

Analysis and Lessons from Cases of Cultivating and Developing Strategic Emerging Industries at Home and Abroad

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Abstract - By analyzing the cases of cultivating and developing strategic emerging industries at home and abroad, this article points out the principles which should be followed during the development of strategic emerging industries. The principles are listed as follows: (1) The development patterns of strategic emerging industries should be "double promoted by government and market; (2) Adhering to the principle of market demand, the choice of strategic emerging industries should accord to the future market demand; (3) The fusion of strategic emerging industries and superior traditional industries is the shortcut of economic development; (4) Industrial policies should attach importance to independent innovation capability and core technologies and at the same time coordinate with the market mechanism and changed with the situation as well.

Index Terms - strategic emerging industry; hard rent constraints; market demands; industrial policies.

1. Introduction

There are several modes of cultivating and developing strategic emerging industries: (1) Market mechanism-oriented model. That means the strategic emerging industries' development relies on the market mechanism, the government rarely give support for planning and industrial policies. (2) Government-oriented model. This model bases on the theory that the strategic emerging industries' development should be in tune with the governments' objective, so the government should play a leading role. (3) Double promote model, which follows the basic market rules, the government needs to intervene to make up the defects of market mechanism. From the point of view of environment at home and abroad, the strategic emerging industries' development has a great uncertainty. This paper reviewed and summarized the experiences and lessons of cultivating and developing strategic emerging industries in the developed countries and the newly industrialized countries, and this offers useful references to the development of our countries' strategic emerging industries.

2. The Case Study of the Development and Growth of Strategic Emerging Industries around the World

A. *The Case Study of Cultivating and Developing the Railway Transportation Industry from the 19th Century to the Early 20th Century in the United States*

From the early 19th century to the 20th century, the railway transportation industry was one of America's strategic emerging industries, with the amalgamation of traditional

transportation industry and steel industry, the railway transportation industry came into being, it assumed a dominant position and led to the rapid and healthy development of the US economy.

At the technical level, the railway transportation industry integrated with steel smelting technology and heavy machinery manufacturing technology - the most advanced technology at that time which made the large-scale rail laying become a reality. At the marketable level, it was America's market environment that pushed the full construction of the railway. At that time, there were huge demands from personnel transport, cargo transport and wars on the railway industry. And the United States had not yet implemented a national transportation pipeline, causing long-standing barriers between the South and the North. Thus the US government needed the railway connection to achieve its political integrity.

Along the way which the US railroad industry develops, the US governments at all levels not only use revenue, but also through a variety of ways to encourage private capital and foreign capital to invest in railway to support railway construction.

In order to promote a rapid development of the railway industry, the US government has formulated a series of supportive policies. The US government at all levels greatly stimulated the railway companies' enthusiasm for the railways construction by means of offering the land freely. After obtaining a well development in railway, the US government regulated the competition and cooperation of interstate railway companies and contained the monopolistic behavior through the establishment of the Interstate Commerce Commission and the promulgation of "Sherman Antitrust Act" [1].

The main reasons for America's successful development of railway transportation industry are as follows: (1) The successful integration with advanced technologies; (2) The broad market demand of railway transportation industry; (3) The "double promote" mode and the government's full support.

B. *The Case Study of the Cultivation and Development of Information Industry in the United States*

In the late 1980s, the United States began to vigorously develop the information industry, until the late 20th century,

the information industry assumed a dominant position in the United States. The biggest boost to America's information industry integration came from the technology integration. Information industry products began to fuse on the bases of technology integration, such as smart phones and broadband network. From the case studies of America's information industry integration, we can see different industries could integrate with each other on the bases of technology integration and follow the market mechanism, and then became the leading industry.

The Clinton administration issued a series of supportive policies to promote the development of information industry, as the US government actively adopted government procurement as a tool to support the development of strategic emerging industries. In Clinton's "comprehensive economic plan", computers and related products in government procurement alone reached \$ 9 billion, as to support the information industry's new products[2]. In addition to domestic government procurement, the US government also tried to eliminate other countries' discrimination against US products purchasing in the expansion of foreign trade negotiations so as to make ways for US goods. As the market of new products growing, the US Government gradually reduced and stopped government procurement, instead, the market mechanism took the place of support policies.

The main reasons for America's successful development of railway transportation industry are as follows:(1) The successful integration with advanced technologies; (2) The broad market demand of railway transportation industry; (3) The "double promote" mode and the government's full support.

C. The Case Study of the Software Industry Development in India

Since the mid-1980s, India cultivated the software industry as a strategic emerging industry, this led to a sustained rapid growth of India's software industry. In 2012, the gross output-value of Indian software services industry' reached about \$ 100 billion[3]. The success is the fruit of the integration between computer industry and India's abundant human resources and educational industry.

The India Government had given strong policy support to the development of India's software industry. In 1984, the Rajiv Gandhi government implemented the New Deal and adopted a series of measures to support the software industry. From then on, successive governments always placed the information industry, especially the software industry, in the position of priority development. For example, the Indian government set up a special working group of national IT and IT Ministry, enforced preferential financial and tax policies, vigorously built software park and actively supported and established a multi-form, multi-level education and training system for software professionals. These policies created a good social and economic environment for software industry. India set up 17 software parks in Bangalore, Madras, Bombay and other places[3] with the technological innovation resources preferentially allocated to in-park enterprises. And

the government also initiated many relative solutions, institutional arrangements and talent projects, all of the above formed an information technology innovation system based on industrial clusters, which greatly speeded up the development of information industry in India.

Below are the main reasons for India's successful development of railway transportation industry: (1)The successful integration of computer industry's development with the abundant human resources and educational industry in India; (2) The broad market demand of railway transportation industry;(3)The "double promote" mode and the government's full support.

D. The Case Study of Fifth-Generation Computer Research and Development Program in Japan

Japan's Fifth Generation Computer Systems Engineering (FGCS), a strategic emerging industry which was supported by MITI lasted 12 years from 1982, ultimately ending in failure.

Although FGCS made partial breakthrough in technology, it ultimately failed to overcome the key technical challenges. More importantly, in 1990s, the computer world was dominated by the distributed networks in which personal computer and small workstations were connected through Internet and communications networks. The age of Mainframes which had ruled for decades ended. As the function and design of FGCS went against the mainstream market, FGCS basically lost its commercial quantities, let alone the industrialization [4]. FGCS's failure is due to MITI's wrong technological predictions. Instead of producing any commercial quantities, the decade-long devotion of MITI and Japan's IT enterprises to FGCS even widened the technological gap of IT enterprises between Japan and America that was narrowing, all because of the bias in research direction. Japan's IT enterprise didn't accomplish much both commercially and technologically in the tide of knowledge-based economy that swept across the world in 1990s.

The root cause of FGCS's failure was the misunderstanding of the future development direction of computer technology and disobeyal of the principle of market selection as well as the "government-led" development model.

3. The case study of the cultivation and development of domestic strategic emerging industries

A. The Case Study on the Development and Policy of China's Home Appliance Industry Since China's Reform and Opening

In 1980s, home appliance industry was a key cultivating strategic emerging industry in China. After 30 years' development, China's home appliance industry grew bigger and stronger under the dual force of policies and market. Now this industry has gained very strong competitiveness in global market. It is remarkable that while foreign brands dominated domestic home appliance market in 1980s, Chinese local brands took the leading role instead after just more than 10 years' development and exported largely to international markets in late 1990s. The success of China's home appliance industry benefited from both the huge market demand and the

rational industrial policy.

Industrial policies for home appliance are represented by different documents in different periods for there had never been systematic industrial policy files developed from Chinese government. The development of Chinese home appliance industry followed the principle of "Government regulation as a supplement to market adjustment". In different stages of the home appliance industry's development, the government adopted different industrial policies.

Specifically, the starting point of the government to formulate industrial policy was to support the industry at The infancy stage from 1979 to 1981; At the expansion controlling stage from 1982 to 1988, the main tone of policies changed from encouraging the development to controlling the excessively expanding in the case of the fast-expansion of the home appliance industry; The industrial policies focused on the capacity control and structure adjustment early at the competition restructuring stage from 1989 to 2001, but later the industrial policy environment gradually tended to loose and the effects of market mechanism became increasingly obvious; The main tone of the policy was to create a well-organized industrial environment and compensate for the drawback of market mechanisms without direct market intervention at the mature growth stage since 2002.

B. The Case Study of the Development of China's Telecommunications Industry and Industrial Policy Since 1982

In 1980s, the communications industry was also a key cultivating and developing strategic emerging industry in China. The Chinese telecommunication industry was a successful example of the integration of traditional telecommunication industry with high-tech industry. The telecommunication industry received remarkable achievements due to the driving of market and the support and cultivation of policy. Specific performances were as follows: (1) The scale and strength of the industry grew rapidly. (2) Local companies dominated in some areas. (3) Local leading enterprises acquired certain international status. For example, Huawei, ZTE, DaTang, Putian and other leading companies had gained international advantages successively in technological areas such as access network, optical transmission, mobile communications and data communications.

Like home appliance industry, no systematic policy documents were formulated by the Chinese government specially for communications, and the related industrial policies were also manifested through different documents in different periods. The Chinese telecommunication industry also followed the principle of "government regulation as a supplement to market adjustment".

The telecommunication industry can be broadly divided into two stages according to the characteristics of industrial development and policy changes. The infancy stage from 1982 to 1990, the main tone of policies in this stage was to support and initiate the nationalization of telecommunication equipment to meet the needs of building a modern communication network in China; And the independent

development stage since 1990, the policies were to establish the telecommunication industry as a pillar industry and encourage the telecommunication equipment's nationalization.

C. The Case Study of the Automobile Industry's Development and Industrial Policy in China

In July of 1956, FAW was founded and put into operation, which marked the beginning of the Chinese automobile industry. In 1980s, the automobile industry was a key cultivating and developing strategic emerging industry in China. Compared with the home appliance industry and telecommunication industry, the industrial policy for automobile industry was the most systematic and complete.

In 1988, the State Council issued "The notice on the strict control of the automobile production sites" to define the layout of automobile's production, that is "Three big ones, three small ones" strategy, i.e. FAW, DFAC, SAIC were the three big ones, Beijing, Tianjin, Guangzhou were the three small ones.

Despite government's strong support and enormous funding investment, China's automobile industry still lagged far behind international counterparts. Foreign automobiles occupied a dominant position in domestic market while domestic brands were at the low end of the value chain with poor quality, low price and small export volume. But since the take-off of their economy, Japan and South Korea only spent over 20 years to develop their automobile industries to the same level as Europe and America. Their automobiles were exported largely and occupied the United States and other international markets.

By contrast, China's home appliance industry and telecommunications industry also took less than 30 years to achieve a technological level that was close to developed countries with huge export volume and strong international competitiveness. Therefore, the industrial policy to drive the development of China's automobile industry was a failure.

D. The Reason for the Failure of Chinese Automobile Industry Policy - Enterprise Rent-Seeking

According to public option theory, the rent-seeking activity in modern society mainly means the rent-seekers seek certain privileges from the government such as government's franchise to the monopolistic use of certain resources like cigarette and wine or protections in certain areas such as restrictions on the imports of cars or other goods to protect domestic manufacturers for the purpose of high profits. The profit that exceeds the original should-be margin is referred as rent.

In 1988, the State Council promulgated "A notice about the severe restrictions on automobile production's sites" which further established the automobile industry's development pattern of "Three big ones, three small ones". This in fact eliminated other companies from entering the automobile industry. Coupled with China's high tariff on imported automobiles and components, such policy bred high rent that was of soft constraints.

As a result, the Three Big and Three Small automotive

enterprises relied heavily on foreign-funded enterprises and lost the motivation of independent innovation. Finally this led to the failure of government's technology policy of "Market for technology". In contrary, some of the national automotive enterprises such as Chery and Geely that were not protected by the government's industrial policy built their independent innovation capability unexpectedly.

At the early stage of an industry's development, the government ought to provide "rent" to support and protect it but with hard constraints. Market is an effective hard constraint. Besides market, there also should be other means to restrain rent users - state-owned enterprises and local governments. The main reasons for the failure of China's automobile industry development are listed as follows: (1) The government offered overprotection to the "Three big ones, three small ones" automobile companies that resulted in a "government-led" development model. (2) Fail to consider the market demand. From 1980 to 2000, Most Chinese people's income was too low to allow them to buy a car. Market demand was insufficient. However, many local governments cultivated the automotive industry as their leading industry, which inevitably led to failure.

4. Experiences Summarized at Home and Abroad

The examples above reveal the high risk in developing the strategic emerging industries. Here are some lessons worth learning for the selection and cultivation of strategic emerging industries.

A. Several Ways of Cultivating and Developing the Strategic Emerging Industries

These ways are listed as follows: (1) Market mechanism oriented development model. That means promoting industrial development through market mechanism with rare support and planning from the government. (2) Government-oriented development model. This model bases on the principle that the strategic emerging industries should be in tune with the government, so the government should play a leading role. (3) Double-promote model, which follows the basic market rules, the government needs to intervene at the same time to make up the defect of market mechanism.

According the above case studies, we can find that we should choose the "Double-promote" model for the development of the strategic emerging industries. One main reason for the failure of Japan's FGCS and Chinese automobile industry is the choice of "Government-oriented" model. With a right development model - "Double-promote", America successfully cultivated and developed the railway transportation industry from 19th century to the early 20th century and the information industry in 1980s; India successfully built its software industry; China successfully developed the home appliance industry and the telecommunication industry. There are two specific ways of "Double-promote" development model. One is the market makes a spontaneous choice at first, and then the government interferences into the market to cultivate and support the industry; The other one is the government choose, cultivate

and support the industry first, then the market test the result. Either way must follow the objective development principle of the strategic emerging industries, government's selection, cultivation and support cannot go against the market mechanism.

B. Properly Grasp the Future Market Demand

The selection of strategic emerging industries should adjust to the future market demand. The basic power of choosing and cultivating the strategic emerging industries is market demand. The root cause of the Japanese FGCS's failure is their misjudgement on the future global computer market. While at the same time, the United States vigorously developed PC and cultivated the information industry with broad prospects[5]. Until 2003, China's automobile industry gained fast development with the driving of huge domestic market demand and became a leading industry.

C. Build the Strategic Emerging Industry on Traditional Advantage Industry

The integration of strategic emerging industry and traditional advantage industry leads to the former's industrial upgrading and the latter's fast and healthy development. The success of America's railway transportation industry, India's software industry and China's telecommunication industry all go to the right way of the strategic emerging industry integration with the traditional advantage industry.

D. The Industrial Policy should Pay Attention to the Development of Independent Innovation Capability and Core Technology

Industrial support policies should coordinate with the market mechanism and establish a government exit mechanism. One main reason for the failure of China's automobile industry is the government's overprotection to the automobile enterprises of "Three big ones, three small ones", which greatly weakened the market competition mechanism and deprive the motivation of innovation of these companies that excessively depended on foreign companies.

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