

Perspectives to Independent Innovation in Chinese Automobile Companies*

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Abstract The development of Chinese automobile industry can be divided into four stages: overall technology importation, closed development, multi-development, and innovative development. It is not until the fourth stage that the independent innovation capability of Chinese automobile enterprises begins to emerge. Through the analysis of Chinese automobile manufacturing enterprises, this paper proposes that the so-called “Market for Technology” strategy on which Chinese enterprises try to rely to introduce and absorb advanced technology by establishing joint-ventures with foreign capital enterprises is unsuccessful. In the meanwhile, it suggests that Chinese automobile manufacturing enterprises should adopt an independent innovation model based on resources integration. On the basis of internal resources integration, Chinese enterprises should use “internalization” and “exploitation” approaches to attract external resources and thereby foster their own core competence, and develop strategic alliances based on resources integration as the way to realize this independent innovation model.

Key words Chinese automobile industry, independent innovation, market for technology, resources integration

1 Introduction

With the development of Chinese automotive industry, the innovation path of Chinese automotive industry has experienced 4 phases (see figure 1). The first phase is during the 1950th, the starting stage, with the symbol of the establishment of China First Automotive Works (FAW). The characteristic is showed as overall technology importation, far from technology innovation. The second stage is 1960th to 1970th. With the breakthrough of cargo truck, Chinese automobile manufacturing enterprises and refitting enterprises sprang up rapidly, automobile products and technology domain spread to Medium-sized vehicles , light-duty vehicles , heavy-duty vehicles and special-purpose refitted vehicles . At that time it has a modicum of imitation innovation capability. The third stage is from 1980th to the end of 20th century, Chinese automotive industry conducted several adjustments to some respects such as automotive industry arrangement, product structuring and regional division. Various ownerships of automobile enterprises such as private, state-owned, collective, joint-venture, etc. were prospering, products and manufacturing technology of commercial vehicles and passenger vehicles are being developed continuously. Innovation system of automobile manufacturing enterprises is forming gradually, but independent innovation capability is still weak. The fourth stage is from early 21 century till now, with the main token of the emergence of a number of national automobile enterprises, such as Brilliance Auto, Geely automobile, Chery automobile, etc. The independent innovation ability of Chinese auto industry really comes into being.

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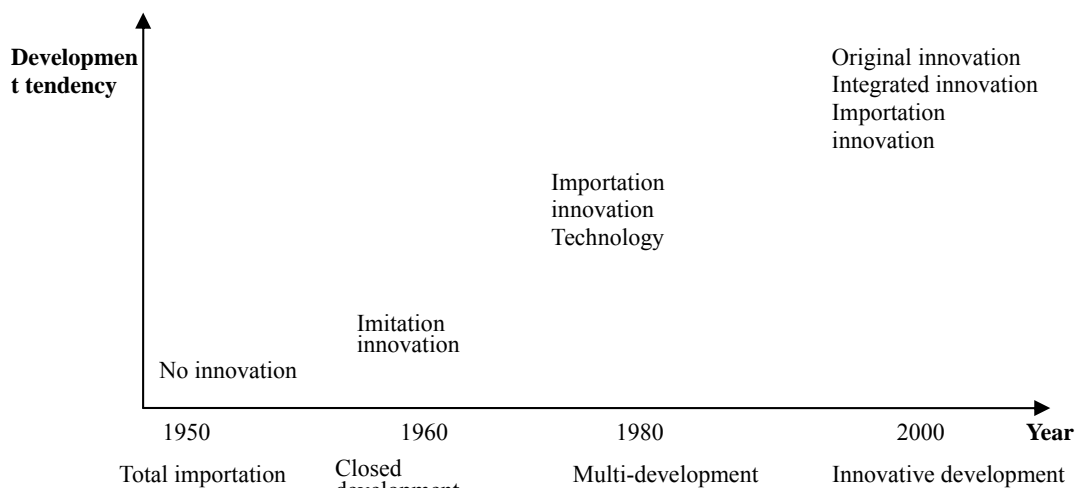


Figure1 Development Phase of Chinese Automotive Industry and Independent Innovation

Lengnick Hall^[1], Hoskisson, and Busenits^[2] proposed that independent innovation is a kind of practice that enterprises use only their own resources and capability to develop new products and services. Namely, independent innovation is an innovative activity, through which an enterprise has achieved technological break-through by their own efforts in order to realize commoditization, industrialization and internationalization of the scientific and technical achievements, and obtain commercial interests based on R&D. Chandy, Tellis^[3] has proved the positive correlation of independent innovation and risk, Hitt, Hoskisson and Johnson^[4] manifested the positive correlation between research expenditure and independent innovation. In China, Chen Jin^[5] proposed that independent innovation is such an activity through which a firm might explore the technological frontier, break through technological barriers, research and develop technologies with independent intellectual property rights, and realizes the commoditization process quickly.

In the "National Medium and Long-term Science and Technological Development Planning Outline (2006-2020)" issued by the State Council of China, the concept of independent innovation has been clarified more exactly as "Independent innovation is to strengthen primitive innovation, integrated innovation and digested innovation in order to improve the innovation capability over the whole nation."

This paper suggests that independent innovation is the process that enterprises mainly relied on their own research capability to absorb and integrate external resources appropriately to form new technology with independent intellectual property rights. This paper aims to raise several judgments on Chinese automobile manufacturing enterprises, and put forward a model for independent innovation of Chinese automotive industry, viz., a new model based on resource integration.

2 Proposition 1: the “Market for Technology” Strategy in China Automotive Industry is a Failure

Under the specific conditions, in order to introduce foreign advanced technology and learn cutting-edge knowledge, to shorten the gap between Chinese and overseas automobile enterprises, Chinese automotive industry adopted a development strategy called “market for technology”, that is, during the development process, Chinese automotive industry introduces overseas funds and establishes joint-venture enterprises, meanwhile, when the products of joint-venture enterprises permeate into Chinese market, fully develop the spill-over and diffusion effect of foreign companies, to establish a mechanism that Chinese automobile enterprises gain their own independent innovation capability by learning from overseas automobile enterprises, and gradually form their own independent innovation capability (shown in Figure 2).

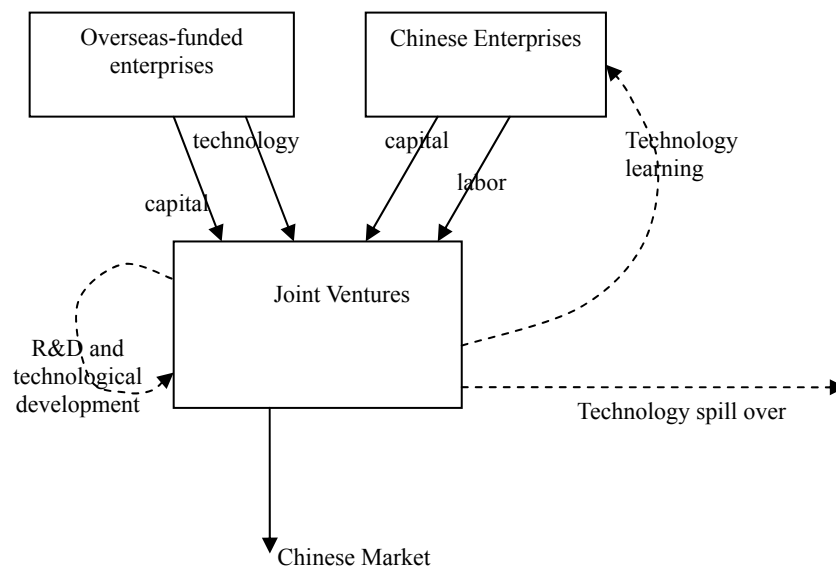


Figure 2 Market for Technology

However, the practice has demonstrated that the strategy of “market for technology” strategy in China automotive industry failed. According to the statistics data from “China automotive information net”, between the year 2001 and 2005: the top 20 Chinese automobile enterprises (ranked by gross sales) had developed 188 kinds of new vehicles altogether, among which, 58 kinds are independently developed, while Chinese local enterprises developed 47 kinds, occupies a proportion of 81%, only 11 kinds were developed by joint venture enterprises (the 130 new kinds of vehicle left were introduced from overseas parent companies of joint venture companies); Among National Science & Technology Progress Award of China, automobile enterprises obtained 79 awards, among them only 14 items came from joint ventures, and Chinese domestic enterprises account for 65 items, which took a proportion up to 82.3%.

The automobile enterprises in Chinese had 1844 granted patents in China during the period from 1985 to 2006, only 133 items were from joint ventures, while Chinese domestic automobile enterprises took a proportion of 92.8% (see Table 1).

Table 1 Chinese granted patents of automobile enterprises in China (1985 to 2006)

Rank	Company name	Joint venture/Non-joint venture	Quantity of patents awarded in China
1	Chang'an Automobile Co. Ltd	Non	864
2	China First Automotive group	Non	315
3	Dongfeng Automobile Co,	Non	262
4	Chery Automobile Co., Ltd	Non	193
5	Shanghai-GM Automobile Co., Ltd	Joint venture	66
6	Shanghai Volkswagen Automobile Co., Ltd	Joint venture	64
7	Geely Gropu	Non	64
8	ChinaFirst-Hainan-Mazada	Joint venture	13
9	Shanghai Automotive Group	Non	3
	Total		1844

Data source: arranged from the patents literature (1985-2006) of China Intellectual Property Office

The main reasons account for the failure of the “market for technology” strategy of Chinese automobile enterprises lies on: (1) the overseas parent company should input both capital and

technology to their joint-ventures in China, however, in fact, a lot of overseas parent companies only input production licenses and capital, makes Chinese joint ventures utterly become their manufacturing base; (2) Actually joint ventures obtained the designing prototype and the production permission from their overseas parent companies directly, and because the parent companies really looked down on the R&D ability of the joint ventures, so that's why it's reluctant for them to support the R&D activity in their joint ventures in China, it causes the inexistence of R&D progress (shown in Fig.2); (3) Standing on the above reasons, we can conclude that it's nearly impossible for technology learning and technology spill over effect to occur in Chinese joint venture automobile enterprises.

3 Proposition 2: There is Latent Capability of Independent Innovation in China Automobile Companies

There has been a long-term dispute about whether Chinese automotive industry has or should have independent innovation capability. So far, actually, the practice of the Chinese automotive industry provides us a definite answer, that is, Chinese enterprises have already begun to have and it's necessary for them to have independent innovation capability. Table 1 shows the representatives out of the independent innovation achievements for Chinese automobile enterprises in 2006. Table 2 indicates that, from the perspective of technology subdivision, the independent innovation of Chinese automobile enterprises involves the respects such as engine, chassis, integrated car, gear box, brake systems, and so on. From the perspective of the type of innovation, there are not only integrated innovation and digested innovation, but also primitive innovation.

Table 2 Independent Innovation Achievements of Chinese Automobile Enterprises(2006)

Technology subdivision	Independent innovation category			Representative enterprises	Representative products
	Primitive innovation	Digestion innovation	Integrated innovation		
engine	√			Chery Automobile Co., Ltd	ACTECO series engine of Chery Automobile Co., Ltd
		√		Dongfeng Comings Engine Co.Ltd	ISBe serial automatically controlled systematic engine
			√	Weichai Engine Co.Ltd	Style 06' commercial vehicles engine of Weichai
chassis	√			Anhui Ankai Automobile Co.Ltd	D serial the whole truss type passenger train chassis
		√		Anhui Hualing Automobile Corporation (Group)	Heavy-duty automobile chassis
			√	Shanxi Ou Shute Co.Ltd	SX6137C low floor urban passenger train chassis
Integrated car	√			The First Automobile Company of China Liberation Automobile Co., Ltd	Liberation Aoweì
		√		Chongqing Chang'an Automobile Co.Ltd	Chang'an star serial passenger car
			√	Zhengzhou Yutong Passenger Train Co. Ltd	ZK6100 type serial passenger car
gear box	√			Gear wheel Co., Ltd Group of Da Tong, Shanxi	DC6J48T gear box
		√		Geely Gear Box Co., Ltd of Zhejiang	Z series AT automatic gear box
			√	Shaanxi Fast Gear Wheel Co.Ltd	12JS160T serial gear box
Brake system	√			Beijing Jeep Automobile Co., Ltd.	Automobile brake system
		√		Ruili Group Co. Ltd	SORL brand automobile brake system

Source: List of the grand ceremony of Chinese automobile enterprises' independent innovation achievements (China automobile. Issue 2997, A4 edition)

4 Proposition 3: The Paradigm of Independent Innovation Based on Resource Integration is an Effective Alternative for China Automobile Companies

Independent innovation does not mean to innovate closely and totally rely on enterprises' own competence, but to integrate external resources rationally. Especially for Chinese automobile enterprises, since the resources they own are still neither comprehensive, nor abundant, therefore, it is more imperative for them to utilize external resources fully. To carry on resource integration is an important choice for Chinese automobile enterprises. The approach includes internal and external resource integration, including integration of the following resources: (1) Talent resource, includes professional technicians and managerial talents from the automotive industry; (2) Technology resource; includes domestic and international professional automobile design companies, especially automobile data survey companies, science & research institutions, universities, etc.; (3) Capital Resource, mainly involves security market, commercial banks, risk investors, government-funded innovation funds and other non-banking financial organizations, etc.; (4) Information resource, includes the information concerning suppliers, distributors, market competitors, and development tendency of the automobile technology; (5) Policy resource, including the organizations such as Chinese automotive industry association, China Machinery Industry Federation and relative governmental departments and institutions.

As a matter of fact, most of the main Chinese Enterprises which featured on independent innovation all adopt an independent innovation mode based on resource integration. For instance, Chang'An Motor Corporation proposed "mainly rely on ourselves, utilize other resources" strategy, makes an utilization of both domestic and international resources extensively, and thereby set up a mature technology development system and a complete basis condition ensuring system, becoming the first Chinese domestic automobile enterprise which has built its R&D center abroad, the first one which established a sample car trial-production system, and the first one which set up new product development procedure. Chery Motor Corporation proposed a mode described as follows: "internal R&D + share holding R&D + national & international joint R&D + commission R&D + related & attendant companies synergistic R&D = independent intellectual property rights". Beiqi Foton Motor Co.Ltd. put forward a thought of independent innovation "integrate knowledge, joint innovation".

Figure. 3 described the concrete approaches for Chinese automobile enterprises to realize the independent innovation model based on resource integration. That is, enterprises combine and integrate their internal resources around their own key resources, then for those external resources which have high strategic value, or which can fill the gap of technology defects of the enterprise, or which has relatively high flexibility and liquidity, enterprises should adopt the external resource internalization strategy, absorb them and make them become internal resources. As for those external resources which are of less strategic value, or of high solidification degree, or of high internalization cost, adopting the utilization strategy, put them into the usage of enterprises' own R&D and innovation activities.

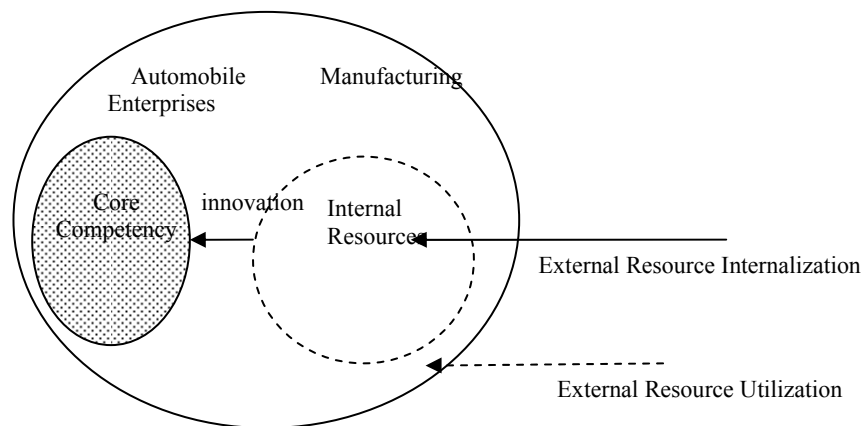


Figure 3 Independent Innovation Model based on Resource Integration

The main approach to realize the independent innovation model based on resource integration is strategic alliance. From the list of the first and second prizes of science and technology progress of Chinese automotive industry, 2007, among the 14 award-winning items, there are 6 items were

completed by strategic alliances, the proportion is up to 42.9% (see Table 3), it is obvious that the University-Industry strategic alliance has made a vital contribution to both the formation of Chinese enterprises' independent innovation achievements and the development of Chinese automotive industry. It's not difficult to find in Table 4 that, among the 6 strategic alliances of automobile enterprises, there is only 1 award-winning item participated by institution of higher education, obviously the R&D advantage of institutions of higher education has not been brought into full play. It's urgent for Chinese auto industry to propel industry-university strategic alliance and joint R&D. As a matter of fact, some Chinese automotive companies set out to establish strategic alliance. For instance, Dongfeng Automobile Co. Ltd. has built several strategic alliance (see Figure 4) with research institutions (i.e. China Academy), Universities (i.e. Huazhong University of Science and Technology, Tsinghua University, and North Jiaotong University, etc.), and companies (i.e. Chunlan Co. Ltd., Yuneng Power Co. Ltd., and Zhongfang Co. Ltd. etc.). Dongfeng Automobile Co. has created a "Electrical Vehicle R&D Alliance" with Wuhan University, Huazhong University of Science and Technology, Wuhan Jinkai Company, and Wuhan Chengtuo Company, and became the sole supplier of electrical vehicle to Beijing 2008 Olympic Game.

Table 3 List and Description of "S&T Progress Prize of Chinese Automotive Industry", 2007

Project name	Award class	Accomplisher	Form of strategic alliance
The development of the 1.5-ton high mobility cross-country car of Dongfeng auto corporation	First class	Dongfeng Automobile Co., Ltd., GADC	Enterprise + scientific research institutions
Key technology research and development of LPG, CNG automobile	Second class	Jilin University, the First Automobile Factory of China - Volkswagen Co., Ltd. the First Automobile Company of China Liberation Automobile Gas Development Co., Ltd, Gas Engine Branch Company of the Automobile, Changchun	Institution of higher education + enterprise
development of Europe III serial CA6SE1, CA6SF2 multiple electronic automatically controlled natural gas engine	Second class	The Technique Center of Group Company of the First Automobile Group Co, Ltd of China, Diesel Engine Branch Company in Dalian of the First Liberation Automobile Co., Ltd. China	Enterprise + enterprise
LaCROSSE monarch independent development	Second class	Shanghai General Motors Co., Ltd., Technology Center Company of Pan Asian Automobile Co, Ltd	Enterprise + scientific research institutions
Research on the deep hot-rolled high strength subcooling, high shaping stencil plate application technology	Second class	The Automobile Research Institute of Chongqing, Red Rock Automobile Limited Company of Chongqing	Scientific research institutions + enterprise
LZQ3130EQC-LZQQG12ZF type Divided and self-unloaded truck	Second class	Shandong Linqing Xunli Special Automobile Co., Ltd. of Shandong, Automobile Importing &Exporting Corporation of Shandong	Enterprise + enterprise

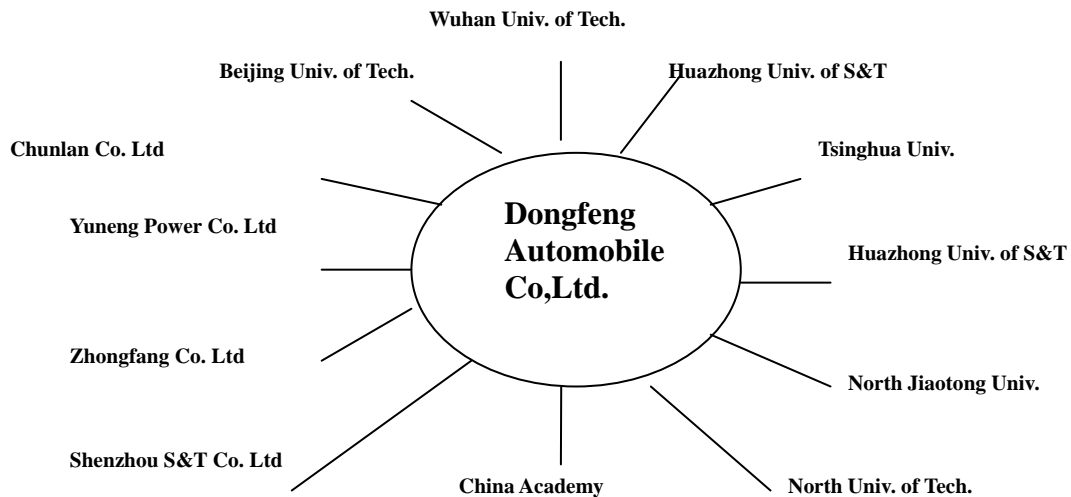


Figure 4 Industry-University Strategic Alliance Partners of Dongfeng Automobile Co., Ltd.

5 Conclusions

Through the above analysis, we can draw the following conclusions: (1) The “Market for Technology” strategy of Chinese enterprises does not achieve the technology learning and independent innovation capability enhancing objectives; (2) Chinese automobile enterprises began to gain effects in their independent innovation activities since 2000, and form their independent innovation capability gradually; (3) The independent innovation model based on resource integration has strong utilization to conduct primitive innovation, integrated innovation and digestion innovation, moreover, strategic alliances provide an effective way for Chinese automobile enterprises to realize the independent innovation mode based on resource integration.

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