

MODELS OF THE SPATIAL EVOLUTION OF MULTI-PLANT ENTERPRISES

Fei Hongping(费洪平)

(*Department of Geo and Ocean Sciences, Nanjing University, Nanjing 210008, PRC*)

ABSTRACT: Since the 1970s, the studies on the geography of enterprise have become increasingly concerned with the spatial evolution of an enterprises in the West developed countries. However, little attention has so far been given to the spatial evolution of an enterprise in China. With China's ongoing economic and political reforms, a number of fundamental changes of enterprise behavior have occurred. These changes have certainly important influences on the evolution of industrial location. Therefore, there is a need for examining the spatial evolution of an enterprise in China. The purpose of the paper is to review the major models of both the growth and associated spatial evolution of an enterprise, with an illustrative case study of the Heavy Automobile Enterprise Group of China. The paper is organized by three parts. The first examines the spatial growth and location adjustment of multi-plant enterprise. The second reviews major models of the spatial evolution of an enterprise. And the third analyzes the spatial evolution, over a period of time, of a representative sample of the Heavy Automobile Enterprise Group of China, and illustrates the findings with case studies. It is suggested that the models of spatial evolution of an enterprise would provide more evidence about micro-mechanism for evolution of micro-regional economic systems.

KEY WORDS: multi-plant enterprises, enterprise groups, spatial evolution of an enterprise, spatial growth, location adjustment.

Since the 1970s, the studies on the geography of enterprise have become increasingly concerned with the spatial evolution of an enterprise, and many researchers have suggested a series of the theoretical models of spatial evolution of an enterprise in the West developed countries. Most of these models, based upon some assumptions, were generalized from case studies, and have not, as yet, been tested against reality. Therefore, these models haven't been generally accepted as theoretical framework with which such enterprise can be studied, and need to be tested more widely in the future. However, the spatial evolution of an enter-

prise in China has so far been completely ignored. Most industrial geography in China is still preoccupied with the studies of macro-scale and meso-scale industrial allocation, but the key impacts of the actions of individual business organizations on industrial location and processes of regional economic development have been completely neglected. Economic geographers often treat the enterprise (or industrial organization) as a “black box” or no more than a “locational actor” , have no interest in the internal changing processes inside enterprise, and even have tended to view the enterprise as a variable somehow independent of the operations of macro-regional economy. Thus for a long time, China’s industrial geography suffer a lack of micro-level analysis, and can’t uncover the micro-mechanisms that generate industrial change in space ⁽¹⁾ . With China’s ongoing reform and opening-up policy, a number of fundamental changes of the behavior of enterprises in China have occurred, and these changes have certainly important influences on industrial location and on processes of regional economy. With the establishment of socialist market economy, the studies on the spatial evolution of an enterprise in China should become a new research topic. This paper analyzes the processes and characteristics of the spatial evolution of China’s enterprise groups and its impacts upon industrial agglomerations, using evidence from a survey of the spatial evolution of the enterprise in the West. It is attempted to provide more scientific evidence about micro-mechanisms for the dynamic evolution of macro-regional economy and industrial systems from a new point of micro-level analysis, and to supplement the gap of studies of the geography of enterprise in China.

I. THE PROCESSES OF THE SPATIAL EVOLUTION OF AN ENTERPRISE

The spatial evolution of an enterprise is used here to describe the changes in the spatial pattern of enterprise’s plants and their linkages that occur during some given period of time. It is made up of two elements: spatial growth which results in the increase of the number of enterprises plants and extends its plant space, and locational adjustment which is concerned with changes in spatial patterns with static or decreasing plant numbers ⁽²⁾ . In most cases the spatial growth is accompanied by locational adjustment. It is difficult to distinguish these two processes. To clarify the process of spatial evolution the two elements should be treated separately. These studies can give a better understanding of changes in industrial location and processes of regional economic development, and contribute to understanding the spatial structure of large corporations or business organizations more fully.

1. Spatial Growth

Spatial growth is of two types: internal growth and external growth ⁽²⁾ . Internal growth occurs where sites are added to the corporate system by establishing branch plants in order to increase its market share, while external growth takes place where sites are ad-

ded to the corporate system by merging other enterprises and their associated plants. The point-shaped spatial pattern of an enterprise can be changed by internal growth and external growth, which result in clear spatial expansion of an enterprise. Consequently, the enterprise tends to grow into multi-plant and multi-locational organization.

2. Locational Adjustment

Locational adjustment can be defined as reorganization within an enterprise. The essential feature of locational adjustment is that the number of plants of an enterprise remains the same or is reduced, while their capacities, products or linkages are changed⁽²⁾. From the point of locational adjustment, there are major differences between the large multi-plant enterprise and the single-plant enterprise. By definition, single-plant enterprises operate entirely at one geographic location. As long as they remain single-plant entities, all changes and adjustments must be accommodated at that site^[3]. Multi-plant enterprises, by contrast, operate at several locations (in the case of very large enterprises, at vast numbers of locations). They not only divide their operations among these different sites in the ways determined by their own organizational design and structure, but they can also reallocate functions and resources between their existing plants. It can, therefore, make substantial adjustments without necessarily adding to or subtracting from its existing spatial network. In contrast with single-plant enterprise, the multi-plant enterprise has far greater potential flexibility.

II. MODELS OF THE SPATIAL EVOLUTION OF AN ENTERPRISE

The purpose of the present part is to review the models of both the growth and associated spatial evolution of an enterprise. The West geographers have concluded numerous models⁽⁴⁻⁵⁾. These models can be divided into three groups: the first group are those which have stressed the development of internal organizational structures associated with growth; the second group are those which have taken the individual organization as their primary focus; and the third group are those which have attempted to stress the interrelationships between organizations as these interrelationships might influence the corporate development sequence. These models can not be widely accepted, therefore these need to be tested and evaluated more fully.

1. Model of the Evolution of Organizational Structures of an Enterprise

The different motives, different strategies and different methods of growth interact one another in various ways as an enterprise evolves, and as it grows it often forms different types of organizational structures. Since the 1960s many researchers have proposed various

evolution models associated with organizational structures. The most widely accepted metamorphosis model is three-stage model proposed by Chandler.

Chandler (1962) thought that an enterprise must pass through the three structural stages. First, the simple single-function, single-product, single-plant, small-scale enterprise with an informal control structure. There is no clear functional differentiation among the three layers: strategy, administration and operation. Second, the functional structure based upon a single product line. As the size of output of enterprises expanded and the geographical location of their operations spread, the need arose for an organizational division of labor in which specialist departments were created to undertake specific functions. Such functional specialization, together with the operation of a number of geographically dispersed plants rather than just one, demanded a far greater degree of central control. Thus developed the separate headquarters unit to coordinate the activities of all the other organizational units. Third, the multidivisional structure usually associated with a diversified multi-product range. In this multidivisional structure, each division is responsible for a specific product, but each product division is responsible for its own basic functions of production and marketing. Therefore, this kind of division is by product rather than by function. In the top layer headquarters coordinate the various product divisions and planning.

This model reflects some essential features as follows: (1) The model uncover the interrelationship between organizational structures and strategies, and between the expansion path and the way organized functionally by an enterprise. (2) The development of organizational structures of the multi-plant enterprise was to pass through three stages. Each of the three major stages of development represents an increase in organizational complexity. The critical feature of such organizational development is the increasing separation between different levels of control. (3) The nature of an enterprise changes as it grows, and changes from one state to another. Each process marks the end of a specific stage of development. (4) Both technological and organizational developments have combined together to produce not only a multi-layered organizational structure in the multi-plant enterprise in which three primary control levels can be identified but also a very clear geographical structure of such enterprise. The structure is rather like a "three-tiered cake". In the bottom layer we have the basic process. In the middle layer, we have the programmed decision-making processes. In the top layer, we have the non-programmed decision-making processes.

2. Models of Geographical Expansion

The general models of the spatial evolution of an enterprise, based upon a survey of individual organization, have been proposed by western writers. The most typical models

are the model of spatial expansion proposed by Taylor and the model of multi-hierarchical expansion by Hakanson.

2.1 An idealized sequence of corporate expansion

The diagram of spatial growth of an enterprise envisaged by Taylor depicts a four-region nation, three regions contain urban industrial agglomerations, and three regions contain secondary urban centres. The enterprise begins in the agglomeration in Region 2, where perhaps the initial choice of centre is influenced by the entrepreneur's home town. After a successful period the enterprise opens a second plant in the same industrial area, thus strengthening its interests in what will be its core region. Sales begin to expand and sale offices are set up first in a more distant part of Region 2, and then in Region 3 and 4. This growth is then confirmed, this time by the acquisition of the plant of a competitor in Region 4. At the same time a depot or warehouse is added to the sale office in Region 3. With growth continuing, a branch plant is set up in Region 3, and depot operations are begun in Region 1. The model indicates some characteristics of the spatial evolution as follows:

(1) The changes in the enterprise space reflect earlier changes in the market area of the enterprise, and the enterprise's plant to market linkages. (2) The spatial expansion of an enterprise was to pass through four distinct stages: single-plant enterprise, single-region enterprise, establishment of inter-regional sales office and, inter-regional warehousing and production. The move from one stage to another should cross a threshold to development, otherwise many enterprises will stop at any one stage. (3) The spatial expansion of the enterprise show a pattern more similar to that produced by the hierarchical diffusion process, which expands not from core region to adjacent region but from core region to the largest urban center in the national city system. (4) In a market economy, the market capture is the primary agents of the spatial evolution of enterprises. As the scale of an enterprise expanded, the spatial spread of the enterprise occurs to exploit and capture a large wider market area, The enterprise, therefore, become increasingly the forms of multi-product, multi-plant and multi-location.

2.2 A model of corporate expansion

Hakanson (1979) proposed the geographical model of corporate expansion through the concepts and principles developed by the organizational school. During the early stage of an enterprise, the initial growth of the single-plant enterprise is generally confined to the home (local) region. However, when the rate of growth of the local market is usually slower than that to which the enterprise aspires, the enterprise starts to penetrate into other re-

gional markets on a national scale by the setting up of sale agencies and sale subsidiaries. This is followed by the establishment of overseas sale agency in order to gain access to foreign market. As its production capacity is growing faster than national market demand, the phase of expansion is then followed by a foreign production phases and, finally, production plants appear in the foreign market, and then become multi-product, multinational conglomerate. The essential features are summarized as follows:

(1) The spatial expansion of the corporation is the spatial development process of operations, first locally and then at an inter-regional scale to the national and multinational. This model was focused on the spatial expansion of individual organization, and the inter-relationships among the business organizations and their effects on the spatial evolution of enterprises have been neglected. (2) The model reflect that the enterprise is based upon the market demand, the market capture becomes the primary of spatial evolution of an enterprise.

2.3 Geographical model stressing the interrelationships between organizations

Most of the models of spatial evolution have tended to treat individual organizations as their primary focus and have not been related to the interrelationships among the organizations and their impacts upon the spatial evolution of the enterprise. This is not true for enterprises operation in a competitive environment. Watts (1980) proposed a model of market area extension, on the basis of a case study of the British brewing industry⁽⁶⁻⁷⁾. In this model, it is assumed that the distribution of the towns which have only one plant each is even and their demand is constant, and the single-product enterprise with high distribution costs and marked economies of scale. In competitive market environment, the larger enterprises (plants) begin to expand their markets by acquiring the small enterprises with high production costs in neighboring areas and the process of market area extension begins. The effect of these changes of the spatial evolution of large enterprise is as follows: At first the merger and closure of plants is complete. After that the large enterprise acquires more distant producers, and major regional centres of the industry develop in the more remote parts of the area. Then the area has been divided into four market areas, and the large enterprise controls 51 percent of the market, compared with the 21 percent of the largest rival. At the end of the sequence, the smallest surviving regional enterprise is acquired by the larger enterprise, and almost 60 percent of market area is controlled by one enterprise. The model shows following features:

(1) The spatial growth of single-product enterprise occurs by acquisition or merger of other enterprises, the large enterprises increase in market area at the expense of the small enterprises, and the large enterprise seek merger partners over a wider area than the region-

al enterprises. This is a reflection of high distribution costs and marked economies of scale. Marked economies of scale have become the primary agents of the spatial evolution of such an enterprise.

(2) This model explained the interrelationships between the changes in the market areas of enterprises and the changes in the spatial pattern of industrial plants with high distribution costs and marked economies of scale. It is relevant to those single-product enterprises with high distribution costs and marked economies of scale, but it is not suitable for all enterprises of industrial department.

Examination of these models outlined above reveals the following features:

(1) These models were based upon the theoretical background of a highly developed market economy. In a highly developed market economy, an enterprise is a complete autonomy decision-making unit. On the one hand, the market mechanism plays a key role in the spatial evolution of an enterprise. The motives of the spatial expansion of an enterprise are mainly to capture and exploit a large wider market area. On the other hand, because of the highly developed market economy, the dominant factors affecting the spatial expansion of an enterprise will be the service and communication forces or the communication costs rather than the technical costs or transportation costs of manufacturing goods. Therefore, the spatial expansion of an enterprise is "free from the friction of distance", and its locational choice has potential flexibility. Thus the idea that enterprises usually expand out of their home region for the first time by acquisition of enterprises in an adjoining region was only partially confirmed. Long distance expansion was as common as short distance expansion.

(2) These models are, of course, concerned in individual enterprises and generalized from case studies. Each type of enterprises has its own distinctive spatial expansion behavior. Consequently, these models have not widely accepted and have not been tested against reality, as yet. These models have significant limitations and shortcomings as follows. First, the material and informational linkages between sites within an enterprise have received only limited attention. Second, perhaps most importantly, these models also exist in only relative time, with the implication that the spatial development sequence of individual enterprises is irrespective of when and where they are set up. This is quite clearly erroneous. Third, when locational behaviour of enterprises is stressed, the idea of growth rationalization stages is perhaps oversimplified, though they are concerned with a much longer period. Fourth, these models of the spatial growth of the enterprise put forward as above may be insufficient to account for the varieties of spatial behaviour. Finally, a further limitation of these models of the spatial evolution of enterprises is the omission or

inadequate coverage given to locational adjustment processes and pattern of corporate contraction. Yet the locational adjustment often follows spatial growth. It is imperative to examine the similarities and differences between the West and China in the context.

III. A CASE STUDY OF THE SPATIAL EVOLUTION OF ENTERPRISE ORGANIZATION IN CHINA

With China's ongoing economic reforms and opening-up policy, a number of fundamental changes of behavior of enterprises in China have occurred. On one hand, the enterprises have become relatively independent self-management economic units, and involved a shift from a pure production to a mixed production and management. On the other hand, with the development of various forms of horizontal economic associations on the basis of specialization and of the needs in developing production, the enterprise groups of various forms and scales have been flourishing in recent years, and have increasingly become a major feature of industrial geography in China. These changes have certainly important influences on evolution of industrial systems and on processes of regional economic development, and dominate regional economy and industrial location. Therefore, much attention should be paid to the studies of the spatial evolution of enterprise groups in China.

An enterprise group, based upon socialist public ownership, should be a major economic entity which comprise one or several key enterprises with inherent productive, technical and economic linkages and independent research institutes, on the principles of specialization, coordination and concentration. The essential characteristics of an enterprise group is that the enterprise group has diverse units operating at several geographical locations and has multi-layer structure comprising closely integrated units, semi-closely integrated units and loosely integrated units.

There should be very closely economic and technological linkages, identical business objectives and common economic interests among the component units, fairly strong capability and comprehensive functions including scientific research, production, marketing, information services and diversification. Therefore, though different from western corporations, China's enterprise groups are a kind of industrial conglomerate with their more sophisticated and specialized internal structure.

1. The Processes of Spatial Evolution of the Heavy Automobile Industrial Enterprise Group

The Heavy Automobile Industrial Enterprise Corporation is a representative sample of enterprise groups in China. The corporate headquarter is located in Jinan City. Since the establishment of the enterprise group producing trucks, the character of the constitute enter-

prises and the form of cooperative organization have changed radically and the spatial pattern of truck manufacturing and assembly has been greatly transformed. The Heavy Automobile Enterprise Group has, so far organized 40 or more large and small plants with the Jinan Heavy Automotive Plant as its core, become a large multi-functional, multi-sectoral, multi-layered and multi-locational enterprise group. According to the management system, organizational structure and linkage behaviour of the group, the three major distinct stages of development can be clearly distinguished.

1.1 The single-plant, single-product and single-location, small-scale enterprise

The Heavy Automotive Plant, the core enterprise of the Heavy Automobile Enterprise Group, first founded in 1934, has long suffered from a shortage of funds for updating equipment and expanding production capacity. Before 1949, the dominant form of the business organization was the extremely simple single-function, single-plant, single-location enterprise. From the early 1950s through the late 1970s, China followed a centrally planned economic system, characterized by "top-down" management through administrative channels. Thus, the decision-making power of this enterprise was highly concentrated in the hands of state organs which decided where the plants were located, when and where they should be supplied or sold and how much should be invested. Therefore, the enterprise was mainly managed by the state through mandatory planning and direct control. The government is not only the owner but also the administrator of the enterprise. The production goals in terms of the quantities of goods and its output value, the supplies of raw materials and the sales of finished product from or to various sectors and regions were set by the relevant authorities. Even the suppliers or purchasers of the enterprise were also appointed by the government. Almost all organizational linkages between enterprises were set up within a government body and any tech-economic linkages, relating to raw materials of the supplies of component and parts, were arranged by administrative bodies. These make this enterprise strive to be as self-sufficient as possible in production, self-sufficiency was sought because it was important for the enterprise to have control over raw materials and supplies of semi-finished product, spare parts and other inputs simply to maintain its own operations. During the early stages of development, its ties with the immediate surrounding environment are likely to be very close, and the action space are generally confined to locations within the home region.

1.2 The single-product, single-location and multi-plant enterprise

Since the late 1970s, a series of the economic reforms were initiated and the so-called "open-door policy" was adopted. The economic reforms have been numerous but basically involved a shift from a planned, centralized economy to a mixed planned and market econ-

omy. Thus, the current allowing popularity of market forces and various types of market economy in China has been allowed. The enterprise has greater management autonomy. Under internal mover of self-interests and external pressure of the competitive market, this enterprise merged 13 large and medium-sized enterprises in contagious market areas for survival and growth, and expanded its production capacity and strengthen its interests in what will be its core region. On the one hand, the organizational structure of this enterprise was devised to enable business organizations to adapt to the volatility and uncertainty of its external environments and to meet its goals and objectives. The most preferred initially was to adopt specialization strategies, to expand and improve the existing plants, and to organize 17 specialized branch plants with the assembly plant as its core on the basis of the specialization and coordination constituting a newly large multi-plant enterprise. On the other hand, it began to develop technological advancement, to abandon its original products, to product the single "Heavy Truck", and to extend its production and sales of its products into new market or capturing a larger share of its existing market. These specialized branch plants, located in Jinan City and its suburban region, were close to each other and had close specialized coordination. Except for its own branch plants, there were other ens of enterprises, linked to the mother plant on the basis of specialization and subcontracting system, which are located in the major cities along the Jinan-Qingdao railway. The linkage space of this enterprise expanded from the local scale to regional scale, and have developed inter-sectional and inter-regional linkages.

1.3 The large multi-plant, multi-product and multi-locational enterprise group

With the development and strengthening of the market forces, the development of internal production and technological specialization and coordination within its own mother plant can not adapt to its external changing environments. During this phase of development, the organizational structure of this enterprise was redesigned and readjusted to deal with the volatility and uncertainty of their external environments. Spatial growth took place where sites are added to the enterprise by the acquisition of other enterprises and associated plants, the specialized coordination were transformed from the inside to the outside of the enterprise, and a spatial networks of specialized coordination comprising large, medium-sized and small enterprises, with the mother plant as a core, was formed. It was to seek more new locations, to expand from a regional scale to an inter-regional scale, to successfully cross the second threshold to development, and to exploit wider market areas. Thus the organizational metamorphosis and structure have been changed radically. In 1984, the Heavy Automobile Industrial Corporation was founded. The corporation had grown to a very large extent by merger and acquisition, and produced a very wide range of products. By the early 1980s, the Heavy Automobile Enterprise Group consisted of 9 major industrial enterprises and institutes. Total employment was 5,4000, and industrial output

value amounted to 646 million yuan (1983). With the deepening of the market forces the transfer of the group from loosely associations to closely and semi-closely associations have taken place. A shift of economic association was also from productive technologies to funds, the specialized linkages and marketing activities were soon be extended into many areas on a national scale. Thus, its constituent points and sale offices were distributed over many urban centers, and joint ventures were set up in a wider areas, and the enterprise entered into a large scale spatial expansion processes. By the late 1980s, this group consisted of more than 40 consistent plants and institutes in China, and a few overseas subsidiaries. Total employment was 68,000, and industrial output value amounted to 1.1 billion yuan (1989). At present, the coordination have grown to a very large multi-locational, multi-layered, inter-owned and intersectional enterprise group by merger and acquisition. It has not only expanded its spatial scale, but also the spatial linkages, and spatial pattern has changed radically. The spatial pattern of the group is organized as follows:

First, under the overall planning of the group, a kind of organizational structure evolved: the multi-divisional structure. Each major product was centered in a separate division. Each division was responsible for a specific product within the enterprise group's portfolio. The enterprise group organized specialized coordination production system among the constituent units, and formed the subcontracting spatial linkage networks. On one hand, specialized truck plants, scattered in five provinces, had their products changed to suit the requirements of the region concerned. The chassis, which these five major plants used, were supplied by the Jinan Heavy Automotive Plant. But the engines, springs gear boxes, water tanks, rubbers, gear wheels, and other auto parts, which the Heavy Automotive Plant used, were supplied by the consistent plants and associated plants. These increased production specialization and greater coordination between plants, leading to expanded truck production in China. The spatial linkages between various consistent plants and the general plant were close.

Second, the sale office and technological service networks were set up in whole China, acquiring the national market stably. Thus, with the deepening of market mechanism, the group is growing into wider geographical space and become multi-locational organization.

2. The Characteristics of the Enterprise Groups in China

On the basis of detailed investigation of the Heavy Automobile Enterprise Group, a survey of the Light Motor Group, the Baima Tool Group and the Langchao Electronics Group was also made. The empirical evidence indicates that all enterprise groups exist in an environment that is both complex and dynamic and are affected and penetrated by their external environments. The groups are based upon a good fit between the character of the

organizational structure and environment features. When its external environment changes, the enterprise will adjust its strategies to deal with external changing environments. The centrally control become the key mechanism of enterprises under a centrally planned economic system. The decision-making and activities of an enterprise was directly controlled by the government, and the spatial expansion behaviour of an enterprise were also appointed by the relevant authorities. Under a mixed planned and market economic system, the spatial expansion behaviour of an enterprise was influenced by the market forces. The essential features are summarized as follows:

(1) In a market economy, the changes in the plant space reflect earlier changes in the market area of the enterprise, and the linkage between enterprise's plant and market .

(2) The spatial expansion processes of an enterprise is very similar to the pattern produced by the hierarchical diffusion process, that is expansion not from core region to adjacent region but from core region to the major industrial centres or subcentres so as to prompt a large number of medium-sized and small enterprises and to organize the regional specialized coordinations.

(3) Under a market economy, the various activities of an enterprise views the market as focus, the market capture was primary agents of the spatial evolution of an enterprise. In order to exploit and capture wider market areas, the most preferred strategy is to seek one or more new locations by the establishing of branch plant and the acquisition of other enterprises and their associated plants. The increased scale of an enterprise may result in spatial decentralization trends, making the enterprise enter into other areas and wider operation space, and promoting the optimization combination of production factors and the rational organization of resources at wider space and at larger scale. Therefore, the enterprise has become increasingly multi-product, multi-plant and multi-locational organization.

(4) As enterprise expanded, special departments should be established to divide the tasks and functions of different units .

(5) An enterprise group has such units as headquarters research and development, management, and specialized production etc. There are complex linkages, internal and external, and different locational requirements among these units. Each unit, therefore, tends to develop rather distinctive spatial patterns. Thus, both technological and organizational developments have combined together to produce not only a multi-layered organizational structure in the enterprise groups but also a very distinctive spatial structure of such enterprise groups.

IV. CONCLUSIONS

Most of the models of the spatial evolution of corporation in western developed countries, based on some assumptions, were generalized from case studies, which were mostly “process” studies but not “model” studies^[8]. These models have not been tested, and have not, as yet, been widely accepted and very different from the spatial evolution of enterprise groups in China. Therefore, these models need to be tested against reality.

This study of the spatial evolution of enterprise groups in China attempts to incorporate enterprise as a basic unit in industrial and regional economic analysis. On one hand, this study indicates that a macro-regional approach or traditional industrial geography can not disclose the changing characteristics of spatial behaviour of an enterprise or corporation alone. However, the micro-level approach can uncover the spatial patterns created by the enterprises, both in aggregate and individually, and attempts to understand changes in organizational structures and their influence on the location of different industries and on city-systems and regions at different historical stages. The spatial evolution pattern of macro-industry can be explained through the characteristics and behavior of organization structure and spatial structure of individual enterprise groups. These studies can contribute to understanding the micro-mechanisms for evolution of macro-regional economic and industrial systems, and deepening the studies of macro-industrial allocation. On the other hand, enterprises exist in the dynamic and complex external environments, and was penetrated and affected by these environmental factors. The enterprise can adjust its forms of organizational structure to achieve a good fit to external environment forces; and choose its surviving environments by the spatial expansion and locational adjustment. Thus, one enterprise interacted closely with its external environments.

With the establishment of socialist market economy in China, the popularity of market forces has been deepened. An enterprise's activities (including production, marketing, investment and the locational choice) will take the market as orientation and become increasingly a main part of market activities. The market mechanisms will become primary agents of the spatial evolution of enterprises. Each enterprise can make locational choice according to its own specific market demands. With the improvement of transportations and communications technology, systematization and standardization of production processes, the business organization tends to be multi-product, multi-plant and multi-locational enterprise and even multinational firms. These will, therefore, encourage the wider dispersal processes of industrial space or realize the industrial agglomerate processes at wider regional scale, and the industrial spatial structure are made even more complex.

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