

The Growth Mechanism of the Leading High-tech Industry Based on Industrial Convergence

Fang Wang
Economics School
Wuhan University of Technology
Wuhan, China 430070
wf87586519@163.com

Yulin Zhao
Economics School
Wuhan University of Technology
Wuhan, China 430070
ylz1115@163.com

Abstract—The leading high-tech industry refers to the high-tech industry of high growth potential, high rates of innovation and high industrial linkages bearing the breakthrough-driving functions to the economic growth. Since the mid-90s of last century, along with the information technology revolution and the rapid development of high-tech industry, industrial development has emerged new features and trends of convergence. Industry convergence could promote the leading high-tech industry's growth which has become the new growth point through expanding relationship between industries, changing industrial organization form and making industrial structure flexible. High-tech industry convergence would break the boundaries of traditional industries, expand the industrial linkage through which horizontal linkages between industries has appeared and a new growth point has emerged.

Keywords—leading high-tech industry; industry growth; convergence-deploitation mechanism

I. INTRODUCTION

The leading high-tech industry refers to those high-tech industries of high growth potential, high rates of innovation and high industrial linkages as well as the breakthrough-driving functions to the economic growth. The leading high-tech industry is not only the high-tech industry of high R&D input, high intelligence-intensive, high risk and high benefit, but also the dominant industry of high industrial linkage and high growth potential in economic development. It has its particular connotation which is distinguished from both ordinary high-tech industry and the ordinary leading industry (see Figure 1).

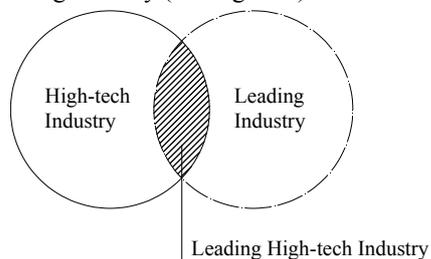


Figure 1. the connotation of leading high-tech industry

In the era of information economy, the phenomenon of mutual infiltration and reintegrating among different industries grow in an increasing number which reflect that industrial convergence become the new trend of industrial

development and turns to be the new engine of economic growth (ZhenhuaZhou,2003).Industry convergence initially occurred in telecommunications, broadcasting and television sectors, and currently it become the inevitable trend of the modern industrial growth and development which is characteristic of digital and technology convergence. It goes without saying that industrial convergence is the important way for the leading high-tech industry growth and development. Through the industry convergence, industry grow can not only through longitudinal industrial linkage, but also through the horizontal expand. Therefore it could be inferred that industry convergence broaden industrial growth path and enrich the content of industrial growth.

Based on industrial convergence mechanism, the high-tech industries could expand their growth. The expand function of industrial convergence to the leading high-tech industry reflects in the following three aspects.

II. AN EXPANSION OF INDUSTRY LINKAGE

The industrial convergence of leading high-tech industry has changed the traditional industrial linkages, and further expands the relationship among industries from input-output vertical relationship to the horizontal linkage. As a result, the horizontal linkage among industrial has appeared which reflects the tendency of industrial linkage change during the transition from industrial economy into information economy. Under the condition of industrial convergence, the new-type of competition-synergy relationship among industries of no relation before has appeared.

First of all, the industrial convergence has changed the traditional industrial linkage because industrial convergence provide the original-separated industries with the similar or same technology base which helps to form horizontal technology linkage between industries. Since the convergence industry could offer the consumers the similar products or services and meet their mutual demands, the barriers of different industries boundary has been lowered down and the horizontal alternative-competitive relationship is easily formed. On the condition of industrial convergence, the characteristics of product alternative has been enhanced and originally non- alternative product has become alternative, also those potential alternative products have gradually become the realistic alternative products. Industrial convergence has changed the basis of industrial linkage from material-base flow into information-base flow which influence and change the linkage content, linkage mode and

linkage basis, therefore there exists the more complex linkage network. The regarding research shows that the industrial convergence occurs in those industries which has certain degree of industrial relevance (Fai & Tunzelmann, 2001) or alternative technologies and products (Gaines, 1998).

Second, industry convergence expands the linkage between industries. The linkage between industries is not only combined in product contact as well as service contact, but the technology contact. Industry convergence is inter-industry technology penetration in which form the competitive relation among industries. However, compared with traditional industrial linkage theory, the industry convergence is not vertical integration based on input-output linkage but the horizontal relation based on the formation of convergence industry. Porter (2005) believes that "Linkage created by technology reduce the costs associated with excavation in linkage." The industrial convergence of leading high-tech industry is mainly reflected in the network, IT services, and technology penetration. The main inter-flow among the industry is not visible intermediate products but information flow, software and technology. The technology advance, innovation and information applications accelerate the penetration of information and technology among the industries, therefore speed up the expansion of industry boundaries and improve the connotation of industrial linkage.

In the traditional vertical linkage mode, the leading high-tech industry growth mainly depends on the forward and backward linkage based on providing products and services mutually. While in the growth mode of industrial convergence, the leading high-tech industry could grow and broaden the fields through many different ways including technology penetrate into traditional industries, intersect with other high-tech industries and recombination in the intra-industry. In the process of industrial convergence, many new products, services have emerged from which the leading high-tech industry has got compound economic effect and enormous potential for industry growth.

III. THE REVOLUTION OF INDUSTRY ORGANIZATION FORM

The industrial convergence of leading high-tech industries has formed the new type of horizontal linkage mechanism and competitive-synergy relation among industries which reflect that the traditional industry organization has been changed. Under the condition of traditional industrial organization, according to the SCP analytical framework, market structure determines the enterprise conduct and performance within industry. The competition occurs within the industry while there isn't any competition between enterprises from different industry. However, in the context of industrial convergence, there exists industrial intersect, penetrate and recombination which make the original technology boundary, business boundary and market frontier have been broken. As a result, new-type competition-synergy relation has formed which is the innovation of industrial organization substantially.

Industrial convergence makes the traditional industry boundary obfuscation and the new type convergence

industry has formed. Convergence industry system lower the enter and exit barriers and horizontal market structure substitute the traditional market structure of vertical integration which is considered as the innovation of industrial organization. In accordance with the theory of contestable markets, the convergence industry system is competitive industrial system, and there is no sunk costs and market entry barriers. There is no competitive disadvantage for potential entrants in production technology, cost and human resources, meanwhile entry and exit is free. Therefore, convergence industrial system is more conducive to maintain an efficient market organization, and helpful to corporate restructuring and efficiency improving.

In terms of the leading high-tech industry especial the information industry, the horizontal relation between industries is more close to each other and has lower cost as well as more frequent transactions. It's easier for the information industry to achieve industrial convergence and grow more quickly. As the leading high-tech industry, recently the information industry could acquire high-speed growth which owes much to its high-growth, high innovation rate and high permeability and other characteristics. The industrial linkage of Information industry is distributed in the network with the information flow spreading and shared in multidirection. At the same time, due to extending of network and diffusing of information and technology flow, industrial linkage could get the extension to service, manufacturing industry as well as the human life which result in the emergence of finance information service, information agriculture, information health industry, information transportation as well as information household, etc. Thus, the business boundary between manufacturing and service is becoming vaguer through which there is a trend of economic services.

IV. FLEXIBILITY OF INDUSTRIAL STRUCTURE

Industrial structure flexibility is the new type of industry revolution based on technological innovation and continuous convergence, reflecting the new trend of industrial structure change during the information era. Its essence is a kind of industrial structure innovation which makes the industrial structure flexible.

Traditional industry refers to the products and services which have the same or close competitive and alternative relationship between each other. Under the circumstances of traditional industry classification, the industry boundary is due to the competitive and cooperated relationship with one particular industry and entering-exiting barriers between different industries. Under the traditional technology revolution and its push-forward technological development as well as traditional industrial production mode only occurred within industries which result in both the improvement of industrial efficiency and relatively clear industry boundaries. The fixed boundary such as technology boundaries, business boundaries, operational boundary and market boundary make the long-term industrial division and form the market structure of vertical integration.

However, industrial convergence whose basic connotation is technology, business and market convergence

makes the industry boundary vague and even disappear thus could changes the discrete situation and vertical integration of traditional industry. During the process of industrial convergence, the technology convergence takes the initial to broken the technology boundary of different industries and makes the different industrial technology getting convergence based on digital convergence; The loosen of industry regulation and the economy of scope intensify the diversification business of enterprise which make the business boundary tend to disappear. The technology convergence and business convergence cause the differentiation of products and services from different industries tend to be obscure, thus the specific market frontier could also fade away. With the all kinds characteristics of industry frontier gradually fade away, the industry relation change from separation to the convergence and the convergence industry has formed which show that the industrial structure and its theoretical system will therefore change thoroughly.

Nihcolas Negorponete from MIT (Nihcolas Negorponete, 1978) use three overlapping circles to describe the industry boundary and phenomenon of industrial convergence happened in computer, printing and broadcasting industry. In the fig 2, the three circles indicate the industry boundary which is featured and separated by various technologies, network, service, market, firm size and other characteristics of different industries. During the process of industrial convergence, there exists the phenomena of cross, overlap and inclusion for the three circles which express that the existing industry boundaries have become blurred, or even disappear, and result in the new convergence industry at the intersection of the circles (Figure 2).

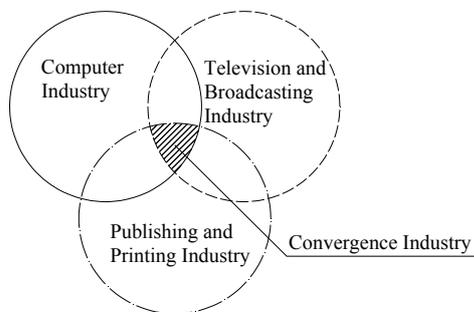


Figure 2. Industry frontier and convergence

The industry convergence especial the leading high-tech industry convergence has become the new model of industry innovation which change the traditional industrial structure and innovate inter-industry relation, resulting in new industry attributes and pattern. The newly emerged technology, product and service during the process of industrial convergence objectively improve the consumers demand level and change traditional way of production and service which upgrade the product and service structure. The continuous upgrading of products and services in turn stimulates the upgrading of consuming structure and industrial structure. Taking the information industry as the

example, as the leading high-tech industry of American economy in the 90s of 20 century, it not only drive the development of linkage industry, also extends to all the traditional industrial sector as the propeller for the convergence between high-tech industries and traditional industries causing the profound change of industrial structure.

V. CONCLUSIONS

In summary, the leading high-tech industry convergence further expands the linkage from the vertical to the horizontal direction which becomes the new point of industrial growth. The essence of industrial convergence is industrial innovation which refers to the whole innovation process of realization of technology, business and market convergence through industry permeation, recombination and intersection. First, the new convergence industry is the innovation of industry pattern; Second, the horizontal linkage is the innovation of industrial organization. Last but not least, the vague and flexible industry boundary is the innovation of industrial structure. The process mechanism of industrial convergence growth reflects the evolution path of industrial innovation process.

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