Delta region have launched competitions for outstanding talents and introduced some preferential policies to attract talents (192). In the process of talent competition, cities realized the importance of cooperation and gradually formed a consensus on talent cooperation. After the increase in the frequency and speed of talent flow, in order to achieve a win-win situation in regional

talent competition, the government takes the lead in cooperating to avoid problems such as regional barriers and administrative barriers.

After more than 20 years of hard work, the regional talent cooperation in the Yangtze River Delta has achieved phased results, which are mainly reflected in the following: First, the awareness of regional talent cooperation has increased. Each city consciously integrates its own development strategy with the regional common development strategy, and incorporates talent development into the overall regional talent resource development track; second, the ability to gather regional talents has been improved. The cities began to sort out their own policies, including talent training, employment guidance, household registration system and social security, etc., and coordinated and cooperated, worked hard on the flow of talents and education, and gradually formulated policy recommendations for integrated talent development, which improved the overall image And competitiveness; the third is to promote regional cooperation in other areas (193). While strengthening the cooperation between the personnel departments between the governments, the relevant departments such as science and technology, education and enterprises have also carried out many aspects of cooperation.

2.4.3 General overview of the population mobility in China

The economic growth rate of the eastern, central and western regions of my country is very different, and there is also a gap in the distribution of the average level of human capital in society. The gap in human capital can be expressed in terms of per capita years of education and the illiteracy rate over 15 years old, as shown in Tables 3-12 and 3-13. The gap between the three regions is obvious, especially between the eastern, central and western regions (194). In 2000, the difference was 5.54 and 4.97 percentage points, and in 2004, the difference was 2.14 and 3.05 percentage points, respectively. It is not difficult to see from the statistical data that the gap between regions is also shrinking, especially between the eastern and central regions. In 2004, the illiteracy rate of the population over 15 years old in the eastern region exceeded that of the central region by 0.51 percentage points. As shown in Table 3-13, the years of education corresponding to the three regions have decreased successively, showing a gradient (195).

The eastern and central regions are above the national average, and the western region is below the national average. From the perspective of the level of social human capital, the central region is closer to the east, and the gap with the western region is gradually widening. The gap in the level of human capital means the inequality of employment opportunities and income gap. From this, the following conclusions can be drawn:

(1) The gap in human capital affects labor mobility

As each province, municipality and autonomous region, the gap in human capital causes a series of differences, which drives the flow of labor between regions, and distance plays a major role in labor mobility.

(2) The direction of human capital flow is from the Midwest to the East

There are obvious regional gaps between the eastern, western and central regions, and the labor mobility between these three types of regions should be the most characteristic. The direction should also be from the Midwest to the East (196).

(3) The direction of labor flow between rural areas is the same as that between regions

The differences in development and income between rural areas are also expanding, and labor mobility between rural areas has also become an important phenomenon. It also flows from the rural areas in the central and western regions to the rural areas in the east.

(4) The flow of human capital across the country is distributed in a regional ladder pattern

With the existence of gaps between the three types of regions and between urban and rural areas, labor mobility has become a kind of regional ladder, that is, first from rural areas in underdeveloped areas to rural areas in developed areas, and then to cities in developed areas (197). The 2005 national 1% population sample survey showed that among the national population, the floating population was 147.35 million, accounting for 11.28% of the total number of people in the country. Among them, the inter-provincial floating population was 47.79 million, accounting for 1/3 of the migrant and floating population, an increase of 5 million from 2000. The population flow is dominated by close-distance intra-provincial mobility, with 2/3 of the migrant and floating population moving within the province (198). Compared with the fifth national census, the floating population increased by 2.96 million, and the inter-provincial floating population increased by 5.37 million. Since the regional income gap in the province is more significant than the inter-provincial gap and easier to compare, the various costs in the migration process are more comparable, and the population flow also has obvious regional characteristics (199).

According to a sample survey of 1% of the national population in 2005, in the process of national population migration, whether it is to cities or villages, the proportion of migration within the province is high. Intra-provincial migration accounts for 66.0%, and out-of-province migration accounts for 34.0. %. From the perspective of the three major regions, the central region has the largest proportion of intra-provincial mobility, accounting for 89.5%, while the out-of-province floating population only accounts for 10.5%; while the intra-provincial population mobility in the western region also reached 81.2% (200). In the total population of the eastern region, the population within the region accounted for 54.3%, while the inflow population accounted for 45.7%, which was significantly larger than that of the central and western regions. This shows the trend of labor flow to the eastern region.

The flow and migration of population inside and outside the province is dominated by the urban population, and the rural population accounts for a small proportion. From a national perspective, 77.4% of the migrants within the province came from cities and towns, while the urban population of

the migrants outside the province reached 81.2%, and the rural population only accounted for 18.8%. This also reflects that from an overall perspective, the tendency of people with urban hukou to flow is greater than that of people in rural areas. From the perspective of different regions, there are certain differences in population migration. In the intra-provincial movement, the rural population in the eastern region accounted for the largest proportion, reaching 28.6%, and the central region had the smallest proportion, accounting for only 13.9%. Among the inter-provincial population flows, the rural population in the western region accounted for the largest proportion, reaching 23.3%, far higher than the national average (201). To a certain extent, it can be considered that for the rural population, the economically developed areas tend to move within the province, while the economically underdeveloped areas tend to move across the provinces.

After excluding the floating population in the province, the inter-provincial labor mobility can be investigated from the relationships within and among the three types of regions. Population flow takes the form of from inland to coastal areas, from underdeveloped areas to developed areas. Migrating and floating population gather in economically developed areas. However, from the perspective of the regional distribution of migrants, the eastern region is the region that attracts the most influx of people. The proportion of regional population mobility in the eastern region is basically the same as the national trend. The population from the central and western regions accounted for 78.1%; the central region Among the population, the proportion of the population from the east and the west is 66.2%; the western region is the region with the least inflow of the population, and the population from the east and the central region only accounts for 44.5%.

With regard to the flow of talents between provinces, there are also differences in the flow of population within different regions. Taking the eastern region as an example, Liaoning, Jiangsu, Zhejiang, and Fujian are the provinces with large population inflows, followed by mountainous areas.

East and Guangdong provinces. The five provinces and cities of Beijing, Tianjin, Shanghai, Guangxi and Hainan accounted for a relatively large proportion of the population movement in the region, especially the proportion of the population from the eastern part of Tianjin was more than half. For the central region, only the three provinces of Inner Mongolia, Anhui and Henan have relatively large population inflows, exceeding 60%, while the inflow of out-of-region populations in Jilin and Heilongjiang provinces is relatively small, accounting for less than 40%. For western provinces and cities, the proportion of inter-regional population flow is generally small. Only Shaanxi and Gansu provinces have relatively large inflows of out-of-region populations, with the proportions being 65.6% and 45.7% respectively (202). The population flow of the remaining provinces and cities is based on intra-regional population flow.

Central Chongqing and Tibet accounted for the largest proportion of intra-regional mobility, reaching 69.1% and 86.8% respectively.

Based on these facts, it can be considered that there is a clear gradient in population flow between regions in China, which is closely related to the level of economic development in different regions.

2.4.4 The basic characteristics of the regional mobility of talents in China

In the flow of talent, whether talent flows from developing countries to developed countries, or from developed regions to underdeveloped regions, or flows between different industries, enterprises, and units in the same region, the flow of talents mostly shows three basic characteristics

2.4.4.1 Talent flow aims at self-development

Talents, especially high-tech talents, need to create space for career development, freedom of research and development and a platform for creation (203). The investment in research and development and the investment in education is an important link in the formation of human resource cohesion. Given a certain salary level, what talents value most is the space and environment for local career development. If only high salaries are given to talents, and there is no research and development environment, talents will leave after a short stay.

For example, the "Silicon Valley" of the United States is equipped with such conditions to gather the world's best entrepreneurial talents, with the richest human resources, and become the place with the highest talent density in the world. Talents, especially high-tech talents, are human capital with high technology content and high "added value". They are both a production factor and a capital. As an active factor of production and capital, it will actively seek the market for high-tech products. Only the market for high-tech products can gather high-tech talents.

2.4.4.2 Talent flow for self-realization

The realization of the value of talents must be based on national financial resources. Only by increasing the country's economic strength and overall national strength can it be possible to gather human resources. Similarly, if a region or an enterprise wants to attract talents needed for development, it must be backed by its own economic strength, including intangible assets and tangible assets, especially intangible assets. This interdependent relationship between human resources and wealth determines that wealth is a condition for gathering talents. Conversely, the accumulation of human resources has also led to a sharp increase in wealth, which includes both social wealth and personal wealth (204).

2.4.4.3Talent flow has a concentration effect

Globally or within a country, capital always flows to places with rich capital. The richer a place is, the more it can gather funds, while it is difficult for a poor place to raise funds. This is the "Matthew" effect in economics. The "Matthew" effect is also evident in the flow of human resources. As the most important factor of production, human resources are human capital with a large amount of knowledge and skills. Therefore, human resources also have the basic attributes of capital. The

richer the human resources of a country or an enterprise, the more it can attract and gather talents, and talents will always move actively to places with abundant human resources. Combining the status of population flow between regions in my country and the basic characteristics of talent mobility, it can be concluded that the regional mobility of talents in my country reflects the following characteristics:

(1) Talents flow from the underdeveloped areas in the central and western regions to the economically developed areas in the east. The polarization is obvious. Western geologists believe that the distribution of wealth is related to the distance from the coastline. The closer to the coastline, the higher the degree of wealth, and vice versa. The lower. Therefore, the density of talent distribution is related to the distance from the coastline, and the direction of talent flow is generally to migrate to cities close to the coastline. With the development of the economy, the flow of talents in our country has a one-way trend, that is, flowing from the underdeveloped areas in the central and western regions to the economically developed areas in the east, and the brain drain phenomenon in some areas is serious. The economic development of the inland areas is lagging, and there is a huge shortage of talents in various fields. However, due to geographical environment, economic development and policy, these areas not only have no advantages to attract talents, but the original brain drain is also very serious. Most of the talents flowed to the richer and economically developed areas along the coast. The brain drain in underdeveloped regions is obvious. For example, in the past 12 years since 1992 in Gansu colleges and universities, the total number of high-level brain drains has basically remained between 97-114. The lost talents with associate senior professional title or above accounted for 26% of the total lost talents, of which the number of senior titles accounted for 5%, and the number of associate senior titles accounted for 21%; from the perspective of the academic structure, the lost talents with postgraduate qualifications accounted for the total number of lost talents 45% of those with a master's degree and 10% with a doctor's degree; from the perspective of age structure, talents under the age of 45 account for 89% of the total number of talents lost. From 1978 to 2003, the total scale of cross-province and city migration of talents was about 50 million, and the total net loss of talents from underdeveloped regions was about 2 million. On the contrary, the frequency of introducing talents in coastal areas has accelerated (205).

For example, Guangdong Province introduced 141,000 technical personnel from outside the province from the beginning of reform and opening up to the end of 2000; Shenzhen introduced 21,600 foreign talents from January to July in 2002. With the gradual facilitation of the flow of talents, the polarization of the flow of talents in our country has become more and more serious. The flow of talents from the central and western regions to the eastern coastal regions, from poor and backward areas to economically developed regions, and from rural to urban areas has always been the main feature of domestic talent mobility.

(2) Talents circulate among state-owned enterprises, foreign-funded enterprises, and private enterprises

The flow of talents from state-owned enterprises and institutions to foreign-funded enterprises and private enterprises is mainly due to changes in the operating environment and corporate strategies of foreign-funded and private enterprises. After China's accession to the WTO, a large number of foreign-funded enterprises have entered China, and the industries that China has promised have continued to open up. Multinational companies entering China have increasingly realized the importance of the localization strategy of enterprises (including talents). Many foreign companies have higher salaries and challenges. Sexual work, excellent corporate culture and a good institutional environment, and also providing opportunities for foreign training and improvement of talents, have enabled a large number of domestic talents to enter these multinational companies and foreign companies in China. The latest statistics show that there are nearly 15 million Chinese working in "three foreign-funded" enterprises, of which about 2 million are in management and technical work. A large part of these talents have moved around the world to become transnational talents (206). With the vigorous development of my country's private enterprises, their flexible employment plans and challenging job prospects have also attracted a large number of talents from state-owned enterprises. In particular, the privatization of state-owned enterprises in prefecture and county-level regions has made the original state-owned enterprises

The vast majority of talents in enterprises have been transformed into talents from non-state-owned enterprises, with unprecedented speed and scale.

According to the survey, in 2000, the proportion of talents flowing to foreign companies and joint ventures reached 54.7%, of which 67.5% were in Beijing, Shanghai, and Guangzhou, and 25.4% were flowing to private enterprises. Affected by the 2008 financial crisis, the operating environment of foreign-funded and private enterprises has been greatly impacted, and the employment environment and treatment conditions have also shrunk significantly (207). At this time, state-owned enterprises and institutions featuring "stability" have begun to become a field for talents. There is a tendency for talents to flow back to state-owned enterprises and institutions from foreign-funded enterprises and private enterprises. According to the survey statistics of different types of employers in the "2009 China University Student Employment Report", undergraduate graduates have five categories of government agencies/scientific research occupations, state-owned enterprises, Sino-foreign joint ventures/foreign-funded/sole proprietorships, non-governmental non-profit organizations, and private enterprises or individuals.

(3) A large number of highly educated talents flow from domestic to foreign countries

Regarding the cross-border flow of talents, according to relevant statistics, since 1978, there have been 4 million people going abroad for private purposes, of which more than 2 million have been permanently relocated. In recent years, the number of Chinese students studying abroad has been increasing sharply. According to data released by the Ministry of Education, the number of overseas students from 1998 to 2003 reached more than 500,000, which was 2.5 times the number dispatched from the founding of the People's Republic of China to 1977. According to statistics, as of the end of 2003, my country had dispatched more than 70,200 international students, and about 172,800 had

returned to China. At present, there are 527,400 students studying abroad. Excluding those who have not completed their studies, nearly 400,000 international students have stayed abroad. The number of returnees accounted for only 24.7%, and more than 75% of international students stayed abroad after completing their studies. Moreover, the level of expatriate talents is relatively high, among which outstanding students from prestigious universities (208).

The highest proportion. For example, 80% of Tsinghua University graduates involved in high-tech majors go to the United States, and the proportion of Peking University is 76%. Most of the international students studying abroad go to the United States. China has also become one of the Eastern countries with the largest number of foreign-born scientific and technical personnel employed by the United States.

(4) The trend of talents flowing from abroad to China is gradually obvious

In recent years, with the rapid development of China's economy, the continuous improvement of the investment environment, and the continuous improvement of the talent incentive mechanism, the domestic attraction and cohesion of overseas talents has gradually increased. According to relevant data, 80% of the top 500 companies in the world today have entered China and established more than 100 research centers in China. The Chinese popular style that has quietly emerged in developed countries and regions has attracted many overseas talents to work in China, and the momentum of international talents landing in China is gradually increasing. For example, the number of permanent foreign talents in Beijing has been increasing year by year, and has exceeded 80,000 so far. The number of talents employed in Shanghai has grown rapidly. As of June 2003, the number of talents from Hong Kong has reached 3,432, an average of 70% per year. The above proportion is increasing; Shenzhen, as a window of reform and opening up and a highly internationalized city, has more than 10,000 senior talents resident abroad and overseas. In addition, the upsurge of overseas students returning to China is also on the rise. The development opportunities and space brought by my country's economic development, as well as the negative impact of last year's financial crisis, have resulted in a large number of overseas students or staff returning to work or start their own businesses (209). As of November 2008, according to statistics from the Chinese Embassy in the United States, the total number of overseas students returning to work in 2008 was one-sixth of the total number of returnees since the reform and opening up, and it was also the year with the largest number of returnees in recent years.

The trend of regional talent mobility is getting stronger, showing the characteristics of larger number, wider scope, increased ratio, faster frequency, and distinct levels. With the improvement of economic development, the total amount of regional talent mobility in my country has been significantly greater than before. The improvement involves various industries and industries; the level of talent mobility is improved, and the level of competition is clear. There is obvious competition in the talent market from high-end to low-end. It has the characteristics of larger number, wider range, higher ratio, faster frequency, and distinct levels. This is also the inevitable result of China's economic development. In the past, the flow mainly driven by management system reform

and corporate system differences turned to market-driven flow. Talent allocation, talent resources, talent structure, talent training and talent quality. They have gradually been in line with international standards and embarked on the path of internationalization. . According to a 2001 survey of 49 foreign-funded companies in 5 major cities in China, the average turnover rate of managers and general employees was 13%, of which the turnover rate of managers in Shenzhen reached 17.5% (210).

2.4.5 Analysis of the Status Quo and Environment of China's Talent Market

The talent market is the place where talent resources are traded and distributed. The main function is to use market mechanisms to coordinate the supply and demand of talents, promote the rational flow of talents, and realize the reasonable and effective allocation of human resources. The construction of my country's talent market system has become an embryonic form, and the construction of talent service institutions has accelerated. The basic situation of talent flow and talent market development announced by the Ministry of Personnel on May 16, 2006 shows that my country’s market-oriented allocation of human resources has further accelerated, the flow of talent has become increasingly active, and the development and allocation of human resources are playing an increasingly important role in economic and social development. protrude.

As of the end of 2006, there were 6,629 talent service organizations of various types across the country, and 2,776 fixed talent exchange places were established, with 51095 employees. Among them, there are 3,500 talent service organizations affiliated to the personnel administrative departments of governments at all levels; 633 talent service organizations affiliated to industry competent departments; 2,427 private talent service organizations; and 69 Sino-foreign joint venture talent agencies. At the same time, a total of 3171 various talent market websites and 5,077 talent databases have been established nationwide, and the service network has been further improved. In 2006 alone, there were 28.39 million pieces of information on demand for incoming talents, and 85.27 million pieces of job search information were provided. In 2006, there were a total of 276 talent service agencies across the country.

Tens of thousands of individual units provided talent services, and 8.6 million people found jobs or changed jobs through talent service agencies, an increase of 28.7% over 2005. In the same year, various talent service organizations across the country received 62.45 million mobile personnel, an increase of 40.5% over 2005; the registration required 2015 million mobile personnel, an increase of 33.4% over 2005. Jobseekers under the age of 35 and undergraduate (including undergraduate) are still the main applicants for registration of mobile talents, and non-public economic organizations have become the main targets of talent services. At present, my country's talent service field and service content are showing an increasingly diversified trend. The talent service business has expanded to personnel agency, talent information network, talent training, talent evaluation, human resource management consulting,

Talent dispatch, etc., the scope of talent services has been further expanded, and service capabilities have been further improved. In 2006, the nationwide talent service agencies provided agency services in personnel file management, talent recruitment, talent planning consulting, social insurance, etc., to 330,000 employers, and represented 5.39 million talents of various types. 35,000 talent exchange meetings were held, 42.72 million job-seeking talents participated in the conference, 2.17 million people participated in the conference, and 13.09 million intentions were reached. Provided 5.68 million person-times based on personnel files, such as file salary adjustment, file inspection, and issuance of relevant certificates. The national talent service agency provided 293,000 people with professional and technical title evaluation applications.

Report work; held 26,000 training courses and trained 2.08 million talents. It also provided talent dispatch services for 56,000 households and dispatched 780,000 talents. Organized 41,000 talent assessments, provided 390,000 talent assessment services, provided 58,000 various human resource management consulting services for employers, served 730,000 talents of various types, and selected 44,000 senior talents of various types. The increasingly perfect talent service has played an increasingly important role in promoting the employment of college graduates.

According to statistics, as of the end of 2006, there were 3,481 employment service agencies (windows) for college graduates established by talent service agencies affiliated to personnel departments of governments at all levels. Among them, 16.07 million college graduates were received in 2006, and 8.22 million college graduates were required to register for employment. Public service activities such as recruitment, employment recommendation, training, employment guidance, and information consultation for college graduates were fully carried out, and 2.06 million were helped. University graduates found a job.

The development and improvement of the talent market system and the construction of an integrated regional mobile talent market play an important role in improving the marketization and scientific degree of talent allocation in the region and promoting the coordinated development of the regional economy. At present, the construction of China's talent market has achieved great results and laid a good foundation for realizing the rational flow of talents. However, as a relatively new product of my country's talent market, there are also many problems in the specific operation process, which are mainly reflected in :

(1) The talent market system is not perfect

Under the planning system, talents are allocated by the state to various units and regions. Individuals have no independent employment rights and no intermediate links. The flow of talents is restricted by local and regional restrictions. Even today, people still subconsciously exclude and discriminate against foreign talents, and they do not allow other talents to work in the "own unit". The management of talents in many regions is carried out by adopting the mode of national management cadres. For example, in terms of file salary management, job title evaluation and employment, pension insurance payment, etc., it is fully implemented in accordance with the standards for

managing state cadres. The establishment of the talent market is also organized according to government plans, rather than independent development and operation in accordance with market needs. Market service functions extend government service functions, rather than fair competition.

A series of reform measures supporting the development of the talent market have not been implemented. For example, the reform of state-owned enterprises, the cadre and personnel system, the reform of the household registration system, the reform of the file management system, the reform of the insurance system, etc., remain more or less at the level of the planned economy. The layout of the talent market is also not quite reasonable. There are not many markets that really have radiation functions. Most of the markets are similar, and they have not created brand characteristics in conjunction with the economic development of the region.

(2) Information asymmetry in the talent market

The basic function of the talent market is to realize the distribution of talents among various social uses through the transfer and purchase of the right to use talents. However, due to the particularities of both parties in the talent market, namely the demand side and the supply side, the market information is not smooth, which is embodied in the information asymmetry between employment opportunities and talent demand resources.

For the demand side of the talent market, that is, the employers, the information they know about talents can only be obtained through the recruiter's resume, speech and behavior, external image, etc. As for the candidate's future work ability, production capacity, and handling of people Attitudes, sense of responsibility for work, etc., these will only be understood after the talents are hired for a period of time. Therefore, for applicants, they will exaggerate their own power and weaken their own

On the downside, there is the risk of adverse selection. If the employer wants to obtain more comprehensive information, it must conduct a comprehensive search, which increases the cost of the enterprise. For applicants, their understanding of the position is far less than the employer. In recruitment, employers will exaggerate the advantages of the job, weaken or conceal the disadvantages of the job, so as to induce candidates to accept the job with a lower bid. Therefore, there are often invalid flows due to information asymmetry, which wastes flow costs.

In addition, the intervention of the talent intermediary structure makes this information asymmetry more prominent. Due to the special form and nature of the services of intermediary agencies, the short-term nature and profit-oriented nature of their services are determined. In this way, in actual operation, there is an incentive to provide false information to get paid. Most of the talent intermediaries in the current market not only failed to play a role as a link in the talent market, employers and talent training institutions, but instead spread false information on technological value and market price information, artificially forging between talents and employers A barrier,

which aggravates the contradiction between the supply and demand of talents to a certain extent, and leads to the failure of market regulation.

(3) The service function of the talent market is not perfect

The talent market in my country is mainly a government-owned talent service organization, which has administratively extended public service (management) functions and market operation service (handling) functions. Talent service organizations are largely dependent on the government's administrative management and do not have specialized market allocation services, so that they collect, store and release talent information, talent exchange, talent supply and demand balance, personnel agency, and talent information networks, etc. There is a lack of function, and it is unable to provide multi-level and all-round services to meet the various needs of different employers. At the same time, the boundaries of talent market services are blurred, and they cannot distinguish their public (public welfare) services from business services, which affects the reasonable allocation of human resources and the public service of personnel talents. The narrow service scope and monotonous service methods of the talent market also affect the function of the talent market. Therefore, the service functions of the talent market also need to be diversified, develop a talent quality evaluation mechanism, and provide a wider range of services including career guidance business, talent leasing business, training business, enterprise talent team deployment forecast, talent agency and price analysis and evaluation.

(4) The supply and demand of talents are out of line, and the contradiction between supply and demand in the region is prominent

The rapid development of the new economy and the inherent characteristics of talents have formed a strong demand for talents. The demand for talents in the new economy is very flexible. As the growth rate accelerates, the demand for talents also increases. However, the elasticity of the supply of talents is relatively small. According to the forecast of educational institutions, in 2010, there will be 8,706,100 talents with a technical secondary school degree or above, and the required talents will be 113 million, and the talent gap will be 104.297 million. The structural contradiction between talent demand and talent is prominent, and the talent demand structure and professional structure are unreasonable. Although our country is a populous country, the labor force is low-quality. Senior talents, especially those with management and technological innovation capabilities, are relatively small, and the number of talents with modern scientific and technological knowledge and application skills is in short supply. Judging from the current severe forms of employment, the difficulty of employment coexists with the difficulty of demanding talents. The shortage of professional talents in industrial technology and machinery and the oversupply of professionals in law and foreign languages reflect the structural contradiction between the supply and demand of talents in China, and the talent market in a severely unbalanced state. This contradiction between supply and demand also exists in the regional economy. The "migrant labor shortage" in the regional economic development of the "Yangtze River Delta" and "Pearl River Delta" reflects the contradiction between the supply and demand of talents.

(5) The degree of regulation of the talent market is not high, lacking unified standards and industry rules

At present, my country's talent market does not have certain norms and guidelines to constrain the behavior of subjects and objects, and there is no standardization and standardization of market advances and retreats, transaction behaviors, methods, and prices. False diplomas and false recruitment information flood the talent market, and disorderly competition is also obvious. In addition, the intermediary agencies in the talent market are not standardized and have low integrity.

Supervision and management, some intermediary agencies charge excessive fees or fraudulently obtain deposits and other illegal activities cannot be stopped in time. These bad behaviors have not only caused serious harm to social credibility, but also are not conducive to the expansion of normal business in the talent market (210). Practice has proved that the cultivation and construction of the talent market not only effectively promotes the rational flow and allocation of talent resources, but also promotes the overall deepening of the reform of the personnel system, laying an important foundation for the comprehensive implementation of the national talent strategy in the new century. However, it must be admitted that the current level of development of China's talent market is still not high, and a series of problems in the flow of regional talents are still restricting the rational allocation of China's talent flow and the construction of talent teams.

2.4.6 Analysis of the influence and main problems of the regional mobility of talents

2.4.6.1 The economic and social impact of regional mobility of talents

In general, the impact of regional mobility of talents on the economy and society can be divided into three aspects:

(1) The impact of brain drain on regional economic gap

Due to the gap in the level of economic development, talents in the central and western regions are gradually attracted by the relatively superior conditions of the eastern developed regions, leading to serious brain drain in the central and western regions of our country. The brain drain not only causes the loss of human capital investment in these relatively underdeveloped regions, increases the replacement cost of talents, and affects the popularization and improvement of regional national scientific and technological quality; it also causes the outflow of intangible assets such as business and technical secrets of the organization. This will weaken the competitiveness of business organizations in these regions. This undoubtedly further widened the imbalance in regional economic development (211).

(2) The impact of talent mobility on regional economic cooperation

In today's society, talents are the main driving force of economic development, and the flow of talents is of great significance to the development of regional economic cooperation. The flow of

talents promotes the flow of technology, capital, information, management, etc., thereby driving the flow of various resources to areas that can be fully utilized and realizing the greatest value. At the same time, it also realizes the rational allocation and effective use of human resources, and ultimately promotes economic growth. . With the development of the economy and the implementation of various economic policies, the booming economy in my country's eastern coastal areas and various economic development zones is undoubtedly the result of the influx of talents into these areas. The development of these regions has also promoted the flow of talents between regions in our country. The emergence of the trend of regional mobility of human resources in my country not only indicates that the role of human resources in regional economic development has been gradually recognized, but will further promote the diffusion of knowledge and technology, improve organizational competitiveness, and promote regional economic development from relying on material resources and market resources. Relying on the transformation of human resources to drive the rapid growth of the local economy. At the same time, the flow of talents has also prompted the government to continue to simplify the approval procedures for the flow of talents, improve management methods such as household registration, files, and social security that affect the flow of talents; reduce the cost of the flow of talents, and actively play the role of the talent market at all levels to provide a comprehensive , Sensitive talent information and various intermediary services, so that talents can be reasonably allocated among regions, and a fair competition is created.

Compete for the environment and improve the efficiency of the use of talents, thereby further promoting the development of inter-regional economic cooperation.

(3) The impact of talent flow on technological progress

Technological talents are the advocates and promoters of technological progress. The flow of technological talents between regions will greatly promote technological progress and play its role in economic development. The flow of scientific and technological talents has a huge impact on regional economic development. It is a kind of benefit for the inflow area, which can bring great potential benefits; but it is a huge loss for the brain drain area or the company enterprise, because the brain drain takes away not only the technology, but many areas or the core of the company Technology or secrets are also taken away. What's more, related technical backbones were also taken away, causing the company to almost face technological paralysis, changing its market share, and greatly weakening its competitive advantage (212). The flow of scientific and technological talents plays a decisive role in economic development. Therefore, local governments of various regions, provinces and cities have adopted various systems and preferential policies to attract the influx of scientific and technological talents.

2.4.6.2 The problem of brain drains

The problem of brain drain does not only exist between countries. The previous data analysis is not difficult to find that the phenomenon of brain drain in my country is very serious, and the outflows are people with high technology or high education; the process of talent flow between regions In

China, due to the difference in economic development and the effect of the market economy, the phenomenon of brain drain in relatively underdeveloped areas in the central and western regions is serious. In particular, there is a serious problem of the loss of scientific and technological talents in the inter-regional flow.

The gap in the number of talents between coastal and inland regions has been widening. In recent years, the number of scientific and technological talents per 10,000 population in my country has been continuously increasing, but the growth rate of the number of scientific and technological talents per 10,000 in the three major economic regions of the east, central and western regions is different. From 1999 to 2003, the number of science and technology talents per 10,000 people in the eastern region increased steadily. In 2003, the number of science and technology talents per 10,000 people in the eastern region increased by 56.57% compared with 1999, which is a large increase. In 2003, the number of scientific and technological talents per 10,000 people in the central region increased by 25.12% compared with the number in 1999, and the growth rate was second to that of the eastern region. In contrast, in 2003, only 17.43 people per 10,000 people were engaged in scientific and technological activities in the western region. Compared with 1999, the number of scientific and technological talents per 10,000 people in this area has increased by 9.83%. From 2001 to 2003, the number of scientific and technological talents among 10,000 people in the western region even showed a downward trend. It can be seen that the regional distribution of scientific and technological talents in China is uneven, and this imbalance is still increasing. The western region of my country occupies 71% of the country's land area, but various types of professional and technical personnel account for less than 20% of the country's total land area (213). The eastern region occupies 11% of the country's land area. 3.44 million professional and technical talents are idle, which is equivalent to the number of college students trained in the country for three years.

The gap in the number of talents is the result of brain drain. The exodus of high-tech talents in the western region is serious. Attracted by the superior conditions of the coastal areas, many scientific and technological talents from western provinces and regions flow there. Among the exodus of young, titled and highly educated talents, highly competitive scientific and technological personnel account for a relatively high proportion, and these talents are often the urgently needed talents and corporate backbones in the western region. According to incomplete statistics, since the 1980s, the outflow of talents in the western region has been more than twice that of inflows, especially among the young and middle-aged backbone talents. In recent years, more than 35,000 scientific and technical personnel have been transferred from the western region to the coastal areas, and most of them are middle and senior personnel (214). Take Guizhou Province as an example. According to the statistics released by the Guizhou Provincial Bureau of Statistics, since 1995, Guizhou has transferred 34,130 professional and technical personnel from the province. In addition, more than 5,000 students in the province are admitted outside the province each year. Key colleges and universities, of which less than one-third of them returned to work in the province after graduating, and the number of postgraduates returning to work in the province was even smaller; as of 2004, the province had sent more than 330,000 people out for training, and only 110,000 had returned. The brain drain phenomenon is very serious.

2.4.6.3 Analysis of the causes of brain drain

There are many reasons for the brain drain, mainly from the two perspectives of the distribution mechanism and the working environment.

To analyze the difference between the east and the west and its impact on the brain drain.

(1) In terms of the distribution mechanism, the distribution mechanism of the eastern, central and western regions is very different

Most areas in the central and western regions implement a fixed wage system, while the assessment and reward system in the east is more flexible and more humane. In the western region, the distribution mechanism in many places is rigid, and income is “equitable”. The income of scientific and technological personnel cannot be fully linked to their own labor, which affects the display of their enthusiasm. This phenomenon mostly occurs in state-owned enterprises and institutions, where the difference in remuneration between mental and manual labor is relatively small. Even if professional and technical personnel receive bonuses and subsidies, in order to improve interpersonal relationships, they often need to use the money to reward everyone. In many places, the concept of "official status" is serious, and the benefits of housing, car use, bonuses, and medical insurance for local officials are much higher than those of professional and technical personnel. Such an environment not only fails to attract talents from other regions, but the enthusiasm and initiative of existing talents are also suppressed, let alone played out. In contrast, the distribution mechanism of most enterprises in the east is very flexible. Most of them implement distribution based on production factors. The invention patents and contributions of scientific and technological talents can be priced as shares to participate in the distribution, and their creative work can be fully affirmed and reflected through high salaries. In addition, the government departments in many cities in the east have more prominently served the function of serving enterprises, simplifying the procedures related to the movement of enterprises and individuals, and greatly facilitating the influx of talents.

Due to the different levels and speeds of economic development, the implementation and implementation of material policies in the eastern and western regions are also quite different. Many local governments in the west have implemented policies to attract talents with far less effort than in the southeast coastal areas. At present, the economic income of all types of talents working in the west is only 1/2 to 1/3 of the income of similar talents of the same grade in the east. It is estimated that if the income of talents in the east and west is basically the same, it can curb about half of the brain drain. The wages and benefits offered by many employers in the eastern region cannot be satisfied by the vast majority of western enterprises. This is also an important reason for the brain drain in the west (215).

(2) In terms of working conditions, there are huge differences in working conditions between the east and the central and western regions

Due to the poor geographical location of the western region, the development started late after the reform and opening up, and capital investment was low, resulting in slow market development, backward infrastructure, and fragile ecological environment. These factors have severely affected the inflow of talents. In contrast, the eastern region has a more developed economy and culture, attracts more investment, and has a more robust market. The capacity of many private enterprises for talents has far exceeded that of state-owned enterprises. This well-functioning economic environment has become an inevitable factor to consider before talents flow across regions.

In the west, state-owned enterprises and scientific research institutions where talents are mainly concentrated have major drawbacks, difficult reforms, and inefficient use of talents. Many units adopt conservative management methods for the software and hardware facilities required for talents to play a role. The utilization rate and update rate are low, and it is difficult for talents to have opportunities to go abroad for further training, which restricts the development of talents. On the contrary, the strong economic strength of the east can provide the hardware environment for talents to play a role, and its humanistic environment is also very superior. Opening to the outside world started early, transportation is convenient, there are many colleges and universities, and there are many opportunities for talents to participate in seminars and advanced studies. There are also many opportunities to get in touch with new ideas and new technologies at home and abroad. For outstanding contributors, regular paid vacations and inspections are also arranged, which is beneficial to talents. Sustainable development.

The economic aggregates in the western region are small and technological strength is weak. The project results are far from the needs of local economic development, and there is a lack of corresponding market support for the transformation, promotion and application of the results. There is also a lack of collaboration among universities, scientific research institutions, financial institutions, and business entities, making it difficult for western talents to apply for patents, publish monographs, and transfer results. Under this circumstance, even if scientific and technological talents have their own scientific research projects, it is difficult to transform the technology into products that are recognized by the market. In contrast, the market in the eastern region developed earlier, and the coordination mechanism of industry, academia, research, and banking has taken shape. Many companies have a strong demand and clear orientation for scientific and technological achievements. Because of these stark contrasts, many talents in the west have no choice but to carry years of research results to the east to find greater development opportunities.

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Chapter 3

RESEARCH METHODOLOGY

3.1 Theoretical basis of the method

3.1.1 Inroduction

This research applied the evaluation method of the economic value of environmental goods in the field of economics to establish the main experimental framework [1]. The main techniques of measuring the economic value of environmental goods are composed of two main categories: stated preference method and revealed preference method, as shown in Fig 3-1.

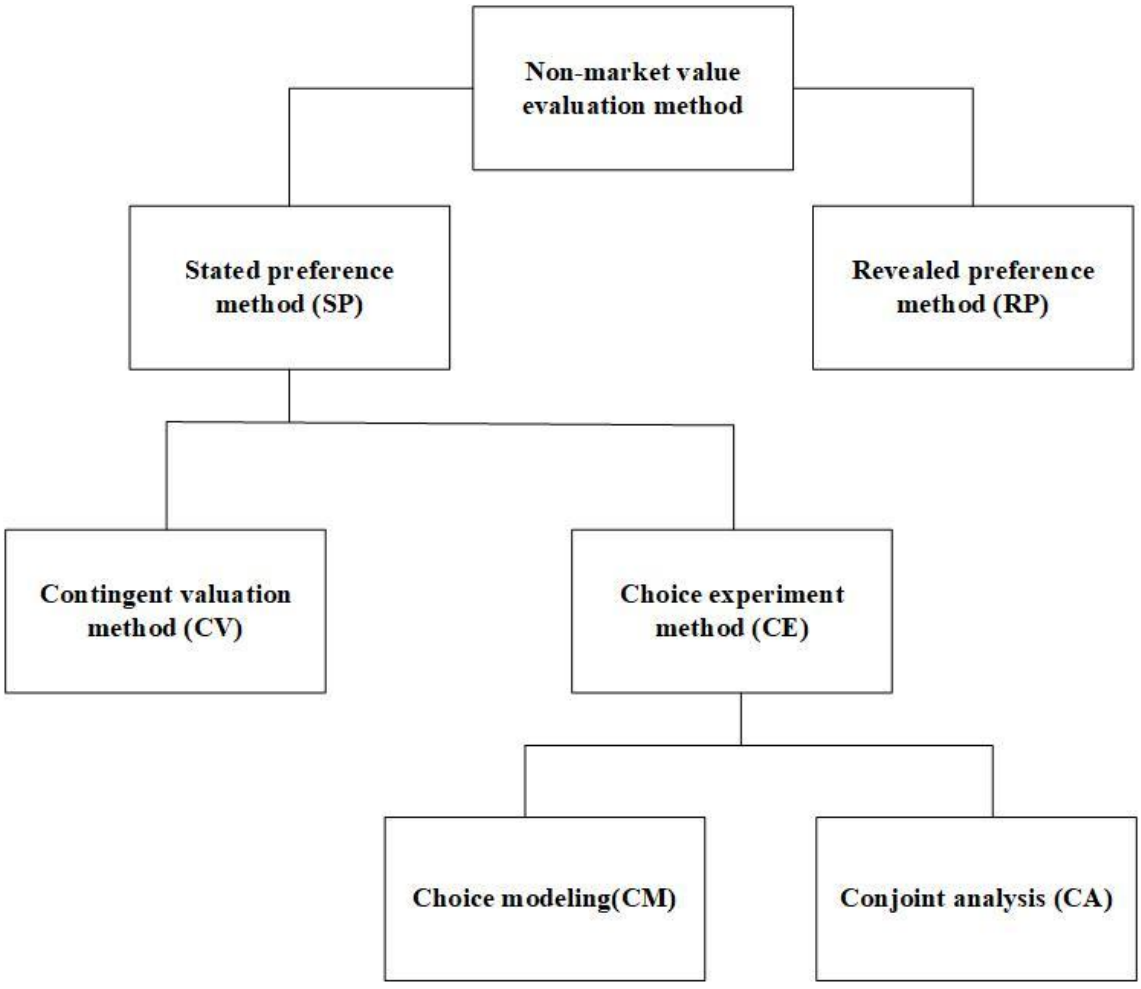

Figure 3-1. Classification of non-market valuation methods

Revealed preference method revealed consumers' preference with regard to environmental good indirectly using market-related information, and estimating the economic value of environmental quality changes, which, however, can only assess the use value [2]. Revealed preference method includes benefit transfer method, market cost method, travel expense method and hedonic price method. Stated preference method refers to eliciting consumers' preference for specific

environmental goods or services by direct asking. The most commonly use stated preference method is the conjoint analysis method, which obtains people's willingness to pay for the benefit of environmental improvement. It could estimate the economic value of a specific environmental goods or service.

Compared with the revealed preference method, conjoint analysis method has obvious objective and efficient characteristics as follows：

1.Objectivity. The traditional method is actually a direct inquiry method, which means that researchers need to ask whether various product attributes are important for them to make a purchase decision until the final consumer can give a most preferred combination of attributes. But this kind of combination is often impractical. For example, consumers like products with high levels of various attributes. Obviously, such products cannot exist. Therefore, the direct inquiry method often produces biased data.

Conjoint analysis is actually an indirect research method that transforms the entire work into a series of choices or ratings, requiring consumers to rank products with different combinations of various attribute levels, and then analyze the relative importance of each attribute. Sex and the popularity of various combinations of levels are obviously more objective and realistic.

2. Efficiency. For many research, the number of products that can be combined with all attributes and levels is very large. For example, if a product has three attributes and each attribute has four levels, there are 64 alternative products. It is undoubtedly difficult for respondents to evaluate all combinations, and conjoint analysis method can obtain the best combination of various attribute levels through orthogonal design methods, so as to obtain as much information as possible with as few combinations as possible, thereby greatly improving the efficiency of analysis.

3.1.2 Theoretical and technical background

The conjoint analysis method can show the different preferences of consumers for multiple attributes of products. It is currently the most widely used method to analyze the preferences of different attributes of environmental products. The main theoretical and technical backgrounds are as follows:

3.1.2.1 Theory of Consumer Preference

Consumer preference refers to the degree of consumer preference for a product or service, and it is an important factor influencing consumers' purchasing behavior. By analyzing consumer preferences, we can better understand the reasons why consumers choose one of the vastly different products over the other. Consumers can sort or rate products or services according to their own preferences. Generally speaking, the demand for a certain product is directly proportional to the degree of

consumer preference for this product. The more popular the product is, the more popular the product is. The greater the demand for. Its main characteristics and influencing factors are as follows:

1. Characteristics of consumption preference: (1) Difference. Different consumers prefer different products or show different preferences for the same product. (2) Stability. In the short term, the preferences that have been formed are difficult to change within a certain period of time. (3) Uncertainty. In the long term, consumer preferences will change with changes in the surrounding environment and personal habits. (4) Value is decisive. Consumers determine the value of the product through their own feelings. When the price of the product exceeds the consumer's budget, even if the consumer prefers this product, they will not consume it, so the product price will also have an impact on their preference.

2. Influencing factors of consumer preferences: (1) Internal factors: It refers to the different attributes of consumers themselves (age, gender, hobbies, education, income, etc.), which form different consumer preferences; (2) External factors: It refers to the general environment of consumers and the characteristics of the product itself. Due to the different political, cultural and economic environments of consumers, the attributes, prices, brands and promotional activities brought by the product itself Different forms of different consumer preferences.

In addition, these factors will influence each other, causing uncertainty in consumer preferences.

3.1.2.2 Basic assumptions of consumer preferences

1. Comprehensiveness. Consumers can always compare and rank different product combinations. Assuming that there are any two product combinations named No. 1 and No. 2, then consumers can only make one of the following three judgments: Consumers prefer No. 1 or No. 2 more, or there is no difference between the two. However, this comparison ignores the cost gap between No. 1 and No. 2. For example, the same consumer has the same demand for beer and liquor, so under the influence of price factors, he is likely to choose Cheaper beer. The comprehensiveness ensures that consumers' expressions of preferences are complete, and they can always accurately express their own preferences.

2. Transitivity. For any three commodity combinations No. 1, No. 2, and No. 3, if consumers' preference for No. 1 is greater than their preference for No. 2, and their preference for No. 2 is greater than their preference for No. 3, it can be concluded that consumers are the preference of No. 1 is greater than the preference of No. 3. The transferability of preference ensures the consistency of preference.

3. Unsaturation. For any two product combinations, if the difference lies only in the quantity of one of the products, then consumers will always prefer the product combination that contains a large number of such products. In other words, consumers always think that more quantity is better than

less quantity. If quality is guaranteed and the cost of all products is ignored, consumers will always choose more products.

These three assumptions are the basis and prerequisites for the research and development of consumer preference theory. Although they do not clearly explain what consumer preferences are, on another level, they prove that these preferences have a certain degree of rationality and logic.

3.1.2.3 Product attribute related theories

1. Product attribute definition and classification: Philip Kotler pointed out that product attributes are characteristics that consumers want to obtain through transactions. Different product attributes interact to form a product. Generally speaking, it includes all the external and internal features and properties of the product. There are many classification methods for product attributes, among which Mark E. Parry divides product attributes into four categories [3]: (1) Intrinsic attributes. Usually refers to the physical composition of the product, including raw materials, shape and size, manufacturing technology and process; (2) External attributes. The attributes that can be evaluated before the product is used, including the price, brand, and packaging of the product; (3) performance attributes. The properties that can be evaluated only when the product is in use. For example, the battery durability of an electric car can be evaluated by the time of use, or it can be evaluated by the user's survey. (4) Abstract properties. Refers to a certain attribute is a collection of multiple attributes. For example, the attractiveness of a certain car to consumers is a combination of attributes such as the brand, price, and appearance of the car.

2. Customer value hierarchy model

Woodruff states that customer value is the customer's perceived preference and evaluation of product attributes, effectiveness and use results that help (or hinder) achieving their goals and objectives in a specific use scenario [4]. As time changes, customers' perceptions of value will also change. Before purchasing a product, customers will pre-evaluate its value before purchasing, and then evaluate the value after purchase. At the same time, this evaluation becomes the basis of psychological expectations before the next purchase. In addition, in different stages of purchase, customers' perception of value may also be different. Therefore, Woodruff proposed the Customer value hierarchy model based on the "Means-End Chain model" in consumer behavior.

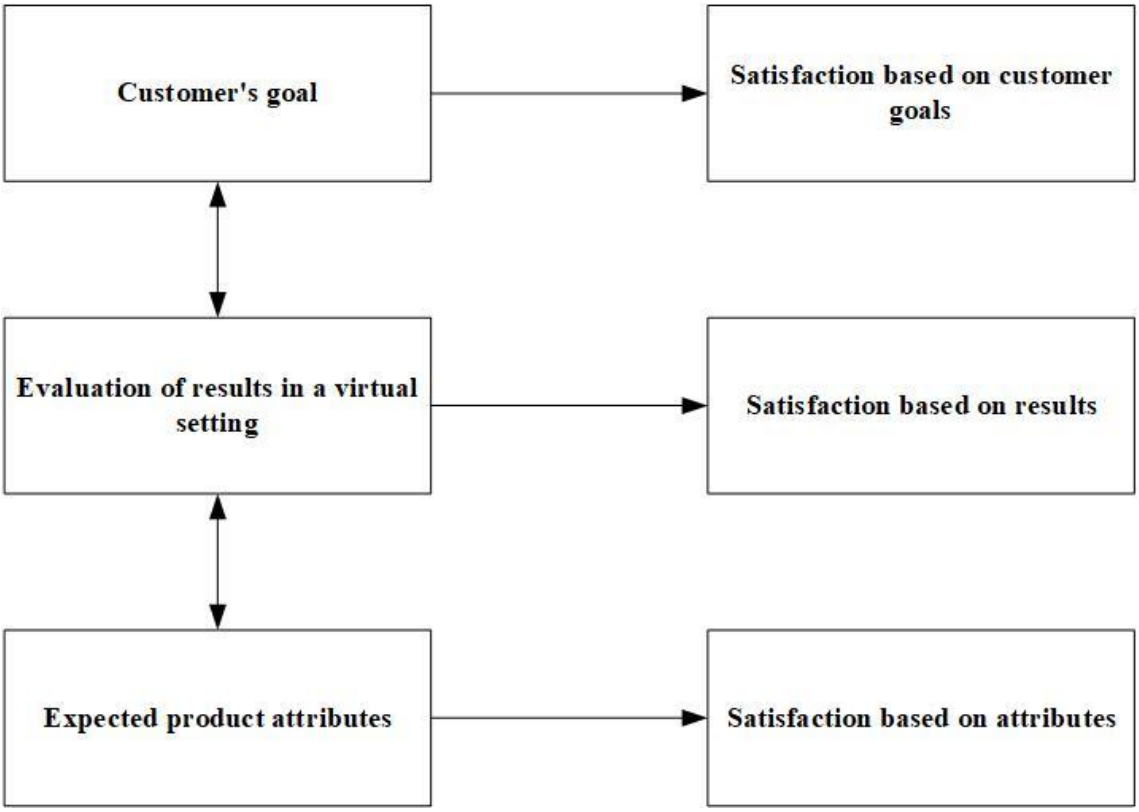

Fig 3-2 Woodruff's customer value hierarchy model

As shown in Figure 3-2, the customer value hierarchy model has three layers, from top to bottom, including the attribute layer, the result layer, and the final target layer. The attribute layer refers to the characteristics of the product, including concrete and abstract attributes; the result layer refers to the effect (positive or negative) after consumers use the product; the final target layer is the most important layer of consumer value, including attracting consumption The core value of the consumer and the purpose of the consumer. At the first level, when purchasing a product, consumers will consider the specific attributes of the product; at the second level, in the process of purchasing and using the product, according to these attributes of the product, customers will form expectations and preferences for the ability to achieve the expected results; At the third level, consumers will form expectations on the ability to achieve goals based on these results. This level model also proposes that customers will have a sense of satisfaction at this level by comparing the expected value of the product with the actual feeling value after use. Therefore, customers will have positive or negative feelings about product attributes, attribute effectiveness, use results, and achievement of target intentions.

3. Lancastrian demand theory

Lancaster proposed a new demand theory which indicate that when consumers buy a product or service, they value whether the product has the characteristics of meeting their own needs more than

the number of products. All possible feature sets below the budget will be sorted by consumers according to their degree of preference. Among them, the feature combination with the greatest degree of preference or the most utility is the consumer's optimal choice [5]. The product or service is only the carrier through which the consumer obtains the required characteristics, which does not have direct utility. When a purchase occurs, consumers are concerned that the product has characteristic attributes that can bring utility. Therefore, a product can be decomposed into a collection of different characteristics, and consumers do not obtain utility directly from the consumer product, but from the consumption of these characteristics.

The main assumptions of this theory are: (1) The product itself does not provide any utility, and the characteristics of the product produce utility to consumers; (2) A product has multiple characteristics, and different products may also have the same characteristics; (3)) The combined product may have different characteristics from the single product.

3.2 Conjoint analysis method

In daily life, consumers often face choices when purchasing a certain product or service. At this time, they usually compare the different characteristics of the product and choose the best result. Different consumers have different preferences. In marketing, the study of consumer preferences is very important. After determining the needs of consumers, businesses can judge which features and functions of the products will attract consumers, and make them desire to buy, and then put into production. Unlike market analysis that can only do qualitative research, joint analysis with multiple statistical characteristics can achieve quantitative analysis that traditional research methods cannot. By simulating the real purchase scenarios of consumers, participating consumers are allowed to choose and evaluate different combinations of products, and then collect these data for corresponding analysis and summary and obtain consumers' preference values for different features of the products. Companies formulate corresponding marketing strategies to provide assistance. Conjoint analysis method is a stated preference method which means that the method measures how a respondent states that he or she will react in a certain situation, for example which recreation area, out of a number of presented areas, that he or she would prefer to visit. As opposed to stated preference methods there are revealed preference methods. In a revealed preference study, the actual behavior of the respondents is studied. Although this seems more advantageous, the revealed preference method is hard to apply with assessment of environmental problems, since many situations cannot be studied directly.

Conjoint analysis is less used in the environmental economy but is growing trend is an effective way to calculate the willingness to pay marginally, inducing respondents. Preference and environmental issues are better [6]. The theory of joint analysis is the earliest Green and Srinivasan dating back to the 1920s, the underlying concept stems from consumer theory, developed by Lancaster, and assumed to be effective benefits can be reflected in the characteristic attributes of the item [7], the main meaning of which is the overall utility of the item can be broken down into the attributes of the item or its benefits. Different parts are embodied in the utility function as the characteristics of the

item. Use the parameters of the equation [8]. Joint analysis methods quickly evolved into the 20th century. In the late 1950s and 1960s, it was widely used in marketing and transportation. There are some successful cases in the environmental field [9]. Beggs et al earlierJoint analysis is applied to environmental case studies [10]; The discrete selection model has made great contributions from principle to application [11]; Lou-Selective joint analysis based on this study Law [12]. Respondents make choices about different product selection sets, choose. The scenes that you want to buy, the scene is more realistic. After that, based on the selection. In the 1980s, joint analysis developed into four forms, namely, full contour joint analysis (CVA), adaptive joint analysis (ACA), selection-based joint analysis (CBC), and hybrid joint analysis. This article chooses the traditional joint analysis (full contour joint analysis) and CBC. Choice-Based Conjoint Analysis (CBC)Started the application, Tiziano Tempesta choose to use conjoint analysis to landscape perception is an analysis of the quality of wine [13].

The aim of this chapter is introducing the different types of conjoint analysis methods and the proper statistic model for them. We could apply these different methods under suitable conditions. We believe that conjoint analysis and related methods have the potential for wider use in related research. We also see an opportunity to use results from these studies to enable a meaningful dialogue between experts, decision makers and stakeholders.

3.2.1 Basic principles and analysis steps of conjoint analysis method

1. The concept of conjoint analysis method： Conjoint analysis is a multivariate statistical analysis method which determines consumers' preferences for multi-attribute products by measuring consumer preferences for product attributes [14]. In the process of conjoint analysis, products are considered to have different combinations of different attributes. Based on this feature, researchers combine these attributes to form various simulated products and collect consumers’ evaluation and preference data on these products. Furthermore, they use the mathematical statistical model decomposes these data to quantify each attribute and its level. It also obtained consumers’ preference for different attributes of the product. The final analysis result can help us understand why consumers would buy this product instead of another one. Products [15, 16]. The dependent variable is the overall evaluation of a certain virtual product by consumers, and the independent variable is the different attribute levels that make up each virtual product.

2. Basic principles of conjoint analysis: When analyzing the attributes of a single product or service, it may not be possible to draw valid conclusions. However, if the attributes and attribute levels of the entire studied group are jointly analyzed, then the attribute utility is likely to be expressed through quantification. Therefore, conjoint analysis is based on a decomposition model. You only need to know the overall preference of respondents for something, and then you can use the relevant mathematical model to decompose it to obtain the relative importance and utility of each attribute [17]. The mathematical models used in joint analysis are introduced as below.

(1) Part-utility: The importance of the attribute level of a certain attribute of the product to consumers can be expressed by the part-utility of the attribute level. We can analyze and express it by establishing a mathematical model to reflect the preference of respondents It is the dependent variable, and the part-utility of the attribute level is used as the independent variable. Its mathematical model can be expressed as follows:

$$\mathrm{Y} = \mathrm{a} + \sum_{i=1}^{m} \sum_{j=1}^{n} V_{ij} X_{ij}$$

Where Y represents the score of preferences; i represents the number of attributes (1,2,3…, m); j represents the level of attributes (1,2, 3, …, n); a represents the intercept which is the utility without respondents choosing the profile; X_{ij} represents the estimated utility of the j-th level of different attribute levels and V_{ij} represents the estimated utility of the j level of different attribute levels (regression coefficients).

$$X_{ij} = \begin{cases} 1, \text{j level of i attribute} \\ 0, else \end{cases}$$

(2) The relative importance of attributes: The calculation of the relative importance of attributes assumes that the greater the difference between the utility values of each level in a certain attribute, the more important the attribute occupies in the full profile. It can be carried out by the following calculation formula Representation: (The relative importance of the attribute is represented by W)

$$C_i = Max(V_{ij}) - Min(V_{ij}), \quad \text{j=1,2,3...m}$$

$$\mathrm{W}_i = C_i / \sum_{i=1}^{m} C_i, \quad \text{i=1,2,3...m}$$

Where i represents the number of attributes (1,2,3, …, m); j represents the number of levels (1, 2, 3, …, n); Ci represents the importance of attribute i; Max (V_{ij}) represents the maximum utility of level; Min (V_{ij}) represents minimum utility of level.

(3) Utility of profile: The estimation models for calculating the utility value of the profile include a discontinuous linear model, a linear vector model and an ideal point model. What we choose is the linear vector model, and its mathematical formula is as follows:

$$\mathrm{U_k}(x) = a + \sum_{i=1}^{m} \sum_{j=1}^{n} W_i V_{ijk} X_{ijk} \quad \text{k=1,2...p}$$

$$X_{ijk} = \begin{cases} 1, \text{j level of i attribute of k profile} \\ 0, else \end{cases}$$

Where i represents the number of attributes （1，2，3，…，m）; j represents the number of levels (1, 2 ,3, …, n); a represents intercept which is the utility without chooing profile; w_i represents respondents' evaluation of the relative importance of the i attribute of the k profile; $U_k(x)$ represents total utility of k profile; k represents the whole number of profiles; V_{ijk} represents the utility of j level of i attribute of k profile.

3. Detailed steps of conjoint analysis method

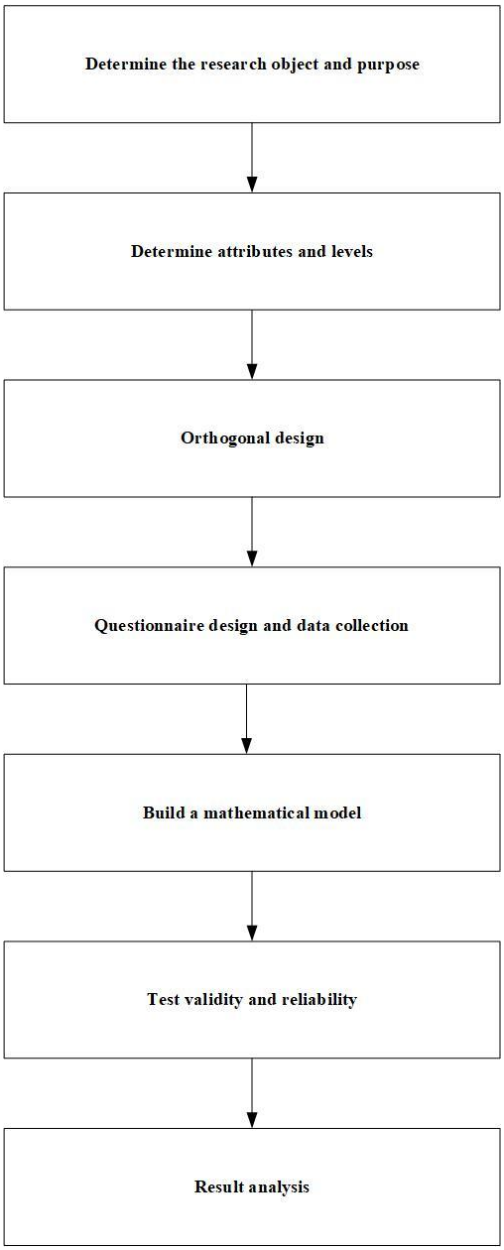

Fig 3-3 Detailed steps of conjoint analysis method

(1) Determine the research object and purpose: First of all, it is necessary to consider whether the research object can be solved by conjoint analysis. CAM can be used when the following two characteristics are met: one is the research for the purpose of consumers' preference for the product, and then the various attributes of the product can be expressed with limited attributes and levels. The other is to determine the purpose of the research, for example, to study the degree of consumer preference for different product combinations, or the impact of product characteristics on consumers.

(2) Determine attributes and attribute levels: First of all, the determined product attributes and attribute levels should have an important influence on consumer preferences. The total number of its attributes should not be too much. Too many attributes will result in too many product portfolios. Too many questions when designing the questionnaire will cause the respondents to become bored and cause inaccurate survey results; too few relative attributes will cause the loss of key data and affect the effectiveness and effectiveness of the model. Reliability is tested by correlation coefficients in specific experiments to determine the accuracy of the results and ensure the accuracy of the research [18]. After the attributes are determined, a representative number of appropriate attribute levels should be selected according to the actual situation. The determination of attributes and attribute levels should be achieved through expert interviews or consumer surveys on the basis of consulting relevant literature.

(3) Orthogonal design: The traditional joint analysis method will cause the combination of attributes and attribute levels to be too large, and the experiment cannot be carried out. For example, when the survey product is determined to have 5 attributes, each of which has 3 attribute levels. After calculation, it can be concluded that there are a total of 243 effective product combinations. It is difficult to organize respondents to evaluate all product combinations. In this case, the researcher can use the orthogonal design method to select the most representative one. The combination of products can ensure the efficiency of the experiment and the accuracy of the experiment at the same time.

(4) Questionnaire design and data collection: According to the product portfolio generated by orthogonal design, the questionnaire design is carried out. The questionnaire generally includes: the first part of the basic personal information; the second part, the virtual product portfolio and evaluation. Respondents evaluated their preference for virtual product portfolios. The evaluation method generally can use the scoring method and the ranking method. The ranking method is a qualitative method according to the consumers' preference for all products. However, this method is time-consuming and laborious, which will bore the respondent and affect the accuracy of the survey, so it is generally not used. The scoring method is generally not used. After the investigator understands the attributes and attribute levels of all product portfolios, he evaluates and scores each product according to his preferences. This is a quantitative method and relatively simple.

(5) Establishing a data model: As the calculation of the joint analysis method is complex and the amount of calculation is huge, we use computer software to build a model for calculation. Generally, we use the Categories module included in SPSS or Sawtooth software for joint analysis [19].

(6) Test reliability and validity: After the data model is established, we also need to test the reliability and validity of the obtained data. In the joint analysis software SPSS, the Pearson correlation coefficient and Kendall correlation coefficient will be used. The larger the correlation coefficient, the more accurate the prediction result [20].

(7) Result analysis: 1) Analysis of the relative importance of group attributes and the utility value of attribute level. 2) Analyze according to consumers' gender, age, education, occupation, etc., and obtain the attributes and attribute level utility values of different categories of consumers.

2.2.3 Common terms of conjoint analysis method

1. Attributes and attribute levels: Attributes refer to the main characteristics of a product or service, and levels refer to the level of these attributes.

2. Profile: A virtual product formed by combining different attributes and attribute levels, we call it a Profile.

3. Orthogonal design: A design used to reduce the number of combinations in the full-profile joint analysis method.

4. Utility value: The important value of the attribute level separated from the overall survey data by the conjoint analysis method, which is used to indicate the degree of consumer preference for the product attribute level. The larger the utility value, the greater the consumer's preference. Relative importance: Relative importance refers to the degree of importance of a certain attribute of a product to consumers' purchasing decisions. The larger the value, the more important this attribute is to consumers' purchasing decisions.

5. Internal validity: There is usually a gap between the product utility predicted by the joint analysis method and the analysis and evaluation of the product in the actual survey. In this case, we can use the internal validity to measure, and judge the joint by the degree of association between the two Whether the conclusion of the analysis method is accurate, in general, the closer the internal validity value is to 1, the better the fit and accuracy of the model, and the more reliable the conclusion drawn by the joint analysis method [21].

3.2 Sources of respondents for all experiments

3.2.1 Graduates

Graduates are an important part of human resources. Graduates are widely regarded as having extremely high autonomy, plasticity and great room for improvement, which makes the introduction of a large number of graduates the main driving force to promote the sustainable economic development of regions and cities. A large number of studies have pointed out that a city attracts The size of graduates is one of the important indicators to measure their future development potential. As mentioned before, graduates are a vital resource for any city that expects sustained economic growth. This is also what many scholars are committed to Research on what strategies can be adopted to help regions and cities attract more graduates to work and even immigrate. There are many literatures on the immigration willingness of graduates, but there is still a lack of research on immigration willingness of graduates from Northeast China. Northeast China graduates Compared with graduates from other regions, it has some outstanding advantages.

In recent years, with China's rapid urbanization process and rapid economic growth, China's northeastern region has fallen into economic stagnation and even has a trend of recession. Due to the deterioration of the economic level, employment opportunities have been further compressed by other regions. It may also lead to a decline in the service level of some basic industries such as local medical and education. The local colleges and universities in the Northeast have produced a large number of graduates, and a considerable part of them are from the Northeast.

Based on the backward economic level of the Northeast, students who are close to graduation tend to choose the latter after comparing their stay in the Northeast and the big cities in the South for better development. It can be pointed out that these choices go to areas with faster development. The immigration tendency of foreign students from Northeast China is considered to be higher than that of students from other regions. The high immigration tendency means that these college graduates who have high-value jobs for the city not only work in their chosen city but may even be there. Marriage and settlement.

In addition to the extremely high tendency to emigrate, graduates from the Northeast region are also an extremely stable source of human resources. As immigrants settle in a new place, they usually attract their relatives, friends, and classmates to study, work, and even work in the same area. Settlement. Maintaining the introduction of Northeast graduates can establish a complex talent attraction network. The successful talent attraction network established by these characteristics of the Northeast diploma can maintain this sustainable talent attraction trend and bring the region or city to meet the economy The huge human resources needed for development and urbanization.

As mentioned before, graduates from universities in Northeast China are a kind of human resources with many reliable advantages. The research on this kind of high-quality human resources is very necessary. So, we studied in Chapter 4 which environmental attributes of the city can be changed. More effectively attract graduates from the Northeast region.

3.2.2 Entrepreneurs

Entrepreneurship is of great significance to the economic and social development of a country and region, and plays an important role in promoting innovation, promoting industrial restructuring, creating jobs, and shaping social culture. Casson (1982) believes that entrepreneurs are people who specialize in making judgmental decisions about scarce resources.

Due to the asymmetry of information, individuals have to pay costs when acquiring information; entrepreneurs make decisions mainly based on personal judgment. Bruyat and Julien (2000) define entrepreneurs from the perspective of value creation. They believe that entrepreneurs are closely related to the new value creation process, that is, without the entrepreneur, the creation of new value cannot be achieved. In our research, we define entrepreneurs as the proponents and main driving forces of entrepreneurial activities and are usually regarded as decision-makers or leaders of entrepreneurial companies.

In Chapter 5, we selected respondents on the entrepreneurial information publishing website with an audience of entrepreneurs across China. Respondents from a wide range of sources can ensure that the preferences of our detected entrepreneurs are more representative. The selected interviewees Not only do they come from various regions in China, but also the industries they are engaged in include service industry, IT, manufacturing and so on.

3.2.3 Tourists

Tourists generally refer to visitors who go to various tourist destinations for different purposes. Many domestic and foreign studies have classified tourists based on tourism motives to facilitate further research.: First, eighteen important tourism motives are proposed, and it can be summarized into four major parts: First, education and culture, to see how other countries and people work, live and entertain, to see special scenic spots, and to have an in-depth understanding of current events. Second, leisure and entertainment, break away from daily routine work duties, relax and have fun. Third, race and tradition, to pay homage to the homeland of one's ancestors, to visit places where family or friends have been. Fourth, others, climate, health, sports, economic adventures, pursuit of history, etc. Taiwan scholar Chen Zhaoming indicated that the factors affecting recreational motivation are very complex but can be roughly divided into two categories: the first category is personal internal factors, mainly including: physiological and developmental status, which vary with age and gender; psychological development status, Varies due to age, gender and education level; recreational experience. The second category is external factors, mainly including: the influence of family, the influence of relatives and friends and reference groups.

In Chapter 6, we mainly selected the interviewees (museums, historical scenic spots, souvenir shops) according to the destinations the tourists went to.

3.3 Classification of conjoint analysis method

1. Conjoint Value Analysis (CVA) is also known as the traditional Conjoint analysis method or the Full procedure joint analysis method. As a traditional method of joint analysis, CVA is mainly used in research with a small number of attributes.

Since CVA was developed in the 1970s, it has become the most widely used type of hybrid conjoint analysis. It can be used for ranking and customer scoring. Through orthogonal research, different attributes and levels of products or services are cross-combined. Become a virtual product portfolio. Through the questionnaire survey and data analysis of the full-profile joint analysis method, the partial value utility value of each level of each interviewee under each attribute can be estimated. CVA can be used for up to 3-5 attributes, each with 1-5 levels of cases, but this model cannot reflect the cross-utility between brand attributes, only the main function.

However, the traditional conjoint analysis method has an obvious shortcoming, its attributes and level cannot be directly related to the brand. The product attributes and brands must be combined first, and the interviewees can rank and rank them, and then select the better product attributes and brands, and then select and score the virtual product combination generated through orthogonal changes. This method not only brings more difficulties and more items to the interviewee's answer, but also requires further explanation and explanation with the help of pictures and other forms.

2. Choice based conjoint analysis

Choice bassed conjoint analysis (CBC) is used to study consumer preferences for product or service attribute combinations, and can be used to study product design, production line extension, price research, market segmentation and other fields. Researchers need to analyze a large number of product portfolios and competition scenarios. Market competition and price sensitivity are all results that CBC research data can provide. In recent years, the selection-based conjoint analysis method CBC has been widely used in the field of market analysis. It is different from other conjoint analysis methods, the biggest feature is CBC simulates the process of consumer shopping choices, through the consumer's choice of virtual products combined to obtain consumer product preferences, rather than rigidly let the tester give The product portfolio is mechanically sorted or scored. Therefore, the behavior shown by consumers in such a preference selection process is consistent with the actual selection behavior of consumers in the market, that is, choosing a preferred product from a set of products is a simple and simple task for the interviewee. A natural task. At the same time, CBC provides the interviewee with an option of "I will not choose any of them", that is, "None". Through this option design, the interviewee can express your lack of interest in the product or service by not choosing any combination of products. By comparing the interviewee's choices of "None" among different groups, you can reveal the principle of the interviewee's buying more or less products. . Most conjoint analysis methods use the assumption of main effect, but the CBC conjoint analysis method is more suitable for aggregate analysis to obtain the overall level of the interviewee rather than the individual level, so it is easy to conduct quantitative interactive research. Nevertheless, the CBC joint analysis method also has certain shortcomings, that is, each product concept has multiple attribute descriptions, and each option contains multiple concepts. Therefore, the interviewee needs

to read a certain amount before making an answer. It will increase the fatigue of being interviewed and answered.

3. Adaptive conjoint analysis (ACA)

Adaptive Conjoint Analysis was first developed by Sawtooth in 1985 and was widely used in the 1990s. Nowadays, although CBC is more popular than ACA and more suitable for practical operation, ACA still has a certain advantage under many conditions. For example, compared with CBC, ACA can reduce the fatigue of the interviewee. You will see two products at a time, then you will rate the two products, and then you will look at the next set of products and keep comparing them. To perform adaptive conjoint analysis, one should know the basic knowledge of conjoint analysis, including defining attributes and normal levels, correctly phrasing the questionnaire text and scale, interpreting the utility of the joint part of the value, and running simulations. Once the data is collected, ACA allows the researcher to simulate the production of new products or improvement of current products based on the respondents' preferences

4. Max-Diff

Max-Diff (Max-Diff) is a technology developed by Jordan Louviere in 1987. In the Max-Diff study, consumers will face a series of possible questions (at least 3) and point out the best of each. And the worst choice. Multiple items (such as brand preference, brand image, product persistence, advertising, etc.) that obtain preference or importance scores in Max-diff method use marketing or social survey research (22).

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Chapter 4

EFFECTS OF URBAN ENVIRONMENTAL ATTRIBUTES ON GRADUATE PREFERENCES IN NORTHEASTERN CHINA

A constant supply of novel ideas and contributions from all economic sectors is required to further the sustainable development of cities. Therefore, there is a growing need for well -educated graduates to enter metropolitan job markets. As urban environments and culture have been shown to affect a graduates' eventual carrier choice and trajectory, governments often seek to change their local environments to attract graduates who can help efficiently allocate and utilize a city's often-limited environmental budgets. In this study, the conjoint analysis method was employed to explore the effects of four environmental attributes (water pollution, air pollution, littering, and green area) on graduate employment preferences in northeast China. Water pollution was shown to have the greatest effect on graduate preferences (43.6%), followed by air Pollution (34.1%), littering (20.7%), and green area (1.6%). According to this ranking of importance, cities could improve their environmental attributes to maximize the attraction of Northeast graduates. Moreover, this study applied the Baidu index (a big data sharing platform) to improve the attribute selection process of the conjoint analysis method. The improvement reduced the cost of the conjoint analysis method and enhanced its objectivity.

4.1 Introduction

The development of sustainable cities requires significant human resources [1]. However, it is difficult to find well-educated employees and preserve them for a long term [2]. In addition to this human capital, urban sustainability is directly affected by several other factors, particularly the local environment, economy, and society [3]. City governments can adjust these three factors to efficiently attract well-educated human resources and effectively advance sustainable development goals. Therefore, many policies have been issued by Chinese metropolitan governments that aim to attracting skilled workers.

Specifically, cities in Northeastern China have been attracting highly educated graduate workers. Northeastern China consists of three provinces (Heilongjiang, Jilin and Liaoning) with five cities in the Inner Mongolia Autonomous Region (i.e., Chifeng City Tongliao City, Xing'an League, Xilingol League and HulunBuir City). In 2011, Northeastern China accounted for 8.82%, 10.64%, and 15.11% of China's total population, the gross domestic product (GDP) and total land area respectively [4]. Due to poor economic development, there has been a greater percentage of emigration from Northeastern China than from other regions in China, with the majority of emigrants preferring to work in Chinese metropolises [5]. In addition to this increased propensity for emigration, Northeastern graduates express an increased willingness to stay and live in the cities where they began to work [6]. Combined, these traits make Northeastern graduates a stable source of long-term highly-skilled immigrants who can assist in the sustainable urban development of metropolitan areas across China [7].

In this article, the term "job preferences" is used to refer to various employee tendencies regarding the process of career selection. Typically, people decide where to live and work by measuring several critical attributes and comparing them between cities. These attributes often include wealth effects [8], city size, geographical preferences of employees [9, 10, 11], social

services, income, and population [12]. Previous studies have also indicated that local environmental attributes affect job preferences [13]. Indeed, many economically prominent regions have created initiatives that promote environmental sustainability and clean-up to attract well-educated talent [14]. However, while numerous studies have suggested that environmental attributes are important for attracting talent, the relative importance of different attributes has yet to be explored.

Previously, studies have sought to quantify the level or health of urban environments by combining several of the most important environmental attributes. Zenker et al. applied the conjoint analysis method to compare several German cities and analyze their attractiveness to well-educated graduates and talents [15]. Their research grouped several environmental attributes, including the number of parks, amount of pollution, and access to water, into one factor, “Nature and Recreation.” De Noni et al. [16] combined quantifications of a city’s green areas, air pollution, and waste management efficiency into a single parameter to assess Milan, Italy. Similarly, Merrilees et al. [17] utilized a “clean environment” factor, which accounted for the cleanliness and pollution of a city’s local environment. However, not all studies clearly delineate which approach is applied to determine the most relevant environmental criteria or the rank of importance given to each attribute. This information is vital for informing future studies as well as policy-level decisions regarding the distribution of the often-limited environment-related budgets of local governments.

Conjoint analysis (CA), as applied by Zenker et al. [15], first became a widely applied marketing research technique used to assess consumer multi-attribute utility functions in the 1970s [18, 19]. It has since become one of the most common approaches for exploring individual preferences over the past four decades [20, 35]. Conjoint analysis was effectively used to assess the non-market value of chosen attributes [20] and was initially applied to environmental studies by Beggs et al. [22]. CA has even been applied to determine the willingness of participants to pay for environmental issues [23]. Thus, due to the well-documented reliability of CA, it was chosen to examine graduate attitudes toward different urban environmental attributes in this study.

While CA can be an effective tool, studies that employ this method are generally limited regarding the number of attributes that can be considered in a single study, as a larger pool of attributes leads to an increased number of questions on the corresponding questionnaire. This can result in respondents experiencing a fatigue effect that reduces the reliability of the results [20, 24]. Moreover, research has indicated that individuals make decisions primarily by considering only a few critical attributes [25, 26]. It is possible to use the conjoint analysis method to assess respondent preferences for a long list of relevant attributes; however, this requires complicated mathematical models (i.e., hybrid conjoint analysis and adaptive conjoint analysis) [27, 28]. Therefore, it is common to use information from preliminary experiments or consultation with experts to determine the most important parameters and reduce the number of study attributes and questions [27, 28, 29]. However, conducting exploratory experiments often costs excess time and money.

Fortunately, big data technology has been shown to accurately predict human preferences and behaviors [30, 31], creating an opportunity for a new attribute number reduction method to be

explored and established in this study. The Baidu Index is a big data sharing platform constructed by Baidu's massive users' behavior information and it represents a normalized search volume for selected keywords over a specified period [32， 33]. Since Baidu is the most commonly used search engine by Chinese people, the Baidu index has become an important source for many big data studies in China [34, 35, 36, 37]. The application of the Baidu index may help researchers to improve traditional conjoint analysis methods by establishing an objective low-cost attribute number reduction process.

In this study, the Baidu index was applied to develop and optimize a new attribute reduction process for the conjoint analysis method Moreover, the significance of each selected urban environmental attribute was explored in terms of its impact on Northeastern graduate job preferences. Finally, the differences among recent graduates with different expected incomes were also examined.

The remainder of this paper is organized as follows; Section 2 introduces the research method and verifies the feasibility of simplifying the conventional conjoint analysis process by exploiting Baidu index. Section 3 explains the results of the conjoint analysis experiments including the importance rank of the different environmental attributes regarding their influence on graduate preferences, as well as the correlation between the expected income of recent graduates and their environmental preferences. Section 4 elucidates implications of our results and compares our results with the conclusions from other similar studies. Section 5 presents the conclusions of our work and provides suggestions for future research. An outline is provided at the end of the study.

4.2 Methods

A face-to-face survey was designed using the Tencent questionnaire (https://wj.qq.com/). All data were acquired between March 2019 and May 2019, and a mathematical model was built using the statistical software environment, R. An exploratory experiment examined the correlation between the Baidu index of environmental attributes and graduate preferences for the attributes.

4.2.1 Conjoint analysis method

CA was chosen to assess graduate job preferences in this study due to its well-documented reliability and use over time (see Section 1). Relevant urban environmental attributes were chosen by the big data sharing platform of Baidu company. This method of attribute selection was chosen because it required significantly less time and money than preliminary analyses. All processes of the conjoint analysis needed to be accomplished rapidly before the respondents graduated, as students usually plan their future careers and form certain psychological expectations in the months prior to graduation [38]. Furthermore, expert consultation is typically regarded as a highly subjective method that is difficult to apply uniformly to varying situations and was thus not considered in this study [39].

4.2.2 Sampling process

All respondents in this study were from one of five Chinese universities. At least one university was chosen from each major province in Northeastern China. According to the comprehensive strength ranking from New Oriental Education & Technology Group Inc.（Xindongfang in Chinese） [40], the largest education company in China, five universities at different levels (Jilin University (ranking 9th), Harbin Engineering University (ranking 63rd), Dalian Maritime University (ranking 112nd), Changchun University of Science and Technology (ranking 171st) and Jilin Jianzhu University (ranking 433rd)) was selected as sample sources. In 2017, 10.8% of graduates in China were from the top 50 Chinese universities [41]. Thus, we selected approximately 10.8% of respondents from Jilin University, and the remaining respondents were chosen from the four other universities. The 2017 graduate data were also used to determine the educational level of respondents, with 85% graduating with a bachelor's degree, 13.5% with a master's degree (13.5%) and 1.5% with a doctoral degree.

We planned to recruit 500 respondents for the preliminary experiment and 1600 respondents for the main experiment. Through cooperation with the staff of the five universities, we randomly selected respondents in the graduating class according to the proportions above and distributed questionnaires to their mobile phones or computers. Finally, 483 valid questionnaires were collected for the preliminary experiment, and 1589 valid questionnaires were collected for the CA experiment.

4.2.3 Experimental process design

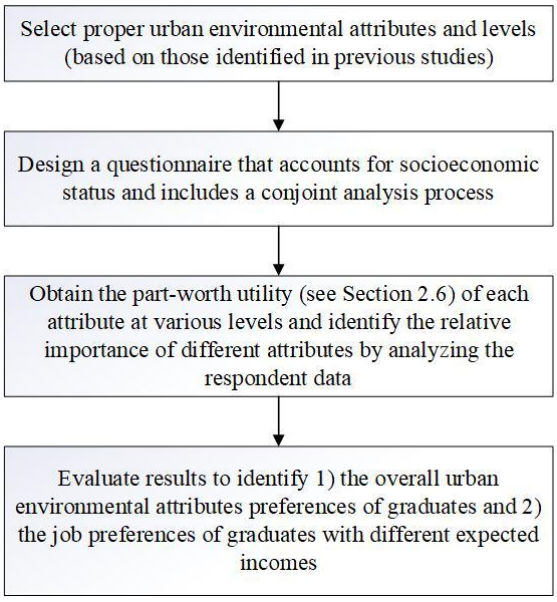

Fig 4-.1 Flow chart detailing the experimental procedure

As shown in Fig. 1, the urban environmental attributes and levels required to be considered for this experiment were identified in Step 1. A preliminary experiment was utilized to select these attributes. In the preliminary experiment, we selected the most relevant attributes using the traditional questionnaire method alongside the new Baidu index selection method. The results of the two selection methods were compared to verify the reliability of the new method. In Step 2, the main-experiment questionnaire was designed to examine the characteristics and socioeconomic information of respondents and their preferences for the combinations of different urban environmental attributes and levels. Table 1 outlines the respondent's reported demographics. We used the orthogonal processing function of SPSS software to design these attributes and levels into nine combinations. To examine graduate preferences, these were portrayed as nine virtual cities that the respondents scored in the CA portion of the questionnaire (see Appendix 1). Then, in Step 3, the questionnaire data were analyzed based on the model established using R version 3.4.3 [42], and the part-worth utility and relative importance results were obtained. Finally, in Step 4, we evaluated these results to identify overall trends in graduate preferences for urban environmental attributes and job preferences of graduates with different expected incomes.

4.2.4 Preliminary experiment

A preliminary experiment was conducted to rank the urban environmental attributes based on their importance using two methods. The first method was based on the Baidu index. The Baidu index refers to the total number of times a particular word was searched on the Baidu website within a period specified by the researchers. On the Baidu website, researchers can select a specific word and determine the Baidu index of other words that are most closely related to this word. Through this function, we obtained the Baidu index for all attributes related to the urban environment in 2018. There were seven urban environmental attributes identified with an average of 10 or more searches per day: air pollution, water pollution, green area, littering, noise pollution, soil pollution, and light pollution. Fig. 2 presents the monthly Baidu index of these attributes for the entire period of 2018. A higher Baidu index indicates more searches. Objects with more searches have attracted more interest from people [43, 44], meaning that they are perceived as more important than other objects with fewer searches.

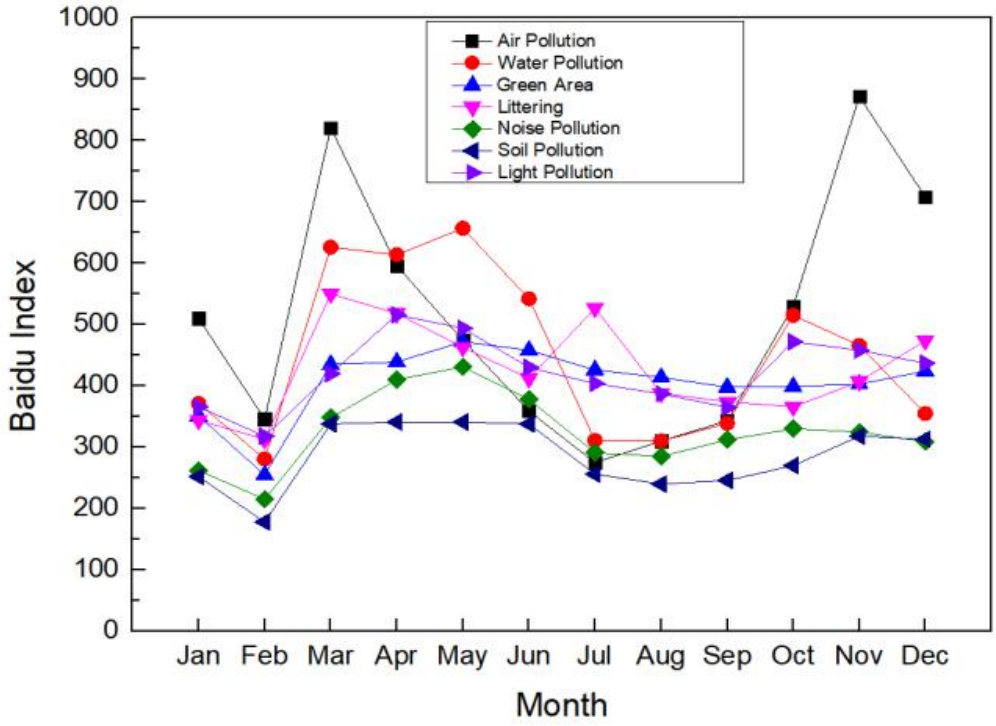

Fig 4-.2 Monthly Baidu index of various metropolis environmental attributes in 2018

To examine the similarity between the urban environmental attribute ranks obtained with the Baidu index and those obtained with the traditional questionnaire method, we used web-based questionnaires to explore graduate preferences for the seven attributes mentioned above. They were asked to score them from 7 to 1 (7-point Likert scale), where higher scores represented greater importance. Graduate preferences regarding urban environmental attributes were then determined using the total scores from 483 respondents. This was compared with the results from the Baidu index analysis (Fig. 3).

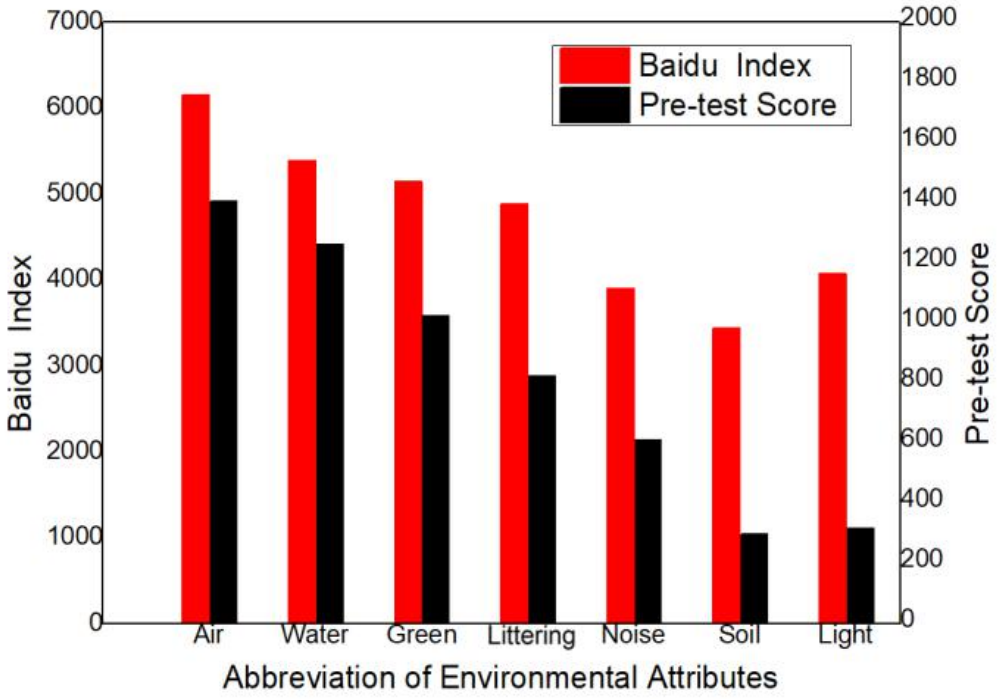

Fig. 4-3 Comparison between Baidu index and Pre-test Score of environmental attributes

A similar trend was found between the Baidu index and pre-test Score. SPSS software was used to examine the Spearman correlation coefficient, which was 0.964（$p<0.001$, $N=7$）, suggesting that the Baidu index was highly correlated with the pre-test scores. Thus, to avoid the fatigue effect and focus only on the most important attributes, we selected the four environmental attributes with the highest Baidu index for the conjoint analysis: air quality, water pollution, littering, and green area.

There exist several conjoint analysis methods including conventional conjoint analysis, hybrid conjoint analysis, adaptive conjoint analysis and hierarchical conjoint analysis [45]. To achieve high performance in data analysis with less than five attributes, the conventional conjoint analysis method was chosen for the following experiment [20].

4.2.5 Conjoint analysis process

The survey was conducted in 10–15 min of class time, as assisted by university staff. The first part of the questionnaire focused on respondent characteristics and socioeconomic information (i.e., gender, age, educational background, income, residential area).

The second part was the CA, where attribute levels were set according to the standards established by the Chinese government. In China, urban air quality is usually assessed using the annual percentage of days where air pollution is higher than a set threshold. Green area was assessed as the

amount of park green area per capita. The levels of these two environmental attributes were set using data from the four most developed Chinese cities (Beijing, Shanghai, Guangzhou, and Shenzhen) [46]. The levels of the other two attributes (water pollution and littering) directly refer to the pollution degree classification of the Chinese urban environment [47, 48]. Before answering the questionnaire, respondents were confirmed to be able to understand and distinguish each study attribute and level.

Orthogonal processing was used to simplify the levels of each attribute into nine different combinations. Table 1 lists the selected urban environmental attributes along with their levels. Bigsby and Ozanne [49] found that visual stimuli can help respondents understand the different attribute and level combinations; thus, respondents were presented with pictures to better understand different environmental attributes.

Additionally, participants were asked to respond to a traditional conjoint analysis questionnaire. This model was first described by Louviere and Woodworth [50]. Shocker and Srinivasan further suggested that the attributes of conjoint analysis method should be made operational [43].

Consequently, the respondents were required to indicate if they had previous experience with poor levels of any of the four study attributes. Then, the staff guided the respondents to recall their experience, personally involving them in the simulated situation. Then, respondents were required to rate the nine simulated pictures of the different attribute and level combinations. The rating scale ranged from 0 to 10 where 0, suggested that working in that city was unacceptable, whereas a 10 indicated that it was extremely desirable to work there.

Table 4-1. Four urban environmental attributes included in the conventional conjoint analysis task. (P is the proportion of annual air pollution days and A is park green area per capita.)

Attributes	Attribute defination	Attribute levels
Air pollution	In this study, the attribute of air pollution is quantified as the frequency of occurrence of fine particulate matter (PM 2.5) pollution in a year	P<5%
		5%<P<20%
		20%<P<35%

Water pollution	The attribute of water pollution is defined as the contamination of water sources in city.	No Slight Serious
Littering	The attribute of littering refers to the existence of garbage in areas such as citizens' living quarters, workplaces, and major transportation routes.	No Slight Serious
Green area	Green area refers to the size of the vegetation coverage area in the main living area of the citizens. In this study, this attribute is quantified by the city's park green area per capita.	$5m^2<A$ $10m^2<A<20m^2$ $20m^2<A$

4.2.6 Mathematical model & data processing

The findings of the conjoint analysis section of the survey were analyzed for all samples and 11 different social-demographic and personal variables were additionally accounted for. Graduate preferences were calculated from the results of the CA section using a multinomial logit function. The function determined the importance of the respective attribute on the graduates' decision making relative to the other attributes, as well as the level of importance of each level of the attributes (part-worth utility). The derived graduate preference model was thus expressed using

$$U=\beta_0+\sum_{k-1}^{n}\beta_n X_n \quad (1)$$

where β_0 denotes a constant coefficient for each alternative, and β_1, β_2, β_3, ..., β_n represent the coefficients obtained by the logit model and indicate the relative importance of the attributes in each alternative. The relative importance of attributes suggests their importance for decision making and the preferences for all levels in the attribute. The relative importance values of each attribute were calculated by determining the part-worth utilities (PWUs) for each level of the attribute. PWU values show how much a specific level of an attribute is desired or unwanted. For example, the "water pollution" attribute has three levels (no pollution, slight pollution, and serious pollution). If no pollution, slight pollution, and serious pollution had PWU values of 7, 0, and -4, respectively, then the "unpolluted" level is the most desired level, with a positive part-worth utility. "Slight pollution" is neither desired nor unwanted, and "serious pollution" is unwanted. The relative importance of an attribute is the ratio of the difference between its highest and the lowest PWU to the sum of the differences between the highest and lowest PWU of all attributes.

Moreover, we adopted the demographics hierarchical Bayes model to analyze the 1589 samples of the main study. The model was built using R's Bayesm package [51] for the hierarchical Bayes random-effects model, which is capable of estimating general and individual parameters simultaneously.

4.3 Results

Table.2 lists the demographic characteristics of the respondents.

Table 4-2. Characteristics of participants (n=1589)

Items	Overall
Age	
<20	20
20~25	70.3
>25	9.7
Sex	
Female	44.542

Male	55.173
Marriage status	
unmarried	96.9
married	2.8
Education	
Below bachelor’s degree	4.4
Bachelor’s degree	79.8
Above bachelor’s degree	15.8
Monthly salary (CNY)	
<1000	15.8
1000~2000	55.9
2000~5000	10.8
>5000	4
Inconvenient	13.2
Hometown	
Urban	54.8
Rural	45.2
Parents' education	
Below bachelor’s degree	71
Bachelor’s degree	26.6
Above bachelor’s degree	2.4
Annual household income (CNY)	
<30000	18.6

30000-50000	15.8
50000-100000	18
100000-200000	15.2
>200000	5.9
Inconvenient	26.2
Willingness to work in metropolitan areas	
Yes	65.1
No	34.9
Air pollution experience	
Yes	88.5
No	11.6
Water pollution experience	
Yes	74.4
No	25.6
Expected future monthly income (CNY)	
<3000	2.1
3000~5000	8.3
5000~8000	35.2
8000~15000	42.2
>15000	11.9

4.3.1 Part-worth utilities

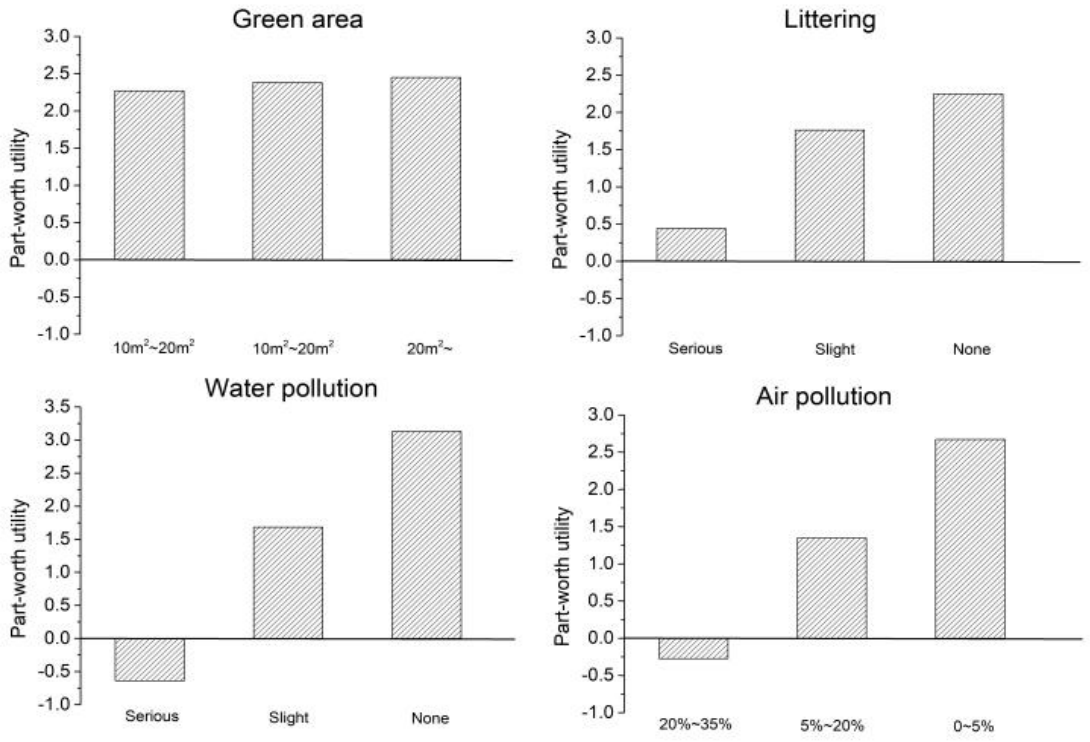

Fig. 4-4 Part-worth utilities of each urban environmental attribute's levels (can be compared within one attribute and not across attributes).

The PWUs of all attribute levels increased with decreasing pollution, as expected. However, "green area" did not increase as significantly as the other attributes (Fig. 4). The PWUs of this attribute's levels were extremely close, indicating that all levels were relatively desirable for most respondents. For air pollution, an attribute level of less than 5% was significantly more desirable (PWU = 2.672) than the 5–20% level (PWU = 1.346) or the 20–35% level (PWU = -0.2731). "Water Pollution" exhibited the most significant PWU difference of all tested attributes. The PWUs of the three levels (None, Slight, Serious) were 3.127, 1.682 and -0.637, respectively, suggesting that respondents prefer no water pollution almost twice as much as slight water pollution. Moreover, the PWU values indicated that "no littering" had similar desirability to "slight littering," and both of these less-severe levels were significantly more preferred than "serious littering."

4.3.2 Relative importance

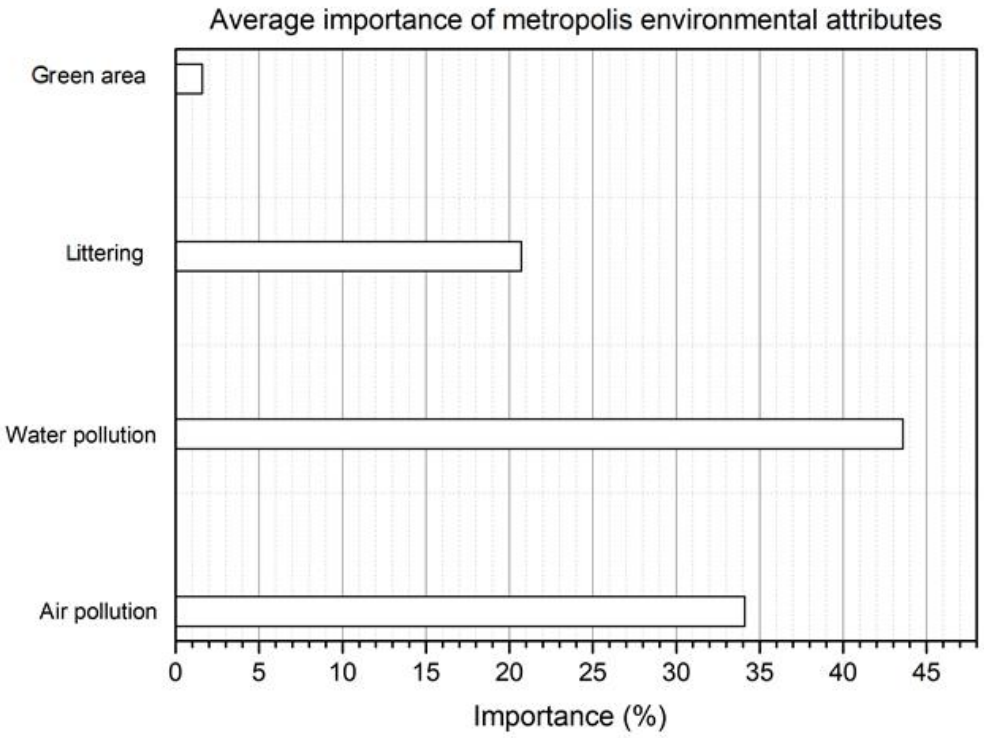

Fig. 4-5 Average importance of urban environmental attributes

Fig. 5 presents the relative importance of the four selected attributes. The results revealed that water pollution (43.6%) was the most important attribute, followed by air pollution (34.1%), littering (20.7%), and green area (1.6%). The relative importance of Per capita green area was significantly lower than the other attributes. The rank of their relative importance is completely identical to the rank of their Baidu indexes (Fig.2).

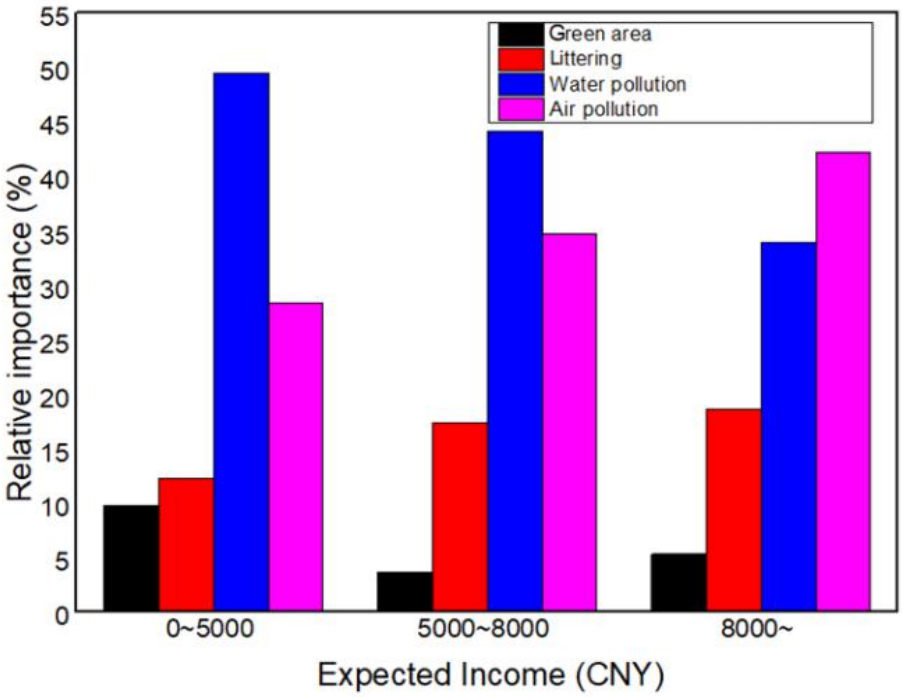

Fig. 4-6 Relative importance of urban environmental attributes for graduates (Bachelor) with different expected future incomes (Measured in Chinese Yuan (CNY))

Fig. 6 shows that the relative importance of urban environmental attributes changed with an increase in expected future income. To avoid the effect of education level, only students graduating with a bachelor's degree were selected for this analysis. The results showed that the importance of littering and air pollution increased with expected future income, the importance of water pollution decreased, and the importance of green areas was the greatest for graduates with the lowest expected future income.

4.4 Discussion

For the four urban environmental attributes examined in this study (water pollution, air pollution, littering, and green area), our results suggest that similar trends existed for the Baidu index and pre-test score results. Combined with a high Spearman correlation (0.964), our validation indicates that environmental attributes for the conjoint analysis method can be accurately selected using the Baidu index, as both preliminary analyses created similar rankings. This result means that a Baidu index-based attribute selecting method can replace the traditional questionnaire method, solving the problem of long experimental time and high expenses while still retaining its utility. In the study by K. Arning et al. that investigated the public acceptance of sustainable CO_2-derived building materials, the preliminary experiment used five participants (out of 145 total participants) to determine the attributes for the main experiment [52]. In a study by Chelsea A et al., 10 patients (out of 200 total

participants) were selected for one-to-one 20 minute interviews that investigated the most important attributes of arthrodesis and arthroplasty in their cognition [53]. For studies with too few pre-experimental participants, use of the Baidu index method to filter attributes can help to avoid subjective results due to a shortage of interviewees. Additionally, conjoint analysis of environmental cases often requires a large number of samples, so pre-experiments also require a large number of respondents to make them effective. Gil-HwanLim adopted a joint analysis method to investigate South Korean residents' attitudes towards nuclear power plants [54]. Researchers used the participants in the preliminary experiment used their questionnaire responses of 81 participants (out of a total of 1417 participants) in the preliminary experiment to identify the three most important attributes for all respondents. For conjoint analysis experiments in the environmental field, the Baidu index method can be used to shorten the experimental period by simplifying the pre-experiment and greatly reducing experiment costs. The Baidu Index is just a basic application of big data technology on the Chinese search engine platform. There are still many limitations to its application, particularly the lack of users in English-speaking regions of the world. Compared with Baidu Index, Google Trends is a search behavior analysis platform with similar functions for English users. It is believed that Google Trends can replace the role of Baidu Index in the attribute selection process of conjoint analysis in order to apply this method on a more global scale.

Our results indicate that the most important environmental attribute influencing graduate job preferences is water pollution, followed by air quality, littering, and green area. These results indicate that improvements to water pollution issues will be more attractive for Northeast graduates than improvements to other environmental attributes. For graduates from other regions, the results of this study may not be applicable. Previous studies have suggested that green space and cleanliness are the most important environmental attributes for attracting workers or students [55, 56]. In a study evaluating the preferences of residents in Porto, Portugal, the most important environmental attribute was green space, which was much more important than urban cleanliness or pollution (air, water, and noise) [57]. Conversely, environmental quality (green areas, urban waste management, and noise/air pollution prevention) was shown to have a more negative impact on the attractiveness of Milan, Italy to its residents [16]. It is likely that regional differences have caused the disparities between the results of our study and those of other cities and regions. Graduates from Northeastern China have different preferences and experiences than respondents from the Americas or Europe. For developing Chinese cities, Kumar P et al. indicates that the quality of water resource plays a critical role in their development, and preventing water pollution is the most important part of urban environmental pollution control [58]. These results show similarities to the environmental preferences of Northeast graduates in our study.

Besides Beijing, Shanghai, Guangzhou and Shenzhen，many fast-growing Chinese cities also have a huge demand for talents. Due to the significant differences in scale between these metropolises and other Chinese cities, it is necessary to minimize the gap between non-environment factors to better reflect the differences in the attractiveness of different environmental factors. Based on the

agglomeration of commercial resources, urban hubs, urban resident activity, lifestyle diversity, and future plasticity levels, Chinese cities are divided into six levels. The number of cities at different levels is as follows: 4 first-tier cities, 15 new first-tier cities, 30 second-tier cities, 70 third-tier cities, 90 fourth-tier cities, 128 fifth-tier cities [59] . It is feasible to select cities of the same level and adopt our method to evaluate the environmental attractiveness to graduates. However, our research still has other limitations. Although our results point out that improving water pollution is the most important environmental measure, the graduates' detailed preferences of graduates on ways to improve water quality and their willingness to pay still need to be examined.

Expected future income refers to income estimated based on the past experiences of an individuals. Graduates with different expected future incomes varied in their indicated varying preferences for the environmental attribute levels. The graduates expecting higher incomes tended to select cities with higher levels of positive environmental attributes (e.g., less air pollution and littering). However, graduates expecting lower income were more concerned about local urban water pollution. Green areas did not exhibit any correlation with the expected future income of graduates. Since graduates usually have no real income before they graduate, we classified respondents based on their expected future income and examined the subsequent differences in their urban environmental preferences. The reason for the difference in preferences of students with different expected incomes might be that graduates with higher expected incomes have enough budgeted to select a living place which is surrounded by a clean environment. Air quality is not particularly different for various regions in the same city, thus "air pollution" was the urban environmental attribute they considered firstly. Jacobsen, Lundhede and Thorsen indicated that the expected future is critical to environmental attitudes [60]. A study of 39 cities in the Czech Republic documented that inhabitants with unfavorable socioeconomic status mainly reside in smaller cities with higher concentration levels of combustion-related air pollutants [61]. A study by Liu F et al. revealed that the increase in air pollution concentration has short-term positive production effects but long-term negative impacts on individual income and will exacerbating the income inequality across socioeconomic statuses [62]. We speculate that graduates with higher expected incomes may have relatively strong confidence in their careers and are unwilling to trade long-term negative effects on their careers for short-term positive production effects, so they choose living place with clean environment. Li B et al also indicated that regional environmental pollution will widen the income gap of local workers [63]. Regional income inequality is likely to affect the tendency of graduates to choose employment in this place. Future research on this subject could apply expected income as a special social background factor in urban environmental research questionnaires to classify unpaid people and obtain their different preferences. A study by Wang et al. showed that absolute income has a positive correlations with environmental concerns [64]. Li and Chen argued in their study that relative income is more likely to exert a significant effect on environmental concerns than that of absolute income [65]. However, most of graduates do not yet have an income. Instead, their welfare is still dependent on their expected future income [66].

While graduates did indicate that it was undesirable to live in a location with a high level of littering,

they overwhelmingly suggested that air and water pollution were the most critical environmental attributes that were used to help determine the location of their first carrier job. Thus, if policymakers focus only on improving these two attributes, it should be effective in attracting graduates to urban centers. However, the attribute of “green area” should not be considered a necessary attribute to promote, as our results showed no significant differences in preferences for the different levels. Therefore, campaigns to increase green areas will not make any significant impact on skilled-worker immigration, meaning urban governments should focus on other environmental problems instead of increasing their green areas. Additionally, the close PWU values found for the low and moderate levels of “littering” indicate that graduate preferences will not significantly change if a city with “slight littering” enacts campaigns to reach “no littering.” Thus, governments should not necessarily strive to improve littering from “slight” to “none,” as they will receive no added benefit in skilled labor influx.

4.5 Conclusions & Suggestions

In this study, we utilized the conjoint analysis method to examine the importance of various urban environmental attributes for attracting graduates to work in metropolises. This paper employed the Baidu index in a novel manner to improve the attribute selection process of the conjoint analysis method, reducing its cost and enhancing its objectivity.

Data on graduate job preferences were collected via questionnaires. Then, a mathematical model was created within R’s statistical environment to analyze the obtained data. The primary conclusions of this study are as follows:

1. The Baidu index can be feasibly and efficiently employed in the attribute selection process of the conjoint analysis method.

2. Water pollution was the most critical urban environmental attribute with the highest importance (43.6%), followed by air Pollution (34.1%), littering (20.7%), and the green area (1.6%).

3. Local governments should focus on improving local water and air quality to attract highly-educated graduate workers; littering should simply be maintained at or below a moderate level.

4. Graduates with higher expected future income prefer to address the issues of air pollution and littering over water pollution. Conversely, graduates with lower expected future incomes prefer addressing water pollution over any other environmental attributes of metropolis.

In this study, we discussed which environmental attribute levels are preferred by graduates. This information can be used to help inform the spending decisions of regional or city governments to optimize the most crucial attributes. It should be noted, however, that the eventual profit of attracting graduates optimizing the local environment to their preferences depends greatly on the methods of environmental improvement and how the local budget is divided.

In the future, several problems still require further examination, primarily including the following:

1. Graduates with different socioeconomic information will have different preferences for various combinations of the urban attributes. Researchers should examine how different socioeconomic backgrounds could influence the graduate preferences in selecting the city of their first career job.

2.Research should seek to broaden the applications of the Baidu index in other fields related to the construct of cognitive.

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Chapter 5

PREFERENCES OF ENTREPRENEURS WITH DIFFERENT INITIAL CAPITALS FOR THE ENTREPRENEURIAL ECOSYSTEM

CHAPTER5: PREFERENCES OF ENTREPRENEURS WITH DIFFERENT INITIAL CAPITALS FOR THE ENTREPRENEURIAL ECOSYSTEM

5.1 Introduction

Entrepreneurship is the process of pursuing entrepreneurial opportunities by individual or corporate (1), and includes the management of new companies (2). Entrepreneurship is regarded as the primary driver of economic growth which plays an important role in creating more innovations and employments (3). Few people would doubt that entrepreneurship is a vital aspect for urban success (4, 5). Due to its significance for sustainable urban development, policymakers and scholars show growing interest in promoting entrepreneurship by improving urban entrepreneurship environment.

It is an effective measure to promote entrepreneurship that the urban governments establish entrepreneurship region (i.e., industrial districts, clusters, innovation systems and entrepreneurial ecosystem) in the external business environment of companies (6). Industrial district is a sizable and spatially delimited area of trade-oriented economic activity which has a distinctive economic specialization, be it resource-related, manufacturing, or services (7). Industrial districts are considered as relative providers of food jobs that not only offer inter-firm business connections, but also benefit companies remain long-term stable firm size (8). Similarly, cluster is defined as a particularly important way to help entrepreneurship through the location-based complementary of companies. It has been found that the corporate within cluster obtained higher economic growth and a longtime survival (9). Different from both of their focus, innovation systems apply the networks and organizations linking knowledge resource providers such as universities and public research institutes within a region. These linkages reduce the cost of knowledge dissemination in the region and promote overall regional innovations (10). The focus of these three measures is mainly on the social and economic context surrounding large and established firms.

Entrepreneurial ecosystem (EE) is a system composed of different types of factors that affect entrepreneurship at a regional level (11). The main difference between EE and its predecessors (innovation system, cluster, and industrial district) is that EE emphasize to analyze entrepreneur rather than the corporation. And EE also has inherited its predecessors' focus on the external environment of the company and the connection network with other related companies and institutions. Due to the emphasis on small and medium-sized enterprises, it is stated that EE has showed a remarkable performance on promoting entrepreneurship and speeding economic growth in many countries (12).

A successful EE is often based on many environmental factors with proper level (11). It has been indicated by the literature that regional entrepreneurship was mainly influenced by these environmental factors of EE as follows: human capital (13, 14), market potential (15, 16) , financial capital (17, 18), entrepreneurial culture (19, 20), the size of the region and role models (20), internet infrastructure (Audretsch et al., 2015, Cohen and Schmidt, 2013), physical infrastructure (21, 22), and the size of the government (23, 24). Isenbrerg (25) summarized six distinct domains of EE : policy, culture， finance, support, human capital and markets. Moreover, Spigel (15) classified these factors as material attributes, social attributes and cultural attributes. The previous work has mainly

focused on evaluating various EE in different regions or examining the isolated impacts of EE factors on entrepreneurship.

However, there remains a need for comparing different EE factors' importance and exploring which factors of EE promotes regional entrepreneurship more efficiently than the others (26). Furthermore, it is still inconclusive which combinations of factors at proper level will generate higher entrepreneurship.

The purpose of this study is to describe and examine the different importance exhibited by EE attributes selected on influencing the preference of entrepreneurs. Choice-based Conjoint Analysis (CBCA) was conducted to examine and analyze the distinctive performances of entrepreneurs in this experiment. Referring to CBCA method, our work established a mathematical model to calculate the related importance of every EE attribute and entrepreneur's willingness to pay (WTP) on each level of all attributes respectively. It is of significance to help governments and policymakers to formulate accurate and comprehensive business strategies to establish a successful Entrepreneurship Ecosystem to promote regional entrepreneurship by attracting more entrepreneurs.

This study is organized as follows. In Section 2, the research method and CBCA process are elucidated. In Section 3, the results of the CBCA experiments are explained, which involve the overall entrepreneurs' preferences of different EE attributes and the correlation between industry category of entrepreneurs and their preferences for EE attributes. Moreover, the results here are discussed, and the mentioned results were compared with other studies' identical conclusions in this part. In Section 4 is the conclusions of our work and based on the mentioned conclusions, some suggestions are provided. Furthermore, the limitation of this research is provided at the end of this study.

5.2 Literature review

A new concept that goes in the direction of offering a view of entrepreneurship has recently emerged, known as the Entrepreneurial Ecosystem (EE). The fundamental ideas behind entrepreneurial ecosystems were first developed in the 1980s and 1990s as part of a shift in entrepreneurship studies away from individualistic, personality-based

research towards a broader perspective that incorporated the role of social, cultural, and economic forces in the entrepreneurship process (27). Moore (28) and Iansiti and Levien (29) indicated that different with the organization of a single industry or value chain, entrepreneurial ecosystems are an inherently geographic perspective. That is to say, entrepreneurial ecosystems focus on the cultures, institutions, and networks that build up within a region over time rather than the emergence of order within global markets.

A few scholars like Feld are quick to point out that examples like Silicon Valley are not replicable (30). The growth of places like Silicon Valley are tied directly into particular events (e.g. the founding of Stanford University with an explicitly industrial orientation), historical trends (the US government shifting defense research away from the east coast in the 1930s and 1940s, the emergence of the Initial capital industry in the 1950s and 1960s), and the existence of a long-lasting culture that encourages risk taking, rebellion, and innovation throughout the place (31, 32, 33).

However, most scholars believe that successful EE has some important common points and has conducted a lot of research on these common points. Many studies and empirical investigations have also been conducted in specific social contexts (34). Acs et al. used quantitative methods to analyze a number of strong entrepreneurial ecosystems that resulted in innovative entrepreneurship (35). Acs et al. created an effective model to characterize the regional entrepreneurial system and used this model to evaluate the impact of regional institutions on it (35). Neumeyer et al. used social network data analysis to examine the EE, seen as a complex social organization (36). In his research, it is important to conduct interviews with different important people in the two cities, who and the leaders and employees. The final successful EE range includes universities and supporting institutions as well as institutions based on these factors that have high-level technology, etc. Scholars have also provided comparisons between EEs (e.g. Kshetri 2014), while using measures that are traditional in entrepreneurship, such as job creation (37). Kshetri compared the entrepreneurial regions in Estonia and South Korea and found that there are different ways of success (37). South Korea relies on the innovative high-end technology of enterprises, while Estonia relies on the institutional advantages shaped by the government. Bell-Masterson and Stangler have provided an early proposal to weigh and measure EEs (38). These studies indicate that EEs with certain outstanding characteristics are usually successful (for example, having more unicorn companies or more entrepreneurial opportunities).

The previous research only focused on the common attributes of successful EE. However, based on their conclusions, it is difficult to guarantee that the new EE established can be successful. Research has noted that the key to developing regional economies lies not only in the development of institutional structures but also the attraction and retention of individual entrepreneurs (39). Research has noted that the key to developing regional economies lies not only in the development of institutional structures but also the attraction and retention of individual entrepreneurs (39). However, despite widespread interest in entrepreneurship and the importance of entrepreneurs to the local and regional economy (40), social scientists have an incomplete understanding of why entrepreneurs move to, or stay within, particular regions. Prior work has shown that many high-performance individuals are motivated by and attracted to economic opportunity (41, 42). Thus, structural advantages of technology clusters and other location-specific factors in the “Technopolis” framework might play an important role in entrepreneurs' location decisions. Some prior research indicates entrepreneurs have a propensity to start a company in the same location where they previously worked because this choice enables them to use their existing local networks (43, 44, 45). The literature shows that entrepreneurs tend to start their businesses in locations in which they have more family and friends or “deep roots”, and thus providing them a rich but geographically

concentrated supply of social capital (46). However, this research examines founders of non-tech companies in Denmark, focused on traditional industries like hospitality, food, business services, and construction. This group of entrepreneurs is likely distinct from founders of technology ventures that were launched in prominent technology clusters like San Francisco Bay Area, Boston, Austin, and New York. Moreover, this earlier work primarily conceptualized social networks as family and friend connections (46), which is perhaps more appropriate for successfully launching new non tech businesses serving local clientele. In the technology sector, especially with the increasing digital reach of online social networks, entrepreneurs can now more easily identify and connect with individuals and resources needed to grow a successful startup. Stephens et.al conducted a survey and analysis on the well-established EEs in Austin, Boston, and New York, and pointed out that financing opportunities and high-tech resources are extremely attractive to entrepreneurs (47). Not only do entrepreneurs from different industries have different preferences for EE attributes, Kshetri's research points out that the different successful entrepreneurial models in South Korea and Estonia show that entrepreneurs in different regions have different preferences (37).

There are still not many studies focusing on entrepreneurs' preference for EE attributes. Spigel analyzed 43 EEs in the UK and pointed out that for technology entrepreneurs, encouraging local entrepreneurial culture can inspire their ideas to start a business here, while excellent entrepreneurship support organisations are also full of appeal (48). Contrary to this conclusion, in a survey of Chinese entrepreneurs, Yaokuang L found that it is difficult for the Chinese government to directly establish supportive policies or provide direct positive social recognition to promote entrepreneurial behavior in the region (49). These studies have large differences in the attractiveness of policies and the entrepreneurial environment to entrepreneurs. In addition, some scholars believe that some inherent attributes of the region itself also have a great impact on entrepreneurs, including infrastructure, geographical location, economic development, etc. Nakamura utilized the spatial hedonic approach to explore the influence of some regional properties of the city of London on entrepreneurs and discovering that their valuation of EE is closely related to the infrastructure environment, in which public transportation and buildings are mainly maintained and integrated at the center (50).

The previous research has two shortcomings as follows: 1. Most of the research data comes from the development of local EE, and scholars mainly take the number of enterprises and their scale and economic conditions as the evaluation objects while ignoring the preferences of entrepreneurs. 2. A small part of the research on entrepreneurs' preference for EE mostly focuses on face-to-face interviews and judgments, and the results obtained are less reliable and not representative.

In order to solve these two problems, it is of great practical significance to propose an adaptable analysis method for entrepreneurs' preferences. In our research, we introduced a conjoint analysis method to analyze Chinese entrepreneurs' preference for EE and quantified them with willingness to pay.

5.3 Methodology

A face-to-face survey was designed by Tencent questionnaire web（https://wj.qq.com/）. All data were acquired from April 2021 to July 2021. Sawtooth software was utilized to build the mathematical model.

5.3.1 Conjoint analysis method

Conjoint Analysis (CA) has become one of most extensively applied marketing research techniques to assess consumer's multi-attribute utility functions in 1970s [51, 52]. CA is one of the most common approaches in exploring individual's preference over four decades [53, 54]. CA examines the joint effects of environmental attributes to respondents since they are presented in different combinations, instead of isolation. The Conjoint Analysis was initially applied to environmental area by Beggs [55]. Besides, it has been proved to be effective in assessing non-market value [56]. Daniels RF [57] employed CA to examine the assessment of environmental impacts on transport projects. CA can also be applied to determine the willingness to pay for environmental issues [58]. Thus it is deduced that conjoint analysis method could be used to examine the graduates' attitudes on different urban environmental attributes.

It was found that each experiment of CA should choose the attributes of the issue which arouses huge attention from researchers. In practice, massive CA experiments faced a problem that the amount of attributes was too large to examine because of the existence of fatigue effect [59, 60]. Moreover, research in cognitive process indicates that individuals consider relatively few aspects of stimuli in making assessment [61]. Likewise, Raz confirms that the critical attributes occupy a little portion which impact individuals to make decisions primarily [62].

5.3.2 Sampling process

In this research, all respondents were from three Chinese online forum where entrepreneurs gather. Since the main target of our research is entrepreneurs in Internet-related industries, these three forums are also mainly for Internet practitioners.

We plan to recruit 50 respondents for previous experiment and 1000 respondents for the main experiment of conjoint analysis. Through cooperation with the administrator of three Chinese online forum, we randomly selected respondents in the group of forum and distributed questionnaires to their mobile phones or computers. Finally, 48 valid questionnaires were collected in previous experiment and 989 valid questionnaires were collected in the conjoint analysis experiment.

5.3.3 Experimental process design

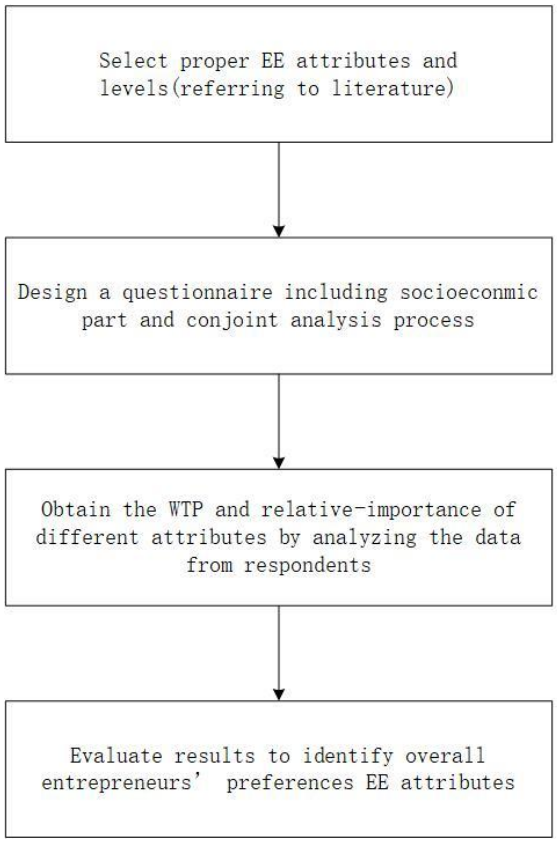

Fig 5-.1 Experimental procedures of our research in details

Referring to Fig. 1, the EE attributes and levels required to be considered for this experiment should be identified in Section 1. Previous literature was utilized to select attributes. In Section 2, the questionnaire was designed to examine characteristic and socioeconomic information of respondents (e.g., gender, age and educational background etc.) and their preferences for the combinations of different EE attributes and levels. Table 1 shows the specific attributes and levels. We used the orthogonal processing function of Sawtooth software to design these attributes and levels into 13 combinations. In order to examine the preferences of entrepreneurs, these 13 combinations in conjoint analysis part of questionnaire were defined as 13 virtual EE which need to be chose by respondents (see Appendix1). Then in the data process, the questionnaire data is analyzed based on the model established by the Sawtooth software. Thus we obtained the results (part-worth utility and relative significance) which can represent the preference of the entrepreneurs. In section 4, we evaluate these results to identify overall entrepreneurs' preferences on EE attributes.

5.3.4 Conjoint analysis process

The content of the questionnaire consists of two sections. Section 1 focuses on characteristics and socioeconomic information of respondents（e.g., gender, age and educational background etc.).

Before section 2, each respondent was confirmed about whether they can distinguish each different attribute and level completely in the research. On the other hand, each respondent should not be over informed to ensure the representative of respondents. It is therefore suggested that respondents should avoid becoming over informed in such a way that they lose their representation of the public [47]. Moreover, we set the levels of attributes with the reference to the data of 11cities from the Greater Bay Area. In section 2, participants were asked to response to a choice-based conjoint analysis questionnaire.

Table 5-1 EE attributes and levels included in the conventional conjoint analysis task.

Attributes	Attributes Description	Attribute levels
GDP	Financial capital	$350B
		$150B
		$50B
Average years of schooling	Human capital	50000
		30000
		20000
		7000
Per capita deposit of citizens	Market potential	$120,000
		$20,000
		$15,000
		$6,000
Length of highways per 10,000 residents	Physical infrastructure	200km
		500km
		1000km
Government expenditure	Government size	$70B
		$10B
		$1.6B
Funding Size	Government's economic subsidies for start-ups	$1,000,000
		$500,000
		$300,000
		$100,000
		$50,000
		$0

5.3.5 Mathematical model & Data processing

The findings of the conjoint process of the survey were analyzed for all of the samples and by complying with 5 different social-demographic and personal variables. A function of souvenir' s preference was calculated from the CBCA data by multinomial logit function. The function determined the importance of the respective attribute relative to the other attributes in choice making, as well as the level of preference for each value of the attributes.

$$U = \beta_0 + \sum_{k-1}^{n} \beta_n X_n \quad (1)$$

Where β0 denotes a constant coefficient of each alternative, β1, β2, β3..., βn represent the coefficients obtained by the logit model, indicating the relative weights of the attributes in each alternative. The weightings of attributes suggest their importance for choice deciding, and the preferences for all levels in the attribute.

The part-worth utilities reveal that the researcher estimates a value explaining the significance of the respondent finding each attribute. They were measured on an interval scale that origins arbitrarily, so it is meaningless to discuss the absolute magnitudes of utilities for different levels. Expressing part-worth utilities in monetary is a common way to make them more understandable. Researchers constantly choose price as an important attribute in conjoint experiment to calculate how much money respondents are willing to pay to elevate levels of other attributes. Money equivalence of a utility difference indicates monetary willingness to pay (WTP) of a unit change of utility. It helps compare the utility of different levels, whereas it remains an estimated result. It is noteworthy that the monetary WTP should be revealed for the differences between two levels, instead of a value attached to a single level. Moreover, the relative importance was exploited to indicate the importance of different attributes for respondents. The value of relative importance was determined by the gap between the highest utility of level and the lowest utility of level for one attribute.

The coefficient of the levels of attributes in the model here was statistically significant at a confidence level of 95%. Furthermore, the model was statistically significant based on the results of Person's test.

5.4 Results

The result about overall enterpreters' EE preferences are listed in Figure 2. According to Figure 2, the critical attribute to the respondents is the funding size (30.84%). The second critical attribute is government expenditure (20.39%), followed by deposits in financial institutions per capita (17.21%), GDP (14.15%), length of highways per 10,000 residents (9.37%) and number of graduates per year (8.04%).

All levels of the attributes were statistically significant and exerted a negative or positive impact, demonstrating that the attribute level was preferred or evaded.

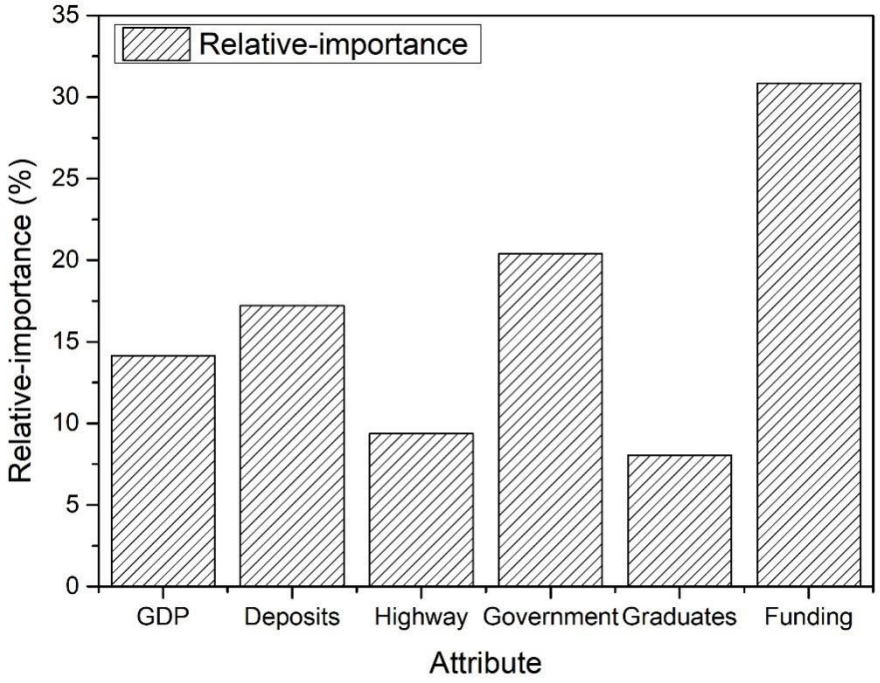

Figure 5-2 Relative-importance of different EE attribute

Entrepreneurs with different initial Initial capital have obvious differences in preferences for EE attributes. The entrepreneurs are classified according to the results of their options for the amount of initial funds in the questionnaire. Figures 3 to 8 show the relative importance of different EE attributes to them, which indicates their preferences.

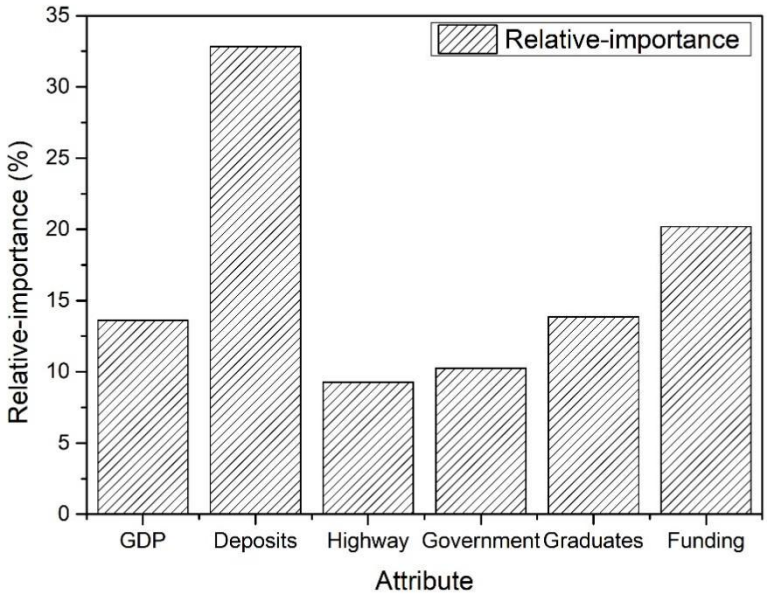

Figure 5-3 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is less than $ 0.05 million.

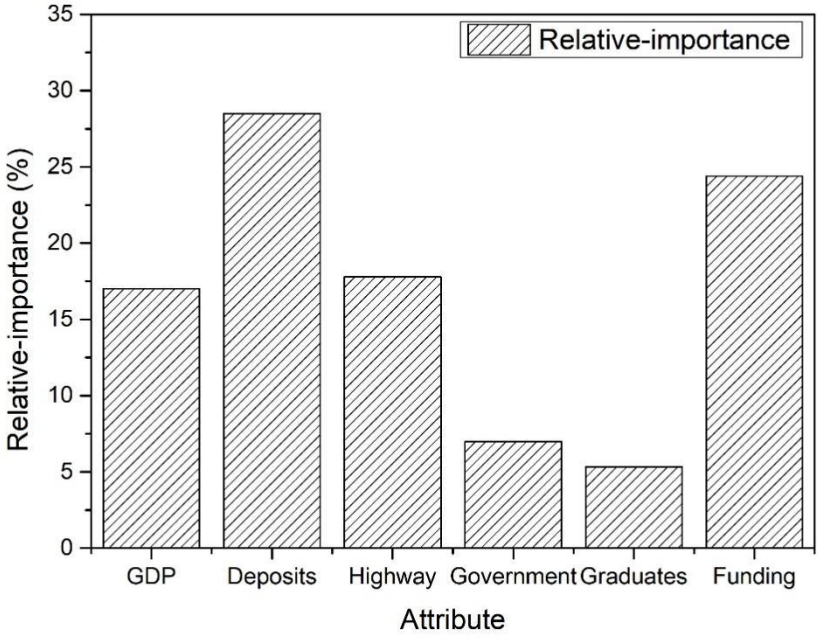

Figure 5- 4 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is between $ 0.05 million with $ 0.1 million.

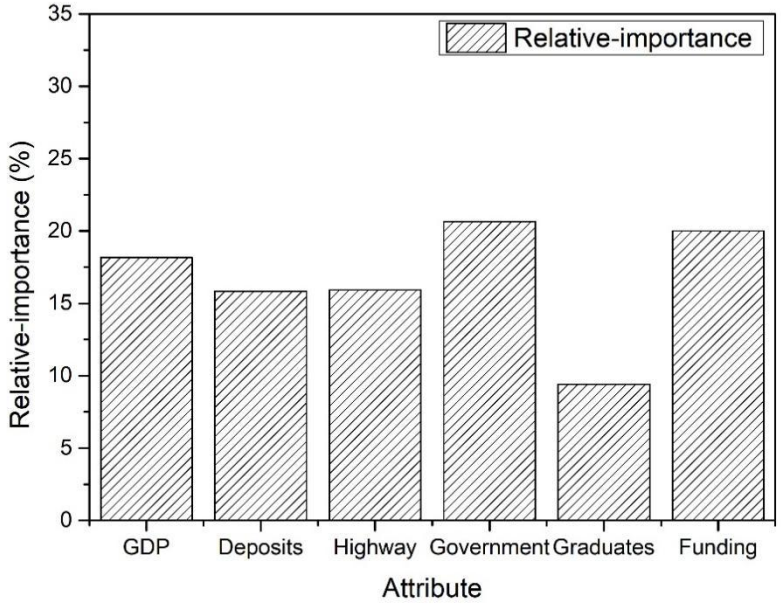

Figure 5- 5 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is between $ 0.1 million with $ 0.3 million.

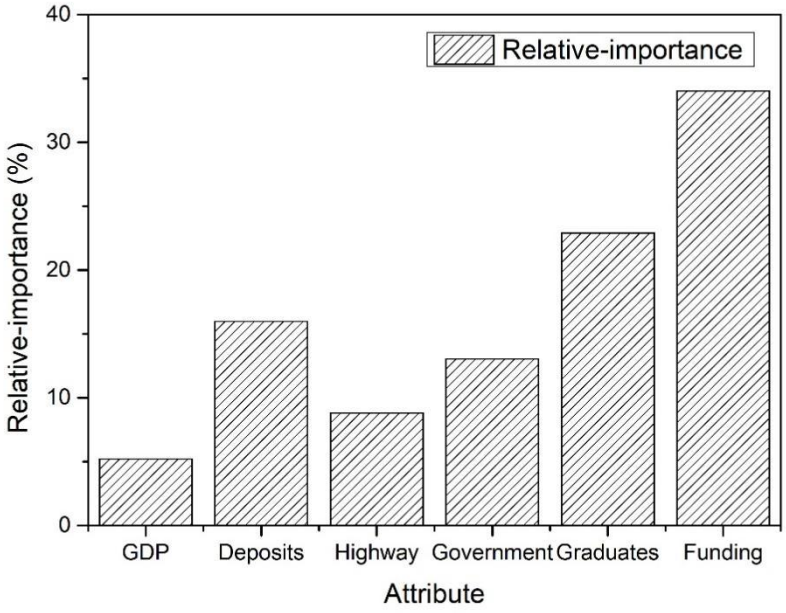

Figure 5-6 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is between $ 0.3 million with $ 0.5 million.

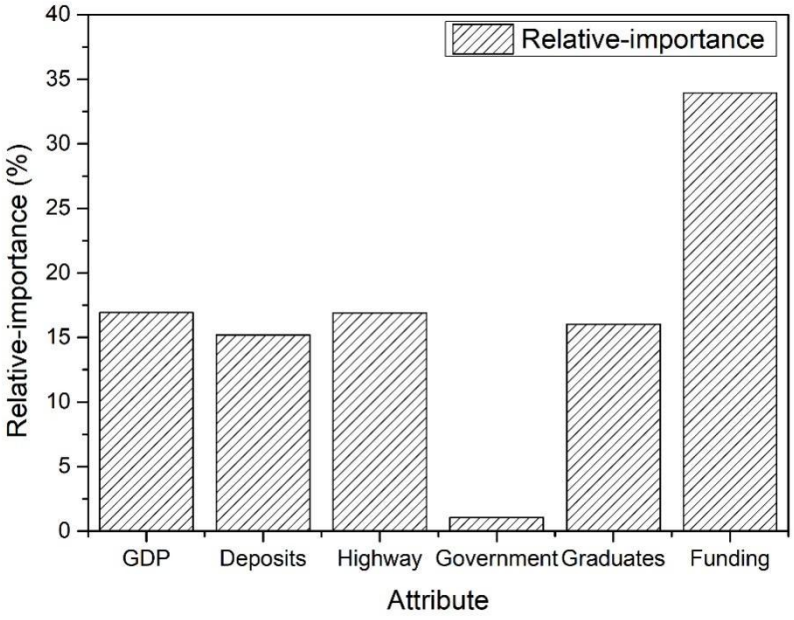

Figure 5-7 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is between $ 0.5 million with $ 1 million.

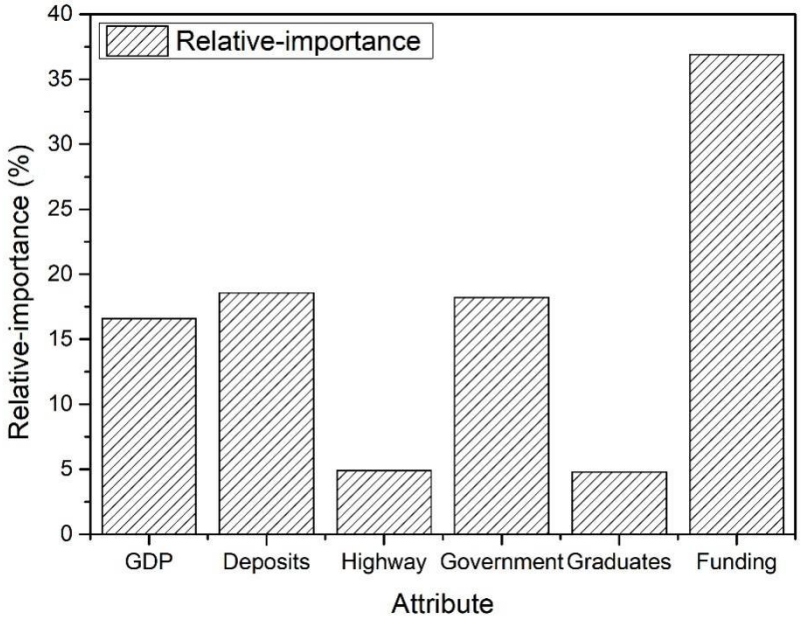

Figure 5- 8 Relative-importance of different EE attributes for entrepreneurs whose Initial capital is more than $ 1 million.

Figure 3 shows that the most important EE attribute for some entrepreneurs with the least Initial capital (IC<$0.05million) is the per capita deposit followed by the funding size. Figure 4 indicates that when the entrepreneur's initial capital is raised by one level ($0.05million<IC<$0.1million), per capita deposit is still the most valued EE attribute and the importance of funding size has increased.

In figure 5, the per capita deposit has lost its leading position in all attributes, which shows that entrepreneurs ($ 0.1 million<IC<$ 0.3 million) with more Initial capital no longer attach importance to per capita deposits. Except for the number of annual graduates, the importance of all other attributes tends to be similar

Referring to figure 6, figure 7 and figure 8 can be seen, when the entrepreneur's capital is more than $ 0.3million, the funding size has always been the most important EE attribute for the entrepreneurs.

Table 5-2 Entrepreneurs with different Initial capital's willingness to pay for improving EE attributes

Attributes	Level gap between	Willingness to pay					
		IC is Initial capital (million US dollar)					
		IC<0.05	0.05<IC<0.1	0.1<IC<0.3	0.3<IC<1	0.3<IC<0.5	1<IC
GDP	$50B，$150B	0.33267	0.03702	0.24708	0.15227	0.24498	0.34437
	$150B，$350B	0.34198	0.65982	0.66085	0.15285	0.25369	0.10491
Deposits in financial institutions per capita	$6,000，$15,000	0.38588	0.28174	0.34495	0.14463	0.06609	0.08308
	$15,000，$20,000	0.21205	0.33083	0.13005	0.01342	0.05981	0.11869
	$20,000，$120,000	1.02907	0.55527	0.31715	0.31154	0.32167	0.30161
Length of highways per 10,000 residents （Km/10000）	200km，500km	0.33260	0.42346	0.77544	0.12579	0.01666	0.02849
	500km，1000km	0.12702	0.30511	0.02071	0.13330	0.48154	0.10473
Government expenditure	$1.6B, $10B	0.47914	0.27609	0.88987	0.16054	0.02964	0.10943
	$10B, $70B	0.02769	0.01004	0.14268	0.22299	0.00133	0.38420
Number of graduates per year	7000, 20000	0.08036	0.02459	0.12877	0.29562	0.04583	0.00483
	20000, 30000	0.29288	0.04924	0.18188	0.08598	0.30203	0.05977
	30000, 50000	0.31290	0.14401	0.15995	0.29202	0.12426	0.06544

Table 2 points out the willingness to pay for different EE attributes of entrepreneurs with different start-up funds (amount of giving up funding). Similar to the previous figures, it shows that entrepreneurs with less initial capital are willing to give up more government funding in exchange for starting a business in a region with more savings per resident. On the contrary, entrepreneurs with larger capital have lower willingness to pay for changing to areas where the per capita deposits of residents are greater.

5.5 Discussion

Ares' research points out that most European and American consumers do not have the habit of saving (63). They usually consume in advance and use their monthly income to pay for the previous month's consumption. This will make it difficult to use the savings of local residents to measure the local market environment. Pradhan indicated that even the wealthiest areas in the U.S. are still very low in savings rates (64). Different from these research conclusions, Chinese residents are generally considered to have good saving habits, and people in different regions save appropriate amounts according to their own income (65). Li X's research revealed that in China, the higher the income of residents, the more savings per capital (66). Xiaoli T proposed that over-saving will affect the local consumer market and reduce the income of Small to Medium Enterprise (SME) owners (67). On the contrary, many studies have pointed out that the situation in China is special. The more saving places, the higher the consumption enthusiasm of people. Even with a similar ratio of consumption to saving, the total consumption of people from high-income areas is higher (68, 69). This is similar to the results of our research. All entrepreneurs tend to choose regions with higher per capita savings to start their businesses. Our research further points out that entrepreneurs with an initial capital of less than $0.05million are eager to start businesses in regions with more savings per capita, even at the cost of giving up large amounts of funding.

With the increase in initial capital for entrepreneurship, entrepreneurs gradually lost their enthusiasm for areas with high per capita deposits and turned to pursue businesses in areas with a higher scale of funding. When the initial capital reaches the highest (IC>$1million), Entrepreneurs are only willing to pay $0.083million (from $6,000 to $15,000), $0.119million (from $15,000 to $20,000), and $0.302million (from $20,000 to $120,000) to improve the level of EE's per capita deposit attribute. Similar to our research， Bennett's research on SME strategies pointed out that even if there is stronger competition, SMEs still hope to choose locations in areas with better market conditions (70). The strategy of a large company is the opposite of that of a small company. According to our experimental results, entrepreneurs (large companies) with more initial capital than other attributes hope to receive large government subsidies. Chen & Li discovered that Chinese local governments have helped large companies improve their performance through extensive tax incentives and financial subsidies (71). Tzelepis and Skuras' research on Greek companies found that government investment subsidies are an important supplement to the solvency of large companies (72). More importantly, many studies point out that higher government investment subsidies represent, to some extent, the government's support for large enterprises (73). A large number of studies have shown

that establishing friendly political ties with the local government is the goal sought by most large private enterprises today (74, 75, 76). We believe that unlike entrepreneurs (small and medium-sized enterprises) with lower initial capital, the local market For entrepreneurs with more initial capital, the importance is lower. However, as a clear policy support, financial support from the local government can not only improve a certain economic situation for the company, but also provide a certain political connection for the company. Khwaja and Mian et al. found that policy support in developing countries is more important for enterprises of a certain scale (78).

5.6 Conclusion & Suggestion

The objective of the present study was to find out entrepreneurs with different initial capital have different preferences for the attributes of entrepreneurial ecosystem and their willingness to pay for improving the levels of the mentioned attributes of EE. This study employed choice-based conjoint analysis method to examine 550 respondents' preferences for EE. The primary conclusions of the study are drawn below:

1.For current Chinese entrepreneurs, the critical attribute is funding size which followed by government size and financial capital.

2. If entrepreneurs' initial capital rise, their preferences for" Funding size" will increase, and the preferences for "Market potential" will decrease. For entrepreneurs with high initial capital, a high funding size not only means more economic benefits, but also brings them government connections and support.

3. Entrepreneurs with an initial capital of more than $1million are only willing to pay $0.083 million to transfer their company location from a region with a per capita deposit of US$6,000 to a region with a per capita deposit of $15,000, $0.11869 million for transferring from $15000 to $20000 and $0.30161 million for transferring from $20000 to $120000. Contrary to them, entrepreneurs with an initial capital of less than $50,000 have an average 323.22% higher willingness to pay for moving to areas with higher per capita deposits.

It is of great significance for local government to analyze these trends and make proper strategies for attracting different sorts of entrepreneurs. In brief, if the government wants to attract entrepreneurs with strong financial resources for local EE, increasing subsidies for large enterprises is the quickest way. For governments that want to increase the number of small and medium-sized enterprises, using funds to improve local people's livelihood will be an effective measure.

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Chapter 6

A CHOICE-BASED CONJOINT ANALYSIS OF SOCIAL MEDIA PICTURE POSTING AND SOUVENIR PURCHASING PREFERENCE

Over the past few years, increasing tourists have generated interest in social media and shared their trip pictures and experience on it. As revealed from existing studies, tourists' preference of posting pictures of their trip on a social media site(s) may be associated with their purchasing behaviors. In the present study, Choice-based Conjoint Analysis (CBCA) was conducted to examine tourists' souvenir preferences based on various frequencies for posting trip pictures (PTP). As indicated by result that tourist exhibiting a higher PTP frequency are more inclined to purchase souvenirs of higher availability. Furthermore, the group of tourists exhibiting the highest PTP frequency reported the highest willingness to pay (WTP) for the souvenir with a high level of "Availability", while tourists with the lower PTP frequency are inclined to purchase souvenirs exhibiting higher uniqueness. The present study is recognized as one of the initial attempts to cross-pollinate the research streams of souvenir purchase behavior and social media usage. The mentioned findings suggest that producers and sellers are required to adjust souvenir promotion and design by complying with the PTP data.

6.1 Introduction

Social media, as one of most popular online net-working tools, has been considered a high corporate priority. According to its definition, "Social media are interactive computer-mediated technologies that facilitate the creation or sharing of information, ideas, career interests and other expression forms via virtual communities and networks." by Kietzmann et al. [1]. Social media is embraced and adopted by individuals in their leisure time. According to the Pew Research Center [2], from February 2005 to February 2018, American adults using social networking sites took up a proportion surging 5% to 69%. Specific platforms have mushroomed their numbers of users: Facebook acquired 50 million users just one year after its commercial launch [3], while the user number of Twitter reached the same level in less than 9 months [4]. Social media is strengthening its impact on all aspects of society, economics and tourism. Through the up-regulated amount of digital mobile device, social media has allowed tourists to share information via its platform to help other tourists plan their travels or even impact their potential travel decision-making eventually. The way individuals plan and consume travel has been fundamentally altered by the engagement of social media [5, 6]. Considerable studies conducted in recent years focused on the interaction between social media and tourism.

The major current focus in the role of social media in numerous aspects of tourism consists of decision-making behaviors, information searching, as well as interacting with consumer. It is generally accepted that potential tourists are inclined to make their tourism decisions by referencing others' experiences via the experimental nature of tourism products [7]. The effect of social media has boomed during the travel planning process and tourism experience sharing. The experimental information from social media will significantly impact final decisions in plans of tourism [8]. Such a type of experimental information pertains to the user-generated content (UGC). With the development of social media, consumers have been promoted to acquire information and generate their own UGC to communicate with other tourists [9]. For most tourists, they have been found to often refer to others' UGC before visiting a new destination themselves [10]. UGC was to some extent considered exerting a similar effect to recommendations offered by friends and members of family [11-13]. According to Fotis et al., UGC of social media is found to be more trustworthy than information presented by the tourism service provider [8]. As a result, it was always considered the substitute for word of mouth. Based on the trustworthiness of UGC, the application of social media spread more rapidly among tourists. In addition, social media critically impacts the process of generating novel methods for tourism organizations (e.g., destination marketing organizations (DMO)) to develop their business models and improve their managements. As illustrated by Crafton and Parker, the application of social media in marketing may have critically boosted tourism by increasing local tourists amount and consumption of Atlantic Canada [14]. Moreover, social media was suggested to probably offer tourism firms a novel online marketing strategy. On the whole, this will help them change their focuses from sales support to develop an interactive relationship with

tourism firms and consumers [15]. The novel relationship exploited by social media can provide sales by predigesting the value chain [15]. Furthermore, social media is changing the tourism culture fundamentally.

Souvenir purchase refers to one of the most ubiquitous components of a trip [16]. Wilkins [17] suggested that three regular purchase motivations are souvenirs as gifts for others [18, 19], those as keeping memory of travel experiences [20, 21], and those as evidence of tour [19]. As proved by the mentioned study, some motivations to purchase souvenirs overlap with tourists' motivations to share tourism experience (e.g., uploading tourism pictures). Thus, the application of social media will impact tourists' souvenir purchasing behaviors by developing an attractive way for tourists sharing their tourism pictures. Bloey et al. classified all tourists into tourism picture posters and non-tourism picture posters. They found that the tourists posting pictures on social media of their trip have different purchase behaviors than other tourists without posting trip pictures [22]. However, this classification for tourism picture posters still faces a problem that tourism picture posters may have different preferences for souvenirs if they post their tourism pictures in different frequencies. In other words, to investigate their preferences accurately, tourism picture posters should be classified according to their frequency of posting tourism pictures (PTP) on social media.

This study aims to explore the different significance exhibited by souvenir attributes selected on influencing the preference of tourists with different frequencies of PTP. Choice-based Conjoint Analysis (CBCA) was conducted to examine and analyze the distinctive performances of tourists in this experiment. It is of significance to help souvenir producers and sellers to formulate accurate and comprehensive market strategies based on the trend of the interests generated by tourists in posting pictures on social media.

This study is organized as follows. In Section 2, the research method and CBCA process are elucidated. In Section 3, the results of the CBCA experiments are explained, which involve the overall tourists' preferences of different souvenir attributes and the correlation between tourists' frequency of PTP and their preferences for souvenir attributes. Moreover, the results here are discussed, and the mentioned results were compared with other studies' identical conclusions in this part. In Section 4 is the conclusions of our work and based on the mentioned conclusions, some suggestions are provided. Furthermore, the limitation of this research is provided at the end of this study.

6.2 Methodology

A face-to-face survey was conducted based on Choice-based Conjoint Analysis. 1506 valid questionnaires were collected instantly from March 18th, 2020, to June 24th, 2020.

6.2.1 Choice-Based Conjoint Analysis

Choice-Based Conjoint Analysis is a stated preference method measuring how a respondent states that individuals will react in a certain situation [23]. The stated preference method exhibits the advantage that it allows the researcher to examine the relative values of attributes considered jointly by the respondents. CBCA was conducted to assess a product with attributes decided by the researcher. This hypothetical product was created by researchers. On that basis, researchers could select the attributes with the largest impact they believed on the respondents to set for the product. Each attribute would be given a number of levels (i.e., high, medium and low levels). The researcher would ask the respondents to choose one product, the association of the different attributes and

levels from a products' group. After lots of the mentioned choosing processes, the researchers were enabled to get the part-utilities and relative importance of the different attributes and levels from the results based on the mathematical model.

CBCA has become one of most widely applied marketing research techniques to estimate consumer's multi-attribute utility functions in the 1970s [24]. It is considered an effective method in the tourism field as well. Shimaditya Nuraeni conducted CBCA to assess the preference attributes of youth for acknowledging their decision making in terms of their tourism destination [25]. Gorazd Sedmak examined tourists' preferences for authenticity in tourism products (e.g., souvenirs) [26]. In this study, CBCA was used to explore the souvenir preferences of tourists, which shows significant interest in the application of social media.

6.2.2 Samples

Luoyang is a famous tourism city in China. It is a municipal area in Henan province, a central province in China with three million urban residents and about four million rural residents. Luoyang established its tourism industry by inventing the national festival celebrating the Peony blossom and propagating its associated culture from 1983 [27]. Apart from the festival, popular tourism sites (e.g., China’s first Buddhist temple, White Horse Temple and United Nations Educational, Scientific and Cultural Organization's world heritage sited Longmen) attract considerable tourists for Luoyang. As suggested by the data from China economic database [28], Luoyang hosted nearly 1413.2 million visitors in 2018, including a massive number of foreigners. For its successful tourism marketing management and the numerous visitors' choices, Luoyang has become one of the most representative tourism cities in China [29]. Thus, it has been taken as a case in this study. The sampling process here was conducted in three of the most popular attractions in Luoyang (Longmen Grotto, White Horse Temple and Luoyang Museum).

6.2.3 Stimuli

For normal CBCA experiments, researchers should apply an item that can be clearly recognized by people as a stimuli to test the attitudes of respondents to its different attributes.

Six Chinese embroidery products acted as the stimuli here. Embroidery products were selected as they are easy to pack and common purchasing souvenirs among tourists visiting China [30, 31]. Initially, 15 Chinese souvenirs pertaining to 6 different product categories were selected to filter out a suitable stimuli. The local Chinese embroidery products were taken as stimuli based on the researchers' observations of souvenir markets and the opinion from tourism experts in Luoyang.

6.2.4 Measures’ details

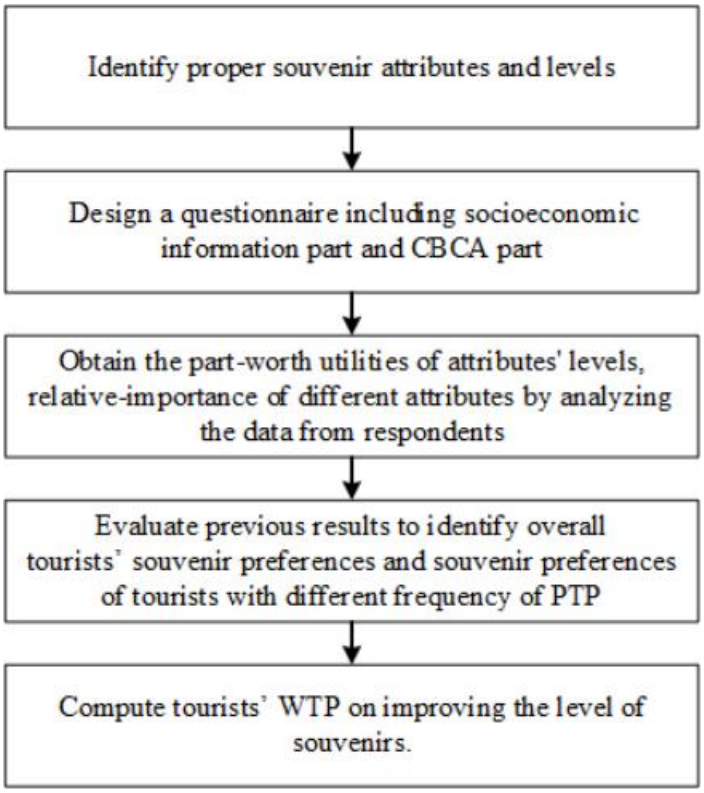

Figure 6-.1 Experimental procedures of our research in details.

Referring to Fig. 1, the souvenir attributes and levels required to be considered for this experiment should be identified in Section 1. It was found that availability (wide range of goods of high quality at an affordable price), aesthetics (well packaged and displayed goods), uniqueness (capable of containing unique memories of the trip) were considered the critical three attributes of souvenirs [32]. Availability, aesthetics and uniqueness were chosen to establish a conjoint analysis model. Besides of the mentioned three attributes, price attribute was used to calculate respondents' "willingness to pay" on improving the levels of other attributes. Given the information from Luoyang Souvenir markets and the advice from local tourism experts, the levels of Price were set below: 20 Chinese Yuan (CNY), 50 CNY, 100 CNY, 150 CNY and 300 CNY. Table 1 lists the souvenir attributes selected along with the setting of different levels.

Table 6-1 Four souvenir attributes included in the conventional conjoint analysis task.

Attributes	Attribute levels
Availability	high
	medium
	low
Aesthetics	high
	medium
	low
Uniqueness	high

	medium
	low
Price	20 CNY
	50 CNY
	100 CNY
	150 CNY
	300 CNY

In Section 2, the questionnaire was designed to examine characteristic and socioeconomic information of respondents (e.g., gender, age, educational background, and using social media or not) and their preferences for the combinations of different souvenir attributes and levels. To examine respondents' preference for the combinations, the respondents were guided by staffs to recall their experience to act as if they were personally involved in the simulated situation. Subsequently, respondents should choose from the 4 simulated souvenirs of the different attributes and levels' combinations. If all of the options were not accepted to be purchased, they could choose the "None" option. In Section 3, the data from questionnaires were analyzed to obtain the part-worth utilities of attributes' levels, relative-importance of different attributes by using Sawtooth software. Next, the results of Section 3 were assessed, and the determination of the most desirable combination of attributes and levels for whole tourists were identified. Besides, the preferences of tourists with different frequencies of PTP were examined. Furthermore, the WTP on elevating the level of souvenirs was computed to measure respondents' preference in Section 5.

6.2.5 Detailed attribute description

Uniqueness: The attribute of Chinese embroidery is primarily determined by two factors, i.e., the local technique they applied, as well as the unique design. For different geographical origins, huge differences always exist between Chinese embroidery techniques and designs [31]. Thus, the three levels of Uniqueness were set according to the area where tourists could obtain the specific Chinese embroidery. Low level of the Uniqueness was defined that tourists could purchase the mentioned souvenirs from tourism markets whether in Luoyang or not. If tourists can only buy a Chinese embroidery in Luoyang, this Chinese embroidery is classified as medium level. In the present study, the souvenirs with a high level of Uniqueness referred to the Chinese embroidery that was only produced in Luoyang and had a creators' signature on themselves.

Availability: Chinese embroidery is generally recognized as an artistic pattern attached to other objects to ornament the mentioned objects (e.g., apparel, bedclothes and curtains). Accordingly, the usage frequency of object they attached to could be used to reveal the availability of Chinese embroidery. Referring to the advice of local tourism experts, the low level of the attribute "Availability" was defined as the souvenirs used for less than three times after they are purchased. The medium level indicated the souvenirs with usage frequency between less than twice a week and three times after purchase. Souvenir with a high level of availability means it would be utilized three times a week at least.

Aesthetics: Chinese embroidery, a sort of ornament or artwork, was always considered exhibiting obvious attribute "Aesthetics". Specific to Chinese embroidery, the color depths are critical to "Aesthetics" [31]. In embroidery, color depth means the amount of lines with different color levels in

one color system (e.g., red or blue). Higher color depth implies higher level of "Aesthetics". Since some Chinese embroideries applied a few color systems, average color depth was adopted to measure the attribute “Aesthetics". In the present study, the levels of "Aesthetics" were set as low level (1<color depths<5), medium level (6<color depths<10) and high level (color depths>10).

Price: The prices of the Chinese embroideries expressed in Chinese Yuan include (1) CNY300, (2) CNY150, (3) CNY100, (4) CNY50 and (5) CNY20. Prices complied with the average price of 173 local Chinese embroideries in Luoyang.

6.2.6 PTP frequency description

Referring to the existing study, the frequencies of people’s behaviors on social media were usually set to 4 or 5 levels [33]. In the present study, tourists' PTP frequencies were set to 4 levels. Since the four levels might show different significance for various tourists, they were expressed for tourists as Always PTP (70%-100%), Often PTP (30%-70%), Sometimes PTP (0-30%) and Never PTP (0).

6.2.7 Choice-based conjoint model

The findings of the conjoint process of the survey were analyzed for all of the samples and by complying with 5 different social-demographic and personal variables. A function of souvenir’ s preference was calculated from the CBCA data by multinomial logit function. The function determined the importance of the respective attribute relative to the other attributes in choice making, as well as the level of preference for each value of the attributes (part-worth utility).

$$U = \beta_0 + \sum_{k-1}^{n} \beta_n X_n \quad (1)$$

Where β_0 denotes a constant coefficient of each alternative, β_1,β_2, β_3..., β_n represent the coefficients obtained by the logit model, indicating the relative weights of the attributes in each alternative. The weightings of attributes suggest their importance for choice deciding, and the preferences for all levels in the attribute.

The part-worth utilities reveal that the researcher estimates a value explaining the significance of the respondent finding each attribute. They were measured on an interval scale that origins arbitrarily, so it is meaningless to discuss the absolute magnitudes of utilities for different levels. Expressing part-worth utilities in monetary is a common way to make them more understandable. Researchers constantly choose price as an important attribute in conjoint experiment to calculate how much money respondents are willing to pay to elevate levels of other attributes. Money equivalence of a utility difference indicates monetary willingness to pay (WTP) of a unit change of utility. It helps compare the utility of different levels, whereas it remains an estimated result. It is noteworthy that the monetary WTP should be revealed for the differences between two levels, instead of a value attached to a single level. Moreover, the relative importance was exploited to indicate the importance of different attributes

for respondents. The value of relative importance was determined by the gap between the highest utility of level and the lowest utility of level for one attribute.

The coefficient of the levels of attributes in the model here was statistically significant at a confidence level of 95%. Furthermore, the model was statistically significant based on the results of Person's test.

6.3. Results and discussion

6.3.1. Overall tourists' preferences for souvenirs and WTP for attributes

The result about overall tourists' souvenir preferences are listed in Table 2. According to Table 2, the critical attribute to the respondents is the souvenirs' price (40.7%). The second critical attribute is uniqueness (23.3%), followed by availability (18.6%) and aesthetics (17.3%).

All levels of the attributes were statistically significant and exerted a negative or positive impact, demonstrating that the attribute level was preferred or evaded.

Table 2 Preference model with estimated monetary values

Attribute	Attribute level	Utility	Std.Deviation	Lower 95% CI	Upper 95% CI	Utility per CNY 100 between 2 levels	Change in monetary value from least preferred (US$0)
Uniqueness	High	0.25179	0.10473	0.24639	0.25719	0.44356	US$22.89
	Middle	0.09887	0.18173	0.0895	0.10824	1.15889	US$16.56
	low	-0.30066	0.14344	-0.30805	-0.29326		US$0.00
	Attribute importance	0.23334					
Availability	High	0.17174	0.15939	0.16353	0.17996	0.50532	US$18.28
	Middle	-0.00246	0.08547	-0.00687	0.00194	0.77395	US$11.06
	low	-0.26928	0.16146	-0.2776	-0.26096		US$0.00
	Attribute importance	0.18628					
Aesthetics	High	0.17344	0.18832	0.16373	0.18315	0.32359	US$16.94
	Middle	0.06188	0.10555	0.05644	0.06732	0.86209	US$12.32
	low	-0.23532	0.2217	-0.24675	-0.22389		US$0.00
	Attribute importance	0.17265					
Price	20	0.33247	0.17874	0.32326	0.34169		
	50	0.2029	0.18224	0.19351	0.2123		
	100	0.02893	0.26185	0.01543	0.04243		
	150	-0.12148	0.19861	-0.13172	-0.11124		

	300	-0.63282	0.17609	-0.6419	-0.62374		
	Attribute importance	0.40772					
None		-0.17879	1.34877	-0.24833	-0.10926		
Total importance		1					

Uniqueness: As expected, the utility results demonstrated that respondents hold a positive attitude towards purchasing the souvenirs exhibiting high uniqueness (0.25) or medium uniqueness (0.10). Moreover, the utility of low "Uniqueness" was -0.30. In fact, respondents aimed to pay $16.56 to promote its level from low to medium and also accepted to spend $22.89 in improving it from low level to high level.

Availability: According to the results for the “Availability” attribute, only high level of this attribute can obtain the clear preference from respondents. When the respondents were not satisfied on this attribute of souvenir, they were motive to pay over $18.28 or $7.22 for replacing low-or medium-level availability with the high-level one. The preference improved with the rise of the times of usage.

Aesthetics: Of the three levels of "Aesthetics", people were found to hold a negative attitude towards the Chinese embroideries with low color-depth (-0.26). Given the results in Table 2, customers were willing to pay much more money for purchasing souvenirs with a higher level of "Aesthetics", such as medium level ($12.32) and high level ($16.94).

As revealed from the results here, uniqueness of the souvenirs critically promoted overall Chinese tourists' purchasing behaviors. The souvenirs exhibiting a higher level of uniqueness might be more easily accepted by customers even though their price is very high. Specific to souvenir producers and sellers, souvenirs' uniqueness should be improved first. Likewise, Kim and Littrell indicated that improving uniqueness of local souvenirs helped attract international tourists [30]. Referring to the study on tourists visiting Finland, uniqueness emerged as one of the preferred attributes in the selection of souvenirs [34].

6.3.2 Proportion of tourists with different PTP frequency

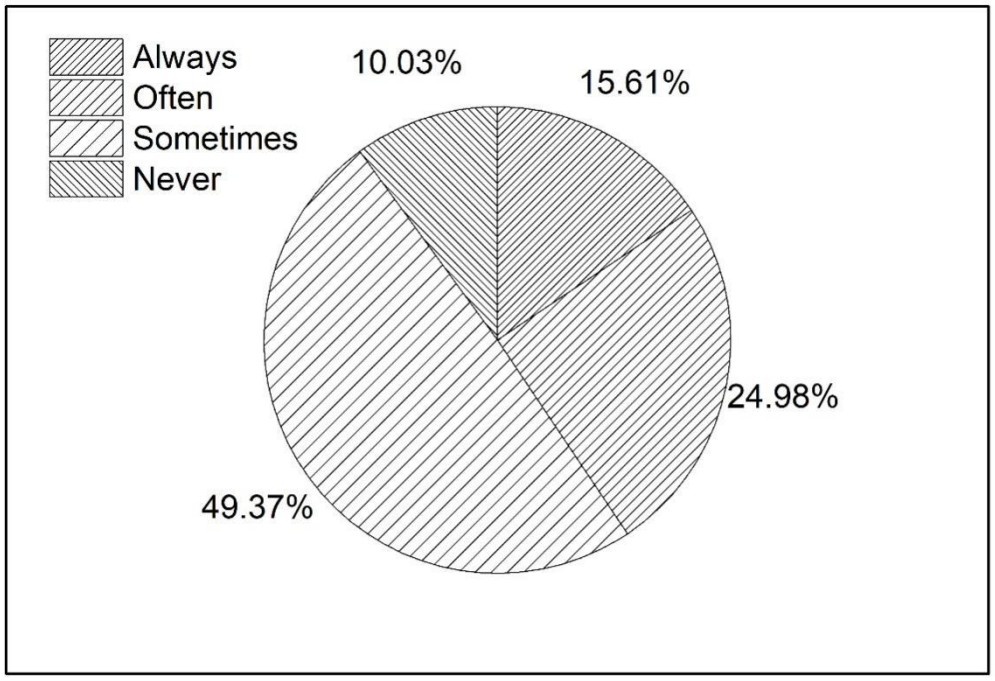

Figure 6- 2. Percentage of tourists with different frequency of uploading tourism pictures to social media.

Fig. 2 suggests the proportion of tourists with different preferences for posting tourism pictures to social media. The results showed that half of the tourists always post their tourism pictures on their personal social media. In addition, nearly a quarter of the tourists stated that they often post their travel photos on social media. Moreover, about 15% of people chose to upload their tourism photos sometimes, and only 10% of the tourists were suggested with an opposed attitude on posting their tourism photograph on social media. The number of active users in Instagram, one of the most representative picture social media, has increased over ten times from 2013 to 2018 [35]. With the dramatic expansion of social media users' scale in recent years, there has been a significant growth in the number of people who intend to post personal photos to social media [36]. A similar conclusion was reached by Munar and Jacobsen [37]. As demonstrated by their survey on Mallorca tourists, 14% of them have shared pictures/videos on social media, and 44% tourists planned to upload their tourism experience to social media in the future. Based on the mentioned previous study, this study considered that the percentage in Fig. 2 would change over time. The change might be that some tourists with low PTP frequency would be converted into members of the group exhibiting high PTP frequency.

6.3.3 Tourists with different PTP

6.3.3.1 Relative importance

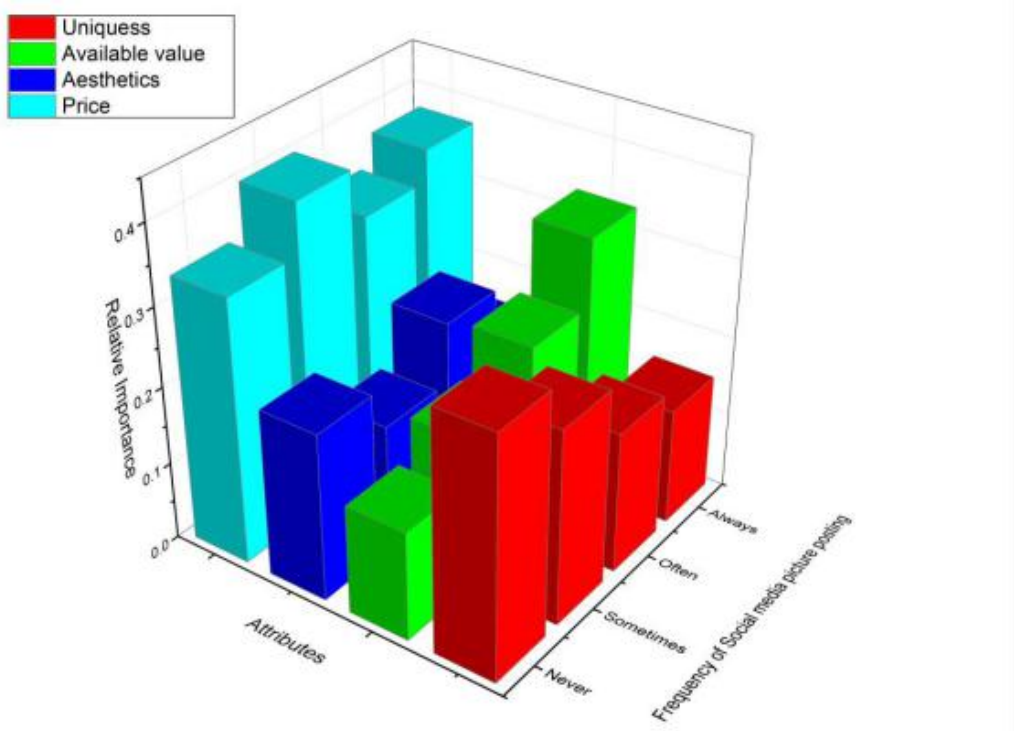

Figure 6- 3. Souvenir attributes' relative importance for tourists with different PTP frequency.

Referring to Fig. 3, even though tourists' attitude on PTP were different, the price attribute of souvenirs was regarded as the critical attribute by all of them. Likewise, the results demonstrated that the tourists' frequency of PTP does not impact the relative importance of the attribute “Aesthetics” for the mentioned tourists. Notably, if the frequency of PTP increases continuously, the relative importance of “Availability” will increase significantly with the decline of the relative importance of "Uniqueness". In other words, tourists exhibiting a stronger preference for PTP raise lower requirements for the uniqueness of souvenirs, and stronger demand for availability. However, when comparing our results to those of previous studies, noticeable distinction must be pointed out. Bloey et al. indicated that "trip picture posters" are more prone to purchase the souvenirs exhibiting higher uniqueness than "non-trip picture posters" [22]. The difference between our studies might be attributable to that there is a non-negligible diversity in values and cultural backgrounds between Chinese and Western tourists. As stated by Wei, the traditional values of Chinese tourists will impact them to make purchases that are not consistent with the expectations of Western tourism and hospitality practitioners [38].

6.3.3.2 Willingness to pay

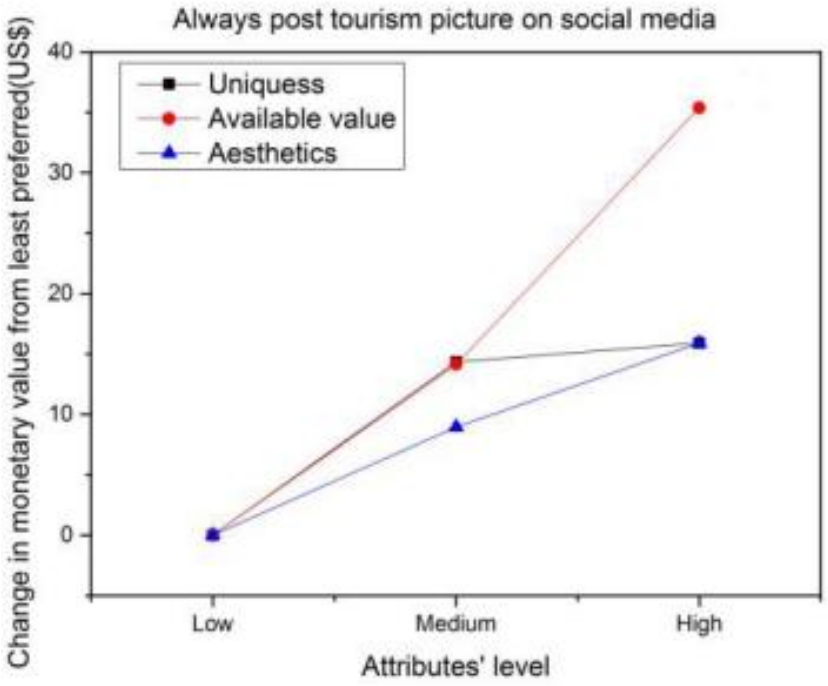

Fig 6-4. (a)

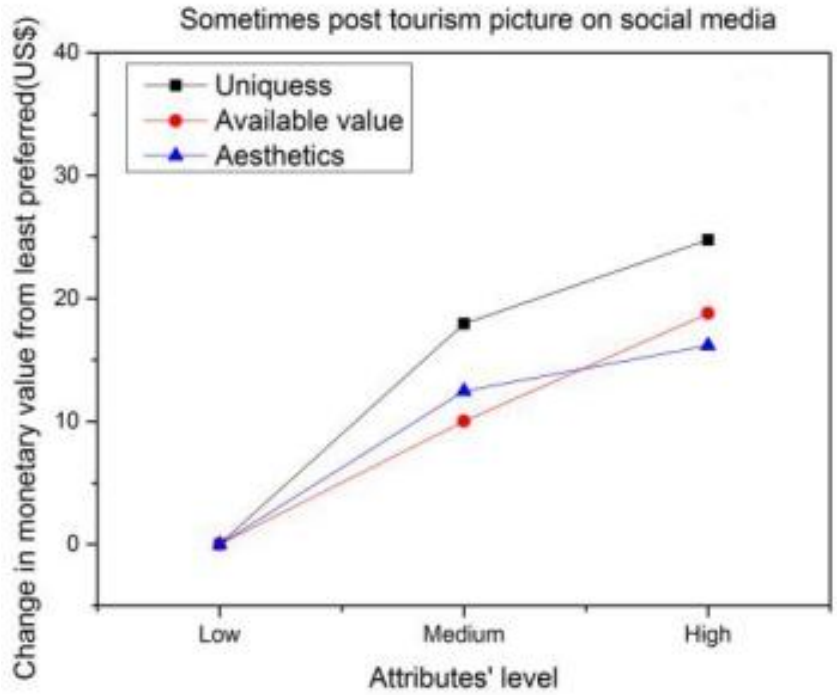

Fig 6-5. (b)

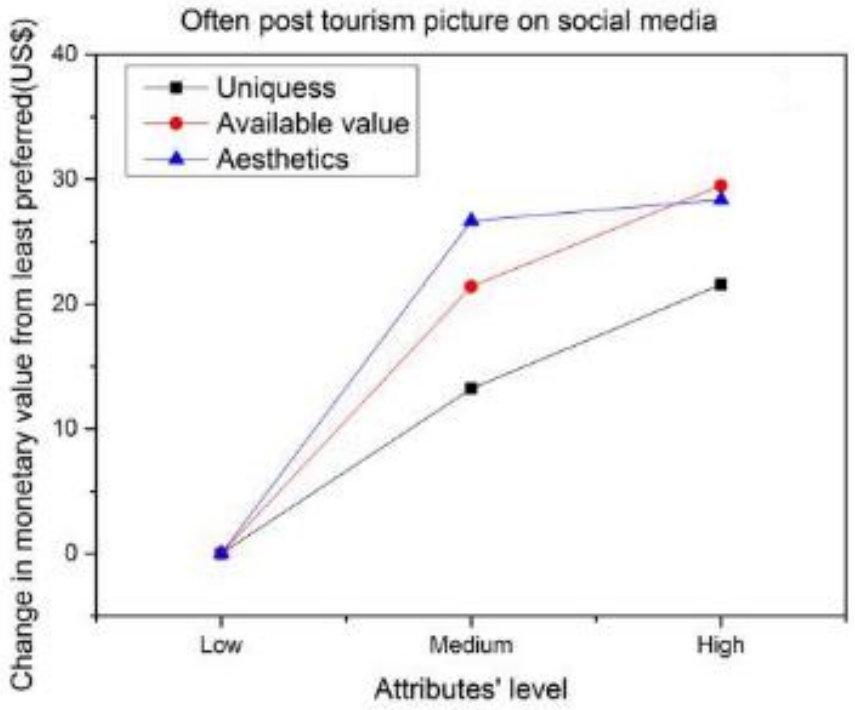

Fig 6-7. (c)

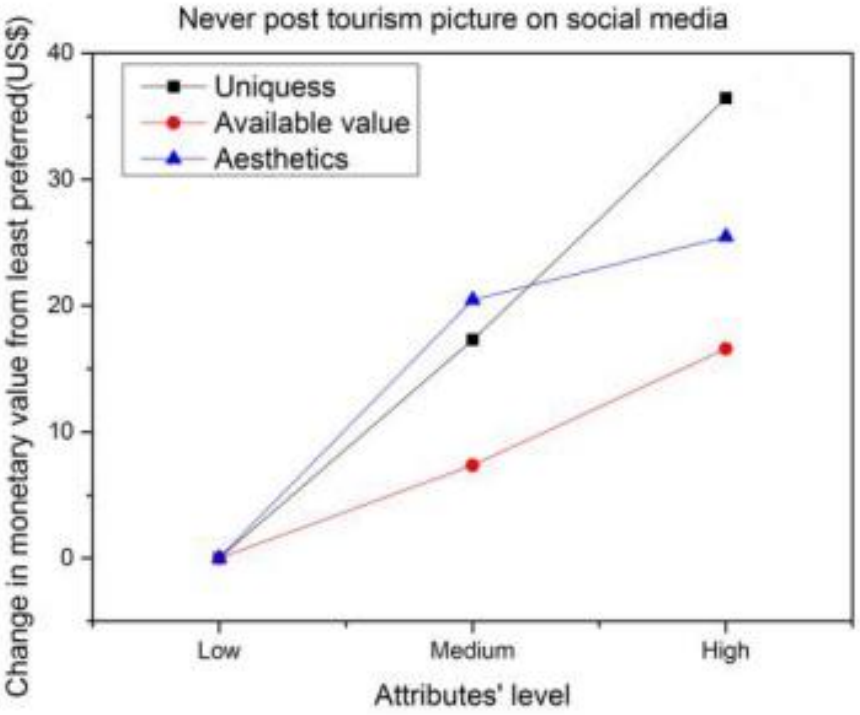

Fig 6-8. (d)

Figure 4. (a) Always PTP tourists' WTP on changing from least preferred (US$0); (b) Often PTP tourists' WTP on changing from least preferred(US$0); (c) Sometimes PTP tourists' WTP on changing from least preferred(US$0); (d) Never PTP tourists' WTP on changing from least preferred(US$0).

By observing fig.4 (a)~(d), it appears that with the decreasing of the frequency of PTP, tourists' WTP on improving the levels of the mentioned three attributes changed differently.

Uniqueness: Fig. 4 (a) shows that people always posting tourism pictures aimed to pay US$14.34 to change this attribute from low level to medium level or to pay US$15.9 for high level. For this group of tourists, the gap between medium and high level was considered worth US$1.56. According to Fig. 4 (b), this group of tourists (Often PTP) suggested a similar performance on medium level' s WTP when their WTP of high level increased remarkably. Specific to the tourists posting tourism picture sometimes, Fig. 4 (c) indicates that their WTP on improving souvenirs' uniqueness attribute was extremely higher than both of the groups before. As shown in Fig. 4 (d), the tourists claiming they had never posted trip pictures showed a nearly WTP on a medium level like those tourists posting picture sometimes. Notably, their WTP on high level uniqueness make a great deal of growth comparing to the group (Sometimes PTP). In general terms, each groups of tourists' WTP on medium level of uniqueness fluctuated around US$15. However, for the souvenirs with a high level of uniqueness, tourists with lower frequency of PTP showed a significantly higher WTP on them.

Availability: Compared with the tourists' changing WTP trend of the attribute "Uniqueness", this trend performed different or even opposite on the attribute" availability". The group of tourists (Always PTP) revealed the highest WTP (US$35.39) on the high level of "Availability" among all tourists. However, with the reduction of PTP frequency, tourists interested in high availability declined continuously and the lowest WTP was examined as US$16.59 (Never PTP). For the medium-level availability, the overall trend is similar to that of the high-level one. Tourists exhibiting a higher PTP frequency were willing to pay more for of souvenirs with the medium-level availability. Unexpectedly, the group with the greatest preference for high availability did not show the highest WTP for the medium availability. We speculated that this might be due to the tourists (Always PTP) just desired to purchase the souvenirs with high availability instead of getting other souvenirs with low price and lower availability.

Aesthetics: According to Fig. 4, tourists' preferences for the attribute "Aesthetics" showed no obvious correlation with their frequency of PTP.

Tourists showed high willingness to pay for souvenirs with high uniqueness because they feel satisfied from purchasing souvenirs only existed locally [34]. Research on the Australian souvenir market showed that uniqueness is an attribute considered by tourists in advance, and tourists were willing to pay more to get unique souvenirs produced locally rather than cheap accessories from overseas [39]. In line with the mentioned studies, the findings here indicated that the low PTP tourists with higher preference for uniqueness still account for the majority of all. On the other hand, tourists' attitude on availability was also worthy of attention. Paraskevaidis and Andriotis demonstrated that most of

tourists chose to buy souvenirs that could be used in their daily life. In their opinions, availability was recognized as an important souvenir attribute by most tourists [40]. This study revealed that tourists' preferences for availability will increase when tourists post their tourism pictures more frequently on the social media. Furthermore, a growing number of tourists will be willing to pay for souvenirs with high availability.

6.4 Conclusions and limitations

The objective of the present study was to find out tourists with different frequency of posting tourism pictures have different preferences for the attributes of souvenirs (uniqueness, availability, aesthetic) and their willingness to pay for improving the levels of the mentioned attributes of souvenirs. This study employed choice-based conjoint analysis method to examine 1506 respondents' preferences for souvenirs. The primary conclusions of the study are drawn below:

For current Chinese tourists, the critical attribute besides price is uniqueness which followed by availability and aesthetics.

2. The Chinese tourists (Sometimes PTP) accounts for the largest proportion (49.37%) of total. Next comes tourists (Often PTP), taking up 24.98%. Moreover, tourists (Always PTP) account for 15.61%, while the lowest proportion (Never PTP) reaches 10.03.

3. If tourists' PTP frequency rise, their preferences for ”Availability” will increase, and the preferences for "Uniqueness" will decrease.

4. With the decrease of tourists' PTP frequency, their WTP for the medium level of the souvenir attribute "Uniqueness" fluctuates around US$15, and the WTP for the high level of "Uniqueness" rises to US$ 36.42 continuously.

5. With the increase in the frequency of tourists' PTP, their WTP for souvenirs exhibiting high availability rises significantly, and note that the highest is the tourists (Always PTP) with the WTP reaching US$35.39.

For the low PTP (Sometimes, Never) tourists showing a high preference for "Uniqueness" accounted over 60% of all tourists in the past, "Uniqueness" was usually regard as the critical souvenir attribute for Chinese tourists. However, according to existing studies [35, 36], people's interest in taking pictures and sharing on social media continues to develop, probably leading to an increase in the proportion of tourists with high PTP in the future. If the proportion of tourists with high PTP continues to increase, overall Chinese tourists' preference for the "Uniqueness" of souvenirs will decrease, and their preference for “Availability” will rise continuously. On the other hand, tourists' demand for souvenirs with a high level of “Availability” will expand significantly and the demand for souvenirs with high "Uniqueness" will shrink further. It is of great significance for tourism companies and markets to analyze this trend and make proper strategies for producing and selling souvenirs. In brief, with the development of tourists' interests in posting picture on social media, it is considered that government and tourism companies should place more stress on the changes in tourists' demand for souvenirs.

Moreover, they should increase their investment in improving the “Availability” of souvenirs and reduce their investment in "Uniqueness" appropriately.

The present study has potential limitations. This study primarily complied with the data from Chinese tourists, whereas every tourism company and government should consider the needs of tourists with various cultures and backgrounds not only Chinese tourists' demand. It remains a gap that souvenirs' attributes will be preferred by international tourists with different PTP frequency. If the mentioned international tourists' preferences could be analyzed in depth, it helps tourism practitioners formulate strategies more comprehensively and accurately.

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Chapter 7

CONCLUSION AND POLICY IMPLICATIONS

Within the resource-based view of the firm, physical capital, organizational capital and human capital was regard as sources of competitive advantage (1). The quick transfer of information and increasing level of industrial technology have diminished the competitive advantage that was once available through physical capital and organizational capital. Currently, producing differentiation rests with talents who generate new ideas or with those who deliver the product. There is increasing recognition therefore of the potential of human capital in making a substantial and lasting impact on sustainable competitive advantage (2). Similarly, many scholars believe that the most important internal driving force for regional economic development comes from the activities of talents, especially technological innovation.

Today's global business climate continues to suffer from the aftermath of the massive epidemic of Covid-19. While employment in some service industries has been greatly affected and has been shrinking, the science, technology, engineering, and mathematics (STEM) fields in China have further increased the demand for talents (3). In the current situation of talent shortage, attracting and retaining talent resources and the application of technological innovation are both important parts of promoting regional economic development.

It reported that there are many studies focusing on the relationship between talent attraction and technological innovation and regional economic promotion (4, 5, 6, 7). However, few scholars have focused on quantifying talents' preference for regions to improve policies to achieve the goal of attracting talents. Our studies have employed the conjoint analysis method – one of the most widely used approach for measuring non-market value, to estimate the value of regional attributes. In terms of innovation, we also put forward suggestions on the development of regional tourism economy from the perspective of new technologies and combined with the joint analysis method.

7.1 Conclusion

The research flow of this thesis follows theoretical study – methodological study – experimental study.

Chapter 1 is general introduction, mainly focus on the research background and research purpose and purpose of the study was addressed. The role of talents and innovation in promoting regional economic development is widely recognized. However, most studies are conducted to determine which regional attributes are more attractive by studying the commonalities of regions that have successfully attracted a large number of talents. The purpose of our research is to directly issue questionnaires to talents to assess the attractiveness of the attributes of the region to different talents which can directly get the talents' own clear understanding and choice of preferences

Chapter 2 is the review of previous literature. It has been analyzed that the research on talents attraction stragies of different countries, regions and cities. It is notable that there are still some research gaps that need to be studied.

Chapter 3 is the research methodology. The designing process and the experimental process of the conjoint analysis were shown in this part. It also introduces different types of conjoint analysis

methods and their applicable environments

Chapter 4 is research on the attractiveness of regional attributes to graduates. Water pollution was regard as the most important urban important environmental attribute for graduates from Northeast region of China. Policy makers can effectively attract graduates to their regions by improving the water environment

Chapter 5 is attracting entrepreneurs for entrepreneurial ecosystem (EE) by improving the attributes of the place where EE is located. Improving the people's livelihood environment can effectively attract small and medium-sized enterprises' owners and increasing the funding size can effectively attract large business owners to start their own businesses

Chapter 6 is promoting regional economic development through enhancing tourists' willingness to purchasing souvenirs. The combination of traditional industries and new technologies is also an effective means of promoting regional economy. In this research, the behavior of tourists on social media proved to be a reference for commercial strategies used in souvenir sales.

In terms of the theoretical level, this study combs and discussed about the engine of regional rconomic development through regional rconomic development theory and subjective economic value theory, proposing that its main facilitator is talent and innovation. In terms of the methodological level, this study points out that the impact of new technologies such as big data and social media in conjoint analysis method research has long been overlooked. In terms of the experimental level, the study focus on Northeast China graduates' preference for urban environmental attributes, entrepreneurs' preference and willingness to pay for the attributes of the entrepreneurial ecosystem, and the role of the improved joint analysis method from the perspective of social media in the promotion of regional tourism economy.

7.2 Policy implications

Based on the experiments and discussions above, this research provided policy implications as follows:

7.2.1 Establish a city brand based on environmental protection

City branding is a subfield of local branding, emphasizing the marketing and brand promotion of residents (and potential residents) who use the city as a place of residence and as an investment place. Traditional urban brand promotion objects are mainly landscape, entertainment, shopping facilities, accommodation and food. However, for cities that intend to attract graduates to settle down, these are clearly not enough.

Kozak's research points out that cleanliness is an important part of the city brand (8). Many scholars also believe that environmental attributes are highly attractive urban attributes that have been neglected (9, 10).

The performance of environmental attributes is of great significance to graduates' choice of settlement place. Improving the performance of environmental attributes, especially the water

environment, can effectively attract a large number of Chinese graduates. However, improving the urban environment alone but ignoring publicity is likely to cause delayed or even weakening of the attractive effect. Reasonable publicity of the city's outstanding environmental attributes will help establish an environmentally friendly city brand and increase the influence of graduates.

7.2.2 Improving the welfare of residents

Research on improving the welfare of residents has always attracted the attention of the government. The main reason for this is that improving welfare can effectively enhance the authority of the government and increase residents' support for the government (10). However, the high investment in this policy often becomes an important reason hindering the government from adopting it (11).

Many studies have pointed out that improving welfare or distributing property to residents can not only improve the image of the government, but also promote local residents' consumption and enterprise development (12, 13). For example, the Japanese government often uses subsidies to residents to protect small and medium-sized enterprises, which proved to be direct and effective (14).

It is suggested that policymakers in regions that hope to promote economic development by attracting small and medium-sized enterprises can choose to improve the welfare of residents to attract the attention of small and medium-sized entrepreneurs.

7.2.3 Strengthen government support for large enterprises

Government support has an important connection with the development of enterprises. Especially large enterprises rely more on government policies and established market rules (15).

Due to their huge scale and large number of employees, large enterprises often need a long-term stable environment to ensure their profits (16). Government support is usually manifested in policy support and economic subsidies (17). Since the two often do not appear independently, once the government increases the economic subsidies for large enterprises, it will usually be accompanied by certain policy support (18).

In order to obtain sufficient power for the development of the regional economy, it is extremely important to attract large entrepreneurs to start their own businesses. Based on the EE preferences of these big entrepreneurs, it is suggested that raising economic subsidies for business owners who have large initial capital to start businesses in the region, which is helpful to increase their confidence and reduce risks.

7.2.4 Improve tourists’ souvenir purchase experience to boost tourism economy

As people's interest in sharing photos on social media continues to grow, there will be an increasing trend in the number of tourists showing travel photos on social media in the future. The souvenirs designed based on the analysis of this trend can bring more purchases and bring prosperity to the local tourism economy.

If the proportion of tourists with high PTP continues to increase, overall Chinese tourists' preference

for the "Uniqueness" of souvenirs will decrease, and their preference for “Availability” will rise continuously. On the other hand, tourists' demand for souvenirs with a high level of “Availability” will expand significantly and the demand for souvenirs with high "Uniqueness" will shrink further. It is of great significance for tourism companies and markets to analyze this trend and make proper strategies for producing and selling souvenirs. In brief, with the development of tourists' interests in posting picture on social media, it is considered that government and tourism companies should place more stress on the changes in tourists' demand for souvenirs. Moreover, they should increase their investment in improving the “Availability” of souvenirs and reduce their investment in "Uniqueness" appropriately.

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APPENDIX

Appendix 1

Questionnaire for main experiment in Chapter 4

We are conducting a survey which examines graduates' preferences on the metropolises with different environmental attributes' levels. We sincerely hope that you can spend a few minutes on this survey, and we would definitely value your opinions! Your identity and answers are absolutely confidential!

1. Age：<20，20-25，>25
2. Gender： Female，Male
3. Marital status：Unmarried，Married
4. Highest Academic Qualification：Below bachelor's degree，Bachelor's degree，Above bachelor's degree
5. Monthly income or living funds (CNY): <1000, 1000-2000, 2000-5000, >5000, Inconvenient
6. Residence: Urban, Rural
7. Highest academic qualification of your parents: Below bachelor's degree, Bachelor's degree, Above bachelor's degree
8. Family income per year (CNY): <30000, 30000-50000, 50000-100000, 100000-200000, >200000, Inconvenient
9. Have you considered working in metropolises in the past: Yes, No
10. Which of the following environmental pollution situations have you experienced: Water pollution, Air pollution
11. If you are going to work in the metropolis, what is your expected monthly income? (CNY): <3000, 3000-5000, 5000-8000, 8000-15000, >15000

In order to helping you understand the different levels of environment attributes in our questionnaire clearly, we will show you some related pictures.



Fig.1 No air pollution **Fig.2** Slight air pollution **Fig.3** Serious air pollution



Fig.4 No water pollution **Fig.5** Slight water pollution **Fig.6** Serious water pollution



Fig.7 No littering **Fig.8** Slight littering **Fig.9** Serious littering

In this survey, we set three levels for four environmental attributes (air pollution, water pollution, littering, green area) respectively, and nine virtual metropolises were combined with different levels of these attributes (detailed levels refer to table 1).

Attributes	Attribute levels
Air pollution	P<5%
	5%<P<20%
	20%<P<35%
Water pollution	No
	Slight
	Serious
Littering	No
	Slight
	Serious
Green area	$5m^2$<A
	$10m^2$<A<$20m^2$
	$20m^2$<A

Table 1. Four urban environmental attributes included in the conventional conjoint analysis task. (P is the proportion of annual air pollution days and A is park green area per capita.)

You need to evaluate your willingness to work in these nine virtual metropolises and score on a scale 1 to 10 (1 represents absolutely rejection, 10 is extremely eager). Please carefully weigh these nine virtual metropolises and score them according to your will.

1. Annual air pollution days proportion<5%, slight level of Water pollution, serious level of Littering, Per capita park green area>$20m^2$

2. Annual air pollution days proportion<5%, serious level of Water pollution, No Littering, $10m^2$<Per capita park green area<$20m^2$

3. 5%<Annual air pollution days proportion<20%, No Water pollution, slight level of Littering, $10m^2$<Per capita park green area<$20m^2$

4. 5%<Annual air pollution days proportion<20%, serious level of Water pollution, slight level of Littering, Per capita park green area>$20m^2$

5. 5%<Annual air pollution days proportion<20%, slight level of water pollution, No Littering, $5m^2$<Per capita park green area<$10m^2$

6. 20%<Annual air pollution days proportion<35%, serious level of Water pollution, serious level of Littering, $5m^2$<Per capita park green area<$10m^2$

7. 20%<Annual air pollution days proportion<35%, No Water pollution, No Littering, Per capita park green area>$20m^2$

8. Annual air pollution days proportion<5%, No Water pollution, slight level of Littering, $5m^2$<Per capita park green area<$10m^2$

9. 20%<Annual air pollution days proportion<35%, slight level of Water pollution, slight level of Littering, $10m^2$<Per capita park green area<$20m^2$

Thank you for taking the time to complete this questionnaire for us!

Appendix 2

Conjoint analysis based on R language

1. Main program

```
#Hierarchical Bayes
#Design matrix
library(nnet)
library(bayesm)
design.matrix<-read.csv("C:/Users/Administrator/Desktop/Design matrix.csv",na.strings = "",header=T)
design.matrix<-na.omit(design.matrix)
design.matrix0<-c()
for (i in 1:ncol(design.matrix)) {
   design.matrix0<-cbind(design.matrix0,class.ind(design.matrix[,i])[,-1])
}
design.matrix0<-design.matrix0[,c(1,2,7,8)]
#Score and demographics
data<-read.csv("C:/Users/Administrator/Desktop/Questionnaire R processing.csv",na.strings = "",header=T)
data<-data[,-24]
data<-na.omit(data)
Y<-data[,15:23]
data.hb<-NULL
for (i in 1:nrow(Y)) {

   data.hb[[i]]<-list(X=design.matrix0,y=as.numeric(Y[i,]))
}
#Priori setting
```

```
deltabar<-c()
nz=14
Z=as.matrix(data[,1:14])
Z<-scale(Z)
Data1 = list(regdata=data.hb,Z=Z)
Mcmc1 = list(R=500, keep=10)
Prior1 = list(ncomp=1)
out = rhierLinearMixture(Data=Data1,Prior1,Mcmc=Mcmc1)
```

2. R-squared calculating program

```
beta<-out$nmix$compdraw
beta.ave<-c()
for (i in a) {
   beta.ave<-rbind(beta.ave,i[[1]]$mu)
}
beta.ave<-apply(beta.ave,2,mean)
y_hat<-design.matrix0%*%beta.ave
y_ave<-apply(Y,2,mean)
R2<-1-sum((y_hat-y_ave)^2)/sum((y_ave-mean(y_ave))^2)
```

3. Data visualization program

```
beta<-out$nmix$compdraw
beta.ave<-c()
for (i in beta) {
beta.ave<-rbind(beta.ave,i[[1]]$mu)
}
beta.range<-apply(beta.ave,2,range)
importance<-data.frame(var=rep(colnames(design.matrix0),each=250),imp=as.numeric(beta.ave))
boxplot(imp~var,data=importance)
```

Appendix 3

Questionnaire for main experiment in Chapter 5

1. Gender：Male，Female
2. Age：<20，20-29，30-39, >40
3.Highest Academic Qualification：Below bachelor's degree，Bachelor's degree，Master's degree, Doctor's degree
4. Current amount of start-up capital: <$50000, $50000-$100000, $100000-$300000, $300000-$500000, $500000-$1000000, >$1000000
6. Career time (year): 0-5, 6-10, 10-20, >20

Conjoint analysis part

1.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $150B, Per capita deposit $20000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 50000 graduates per year, Financial subsidies $50,000- $100,000 ; B. GDP $50B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies $50,000- $100,000 ; C. GDP $350B, Per capita deposit $120000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 30000 graduates per year, Financial subsidies $500,000- $1,000,000 ; D. GDP $350B, Per capita deposit $6000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $300,000- $500,000.

2.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $70B, 50000 graduates per year, Financial subsidies > $1,000,000 ; B. GDP $150B, Per capita deposit $6000, 1000 kilometers of highways per 10,000 people, Government expenditure $1.6B, 7000 graduates per year, Financial subsidies $50,000- $100,000 ; C. GDP $50B, Per capita deposit $15000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 20000 graduates per year, Financial subsidies $100,000- $300,000 ; D. GDP $350B, Per capita deposit $20000, 500 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies $100,000- $300,000.

3.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $350B, Per capita deposit $6000, 200 kilometers of highways per 10,000 people, Government expenditure $70B, 20000 graduates per year, Financial subsidies $300,000- $500,000 ; B. GDP $50B, Per capita deposit $20000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 7000 graduates per year, Financial subsidies $500,000- $1,000,000 ; C. GDP $150B, Per capita deposit $15000, 1000 kilometers of highways per 10,000 people, Government expenditure $1.6B, 50000 graduates per year, Financial subsidies $100,000- $300,000 ; D. GDP $150B, Per capita deposit $15000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies >$1,000,000.

4.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $120000, 1000 kilometers of highways per 10,000 people,

Government expenditure $10 B, 50000 graduates per year, Financial subsidies < $50,000 ; B. GDP $50B, Per capita deposit $20000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies $50,000- $100,000 ; C. GDP $350B, Per capita deposit $6000, 500 kilometers of highways per 10,000 people, Government expenditure $1.6B, 7000 graduates per year, Financial subsidies $500,000- $1,000,000 ; D. GDP $150B, Per capita deposit $20000, 200 kilometers of highways per 10,000 people, Government expenditure $70B, 20000 graduates per year, Financial subsidies $300,000- $500,000.

5.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $350B, Per capita deposit $15000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 50000 graduates per year, Financial subsidies $300,000- $500,000 ; B. GDP $150B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $10B, 20000 graduates per year, Financial subsidies $100,000- $300,000 ; C. GDP $50B, Per capita deposit $20000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 30000 graduates per year, Financial subsidies $50,000- $100,000 ; D. GDP $50B, Per capita deposit $15000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies <$50,000.

6.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 50000 graduates per year, Financial subsidies $300,000- $500,000 ; B. GDP $350B, Per capita deposit $6000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies >$1,000,000 ; C. GDP $50B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $1.6B, 7000 graduates per year, Financial subsidies <$50,000 ; D. GDP $150B, Per capita deposit $120000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 30000 graduates per year, Financial subsidies $500,000- $1,000,000.

7.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $350B, Per capita deposit $6000, 1000 kilometers of highways per 10,000 people, Government expenditure $70B, 50000 graduates per year, Financial subsidies $50,000- $100,000 ; B. GDP $150B, Per capita deposit $20000, 500 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $100,000- $300,000 ; C. GDP $50B, Per capita deposit $15000, 1000 kilometers of highways per 10,000 people, Government expenditure $70B, 30000 graduates per year, Financial subsidies >$1,000,000 ; D. GDP $350B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies >$1,000,000.

8.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $150B, Per capita deposit $120000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 20000 graduates per year, Financial subsidies $50,000- $100,000 ; B. GDP $50B, Per capita deposit $20000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 7000 graduates per year, Financial subsidies $100,000- $300,000 ; C. GDP $350B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure

$1.6B, 50000 graduates per year, Financial subsidies $300,000- $500,000 ; D. GDP $150B, Per capita deposit $6000, 200 kilometers of highways per 10,000 people, Government expenditure $70B, 30000 graduates per year, Financial subsidies <$50,000.

9.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies $500,000- $1,000,000 ; B. GDP $350B, Per capita deposit $20000, 1000 kilometers of highways per 10,000 people, Government expenditure $1.6B, 30000 graduates per year, Financial subsidies <$50,000 ; C. GDP $350B, Per capita deposit $6000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $50,000- $100,000 ; D. GDP $150B, Per capita deposit $15000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $50,000- $100,000.

10.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $150B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 30000 graduates per year, Financial subsidies <$50,000; B. GDP $50B, Per capita deposit $6000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 50000 graduates per year, Financial subsidies $1,000,000 ; C. GDP $50B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $300,000- $500,000 ; D. GDP $150B, Per capita deposit $20000, 1000 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies $500,000- $1,000,000.

11.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $20000, 200 kilometers of highways per 10,000 people, Government expenditure $1.6B, 7000 graduates per year, Financial subsidies >$1,000,000 ; B. GDP $150B, Per capita deposit $20000, 1000 kilometers of highways per 10,000 people, Government expenditure $70B, 7000 graduates per year, Financial subsidies > $1,000,000 ; C. GDP $350B, Per capita deposit $6000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies $500,000- $1,000,000 ; D. GDP $350B, Per capita deposit $120000, 500 kilometers of highways per 10,000 people, Government expenditure $70B, 20000 graduates per year, Financial subsidies $100,000- $300,000.

12.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $150B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $10B, 7000 graduates per year, Financial subsidies $50,000- $100,000 ; B. GDP $350B, Per capita deposit $15000, 1000 kilometers of highways per 10,000 people, Government expenditure $1.6B, 30000 graduates per year, Financial subsidies $300,000- $500,000 ; C. GDP $150B, Per capita deposit $12000, 1000 kilometers of highways per 10,000 people, Government expenditure $10B, 50000 graduates per year, Financial subsidies $500,000- $1,000,000 ; D. GDP $50B, Per capita deposit $6000, 200 kilometers of highways per 10,000 people, Government expenditure $70B, 20000 graduates per year, Financial subsidies <$50,000.

13.If you were to choose one of the following cities to start a business, which one would you choose:
A. GDP $50B, Per capita deposit $120000, 200 kilometers of highways per 10,000 people, Government expenditure $10B, 30000 graduates per year, Financial subsidies $100,000- $300,000 ; B. GDP $350B, Per capita deposit $120,000, 1000 kilometers of highways per 10,000 people, Government expenditure $70B, 7000 graduates per year, Financial subsidies >$1,000,000 ; C. GDP $150B, Per capita deposit $20000, 500 kilometers of highways per 10,000 people, Government expenditure $10B, 50000 graduates per year, Financial subsidies $300,000- $500,000 ; D. GDP $350B, Per capita deposit $15000, 500 kilometers of highways per 10,000 people, Government expenditure $1.6B, 20000 graduates per year, Financial subsidies > $1,000,000.

Appendix 4

Questionnaire for main experiment in Chapter 6

1. Gender：Male，Female
2. Age：<20，20-29，30-39, >40
3. Residence: City, Countryside
4. Highest Academic Qualification：Middle school and lower，High school，Bachelor's degree, Master's degree and higher
5. Monthly Income: <￥2000, ￥2001-￥3500, ￥3501-￥6000, ￥6001-￥10000, ￥10001-￥20000, >￥20000
6. Online time per day (hour): 0-1, 1-3, 3-5, >5
7. Frequency of use of social software: Never, Sometimes, Often, Always
8. Annual number of trips: 0, 1, 2, 3 or more
9. Frequency of taking photos and sharing them on social media while traveling: Never, Sometimes, Often, Always
10. Frequency of buying souvenirs while traveling: Never, Sometimes, Often, Always

Conjoint analysis part

Please choose your favorite travel souvenir from each question below (referring to table 1)

Table1 Details of level settings of each attribute

Attributes	**Attribute definition**	**Attribute levels**
Availability	Utilized three times a week at least	High
	Usage frequency between less than twice a week	Medium
	Used for less than three times	Low
Uniqueness	With special signature	High
	Only from Luoyang	Medium
	From China	Low
Aesthetics	color depths>10	High
	6<color depths<10	Medium
	color depths>10	Low

1. A. High Availability, Medium Uniqueness, Medium Aesthetics, 100CNY; B. Medium Availability, Medium Uniqueness, Low Aesthetics, 50CNY; C. Low Availability, Low Uniqueness, Low Aesthetics, 300CNY; D High Availability, High Uniqueness, High Aesthetics, 20CNY

2. A. High Availability, Low Uniqueness, Low Aesthetics, 300CNY; B. Medium Availability, High Uniqueness, Medium Aesthetics, 300CNY; C. Medium Availability, Low Uniqueness, High Aesthetics, 50CNY; D Low Availability, High Uniqueness, High Aesthetics, 150CNY

3. A. Medium Availability, Medium Uniqueness, High Aesthetics, 20CNY; B. High Availability, Low Uniqueness, High Aesthetics, 150CNY; C. Low Availability, Medium Uniqueness, Medium Aesthetics, 150CNY; D Low Availability, Low Uniqueness, Low Aesthetics, 100CNY

4. A. High Availability, Medium Uniqueness, Medium Aesthetics, 50CNY; B. Low Availability, Medium Uniqueness, Low Aesthetics, 150CNY; C. Low Availability, High Uniqueness, Low Aesthetics, 20CNY; D Medium Availability, High Uniqueness, Medium Aesthetics, 20CNY

5. A. High Availability, Low Uniqueness, Medium Aesthetics, 150CNY; B. Medium Availability, Medium Uniqueness, High Aesthetics, 100CNY; C. Medium Availability, Low Uniqueness, Low Aesthetics, 100CNY; D Low Availability, High Uniqueness, High Aesthetics, 50CNY

6. A. High Availability, Medium Uniqueness, Low Aesthetics, 300CNY; B. Low Availability, Low Uniqueness, High Aesthetics, 20CNY; C. High Availability, High Uniqueness, Medium Aesthetics, 50CNY; D Medium Availability, High Uniqueness, High Aesthetics, 300CNY

7. A. High Availability, High Uniqueness, High Aesthetics, 300CNY; B. Medium Availability, Medium Uniqueness, Low Aesthetics, 50CNY; C. Low Availability, Low Uniqueness, Low Aesthetics, 20CNY; D Medium Availability, High Uniqueness, Low Aesthetics, 50CNY

8. A. Low Availability, Low Uniqueness, Medium Aesthetics, 300CNY; B. Medium Availability, Low Uniqueness, Medium Aesthetics, 50CNY; C. High Availability, Medium Uniqueness, High Aesthetics, 100CNY; D Medium Availability, High Uniqueness, Low Aesthetics, 100CNY

9. A. Low Availability, Medium Uniqueness, Medium Aesthetics, 50CNY; B. Medium Availability, Medium Uniqueness, Medium Aesthetics, 20CNY; C. High Availability, High Uniqueness, Medium Aesthetics, 300CNY; D Low Availability, High Uniqueness, Low Aesthetics, 150CNY

10. A. Low Availability, Low Uniqueness, High Aesthetics, 100CNY; B. Low Availability, Medium Uniqueness, High Aesthetics, 20CNY; C. High Availability, High Uniqueness, Low Aesthetics, 150CNY; D Medium Availability, Low Uniqueness, Low Aesthetics, 150CNY

11. A. Medium Availability, High Uniqueness, Low Aesthetics, 20CNY; B. High Availability, High Uniqueness, Low Aesthetics, 20CNY; C. High Availability, Medium Uniqueness, High Aesthetics, 300CNY; D High Availability, Low Uniqueness, Medium Aesthetics,100CNY

12. A. High Availability, Medium Uniqueness, High Aesthetics, 50CNY; B. Low Availability, High Uniqueness, Medium Aesthetics, 100CNY; C. Medium Availability, High Uniqueness, Medium Aesthetics, 300CNY; D Medium Availability, Low Uniqueness, High Aesthetics, 150CNY

13. A. Low Availability, Medium Uniqueness, Medium Aesthetics, 300CNY; B.High Availability, Medium Uniqueness, High Aesthetics, 20CNY; C. Medium Availability, Low Uniqueness, Low Aesthetics, 100CNY; D Low Availability, High Uniqueness, High Aesthetics, 50CNY

Appendix 5

Basic result of Chapter 5

Number	Gender	Age	Graduation	Start-up Capital	Career time	CA1	CA2	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10	CA11	CA12	CA13
1	2	1	1	1	1	3	1	3	4	2	4	4	1	2	3	4	3	2
2	1	4	2	6	3	3	1	4	2	1	2	2	2	1	4	2	3	4
3	1	3	4	4	2	3	4	4	3	2	4	4	3	1	4	3	3	4
4	1	2	2	2	2	3	4	4	4	1	2	4	3	3	4	3	3	4
5	1	1	2	1	1	3	4	4	4	1	4	4	1	2	1	4	3	2
6	2	1	1	1	1	1	1	1	1	1	1	2	4	1	2	3	4	4
7	2	2	2	1	1	2	3	2	2	3	4	3	2	1	3	1	4	1
8	1	2	3	1	1	1	2	4	1	4	1	2	4	1	3	3	4	2
9	2	3	3	2	2	4	4	1	4	1	2	4	3	2	4	3	2	4
10	1	2	2	3	2	2	2	2	2	2	2	3	2	2	2	2	2	2
11	1	2	2	3	2	2	2	2	3	3	2	3	2	2	2	3	2	4
12	1	2	2	3	2	4	3	2	3	2	3	2	3	3	3	3	3	3
13	2	3	2	3	2	2	2	3	3	2	2	3	2	2	2	3	3	3
14	1	3	2	4	2	3	3	3	2	3	1	3	4	4	2	3	4	2
15	1	2	2	3	2	3	2	3	3	3	2	3	2	2	2	3	2	4
16	2	3	2	3	2	2	2	3	3	2	2	3	2	2	2	3	3	3
17	1	2	2	3	2	4	3	4	4	1	3	3	2	2	2	3	2	4
18	1	3	2	4	2	2	3	2	2	3	3	3	3	2	4	2	3	4
19	2	3	2	3	2	2	2	3	3	2	2	3	2	2	2	3	3	3
20	1	3	2	4	2	2	3	2	2	3	3	3	3	2	4	2	3	4
21	1	4	2	3	2	2	2	3	3	2	1	2	3	2	2	3	3	2
22	2	3	3	4	3	1	3	3	3	2	2	3	4	4	3	4	2	3
23	1	2	1	3	1	2	3	2	2	3	3	2	3	2	3	3	4	2
24	1	3	3	4	2	3	3	2	2	3	3	2	4	3	3	3	2	3
25	1	4	2	3	2	2	2	3	3	2	1	2	3	2	2	3	3	2
26	2	3	3	4	3	1	3	3	3	2	2	3	4	4	3	4	2	3
27	1	3	3	4	2	2	3	2	4	3	4	2	4	3	3	3	2	3
28	1	4	2	3	2	3	2	4	3	2	1	2	3	2	2	3	3	2
29	2	3	3	4	3	1	3	3	3	2	2	3	4	4	3	4	2	3
30	1	2	1	3	1	3	3	3	3	4	3	2	3	2	3	3	4	2
31	1	3	2	3	2	2	3	1	2	3	1	2	3	2	3	2	2	3
32	2	2	2	3	1	2	3	1	2	2	2	3	3	1	2	3	3	2
33	2	2	2	5	2	2	3	3	4	2	3	4	3	3	3	3	4	4
34	1	3	2	3	2	2	3	1	2	3	1	2	3	2	3	2	2	3
35	2	2	2	3	1	3	3	3	2	1	2	4	3	2	2	2	3	3

36	2	2	2	5	2	3	3	2	4	1	3	2	4	3	4	3	1	3
37	1	3	2	3	2	3	4	3	3	4	3	3	3	2	3	2	2	3
38	2	2	2	3	1	3	3	1	2	2	2	3	3	1	2	3	3	3
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41	2	2	2	3	2	2	3	4	3	4	3	4	2	2	3	3	3	3
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43	1	3	2	3	2	3	3	4	3	1	3	4	2	4	4	3	1	4
44	1	4	2	4	2	3	4	3	1	3	3	4	2	3	1	3	3	4
45	2	2	2	3	2	2	2	4	1	4	2	1	4	3	2	4	3	2
46	1	3	2	3	2	2	3	3	3	2	4	3	3	3	3	3	4	3
47	1	4	2	4	2	4	4	4	1	4	2	4	2	2	1	4	1	4
48	2	2	2	3	2	3	4	4	2	3	2	3	3	3	3	1	4	3
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55	2	2	1	2	4	1	3	4	3	1	3	4	3	2	1	3	1	2
56	2	1	1	2	2	3	4	4	4	1	2	4	3	3	4	3	3	4
57	1	4	2	4	2	4	2	4	3	3	3	3	2	2	3	2	3	3
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98	1	4	2	1	3	3	1	3	2	2	4	4	1	2	3	4	3	2
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109	2	3	2	3	2	1	2	3	2	2	3	3	2	3	2	3	3	4
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111	2	1	2	1	2	2	1	4	1	4	2	3	1	2	2	4	1	4
112	1	4	1	1	2	1	1	1	1	1	1	2	4	1	2	3	4	4
113	1	3	4	1	2	2	3	2	2	3	4	3	2	1	3	1	4	1
114	1	2	1	1	2	1	1	1	1	1	1	2	4	1	2	3	4	4
115	2	2	2	2	2	3	2	3	3	4	4	3	3	3	1	3	2	4

116	2	1	1	3	2	2	2	3	3	2	2	3	2	2	2	3	3	3
117	2	2	2	3	2	2	3	1	2	3	1	2	3	2	3	2	2	3
118	1	2	3	3	1	2	2	3	3	2	2	3	2	2	2	3	3	3
119	2	3	3	3	2	2	3	1	2	3	1	2	3	2	3	2	2	3
120	1	2	2	4	2	2	4	3	3	3	3	2	2	3	2	3	3	3
121	1	2	2	3	3	2	2	2	2	2	2	3	2	2	2	2	2	2
122	1	2	2	3	1	4	3	2	3	2	3	2	3	3	3	3	3	3
123	2	3	2	3	2	2	3	4	3	4	3	4	2	2	3	3	3	3
124	1	3	2	4	2	2	3	2	2	3	3	3	3	2	4	2	3	4
125	1	2	2	2	3	2	3	1	2	3	1	3	4	1	3	1	3	2
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127	1	2	2	3	2	2	2	2	3	3	2	3	2	2	2	3	2	4
128	1	3	2	4	3	3	4	4	3	2	4	4	3	1	4	3	3	4
129	2	3	1	3	1	3	1	2	3	1	4	2	1	3	1	2	1	3
130	1	3	2	4	2	1	3	3	3	2	2	3	4	4	3	4	2	3
131	1	4	2	3	1	3	3	3	3	4	3	2	3	2	3	3	4	2
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135	1	4	2	4	2	2	3	2	4	3	4	2	4	3	3	3	2	3
136	2	3	3	2	2	3	4	4	4	1	2	4	3	3	4	3	3	4
137	1	3	3	3	1	3	4	4	2	3	2	3	3	3	3	1	4	3
138	1	4	2	3	2	2	2	3	3	2	2	3	2	2	2	3	3	3
139	2	3	3	4	2	1	3	3	3	2	2	3	4	4	3	4	2	3
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973	2	3	4	3	2	3	3	3	3	4	3	2	3	2	3	3	4	2
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976	1	4	2	4	4	3	3	3	2	3	1	3	4	4	2	3	4	2
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987	2	2	4	3	2	3	2	4	3	2	1	2	3	2	2	3	3	2
988	2	1	2	3	1	2	2	2	3	3	2	3	2	2	2	3	2	4
989	2	2	3	1	3	3	1	3	4	2	4	4	1	2	3	4	3	2