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The Analysis of Innovation Policies for New Energy Vehicle Technology

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Abstract

Based on Liu Yuling's innovation policy analysis framework, this paper sorted the introduction of innovation policies for new energy vehicles in various periods in China and comparatively analyzes the domestic and foreign policy, which led to the discovery of "three similarities and three differences". Also, it raised the idea of strategic adjustment for new energy vehicle technology innovation, providing a reference for decision-making to further promote the new energy vehicle technology progress and industrialization.

Key words: New energy vehicles; Innovation policy; Sort; Evaluation

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INTRODUCTION

With the energy drain and deterioration of ecological environment, new energy vehicle has become an absolute choice for the development of automobile industries all over the world. Developed countries such as the United States, Japan and E U also attaches great importance to the development of new energy vehicles and thus introduced favorable policies. China has also introduced a number of new energy vehicle innovation policies. Encouraged by these policies, China's made some progress in developing new energy vehicles (Liu, 2010). However, some critics

think that these innovation policies are ineffective and didn't play a real role in promoting the development of new energy vehicles (Zhang, 2010, June 30), or even hindered the innovation process of new energy vehicles. How to evaluate these innovation policies? What is the difference between China's innovation policies and those in other countries? These are two major concerns of this paper.

According to Liu Xieling (1993), innovation policies could be divided into three categories: One is supply policy, it includes providing financial, human resource and technical assistance, the establishment of infrastructure for science and technology. Second, the demand policy, it includes government purchases, contracts. This demand is the demand for innovative products, processes and services. Third, environmental policy, it includes tax policy, patent policy, government regulation and so on, which could provide a good environment for innovation activities. In this paper, the author used Liu Xieling's analytical framework to analyzed our new energy vehicle technology innovation policies raised in the "fifth five-year plan", "the eleventh five-year plan", "the twelfth five-year plan" and compared with the new energy vehicle innovation policies in other countries so as to put forward a strategic and adjustment for China's new energy vehicle technology innovation strategic policy.

1. THE SORTING OF CHINA'S NEW ENERGY VEHICLE INNOVATION POLICIES

China has adopted supportive policies for new energy vehicle development, which has been increasing year by year. Periodically, the "tenth five-year plan" period is the initial stage for the development of new energy vehicles, government issued a limited number of policies. In the "eleventh five-year plan" period, new energy vehicles enjoyed an integrated development, during that time, a

large number of policies emerged, which amounted to as much as 16 pieces. In the “twelfth five-year plan” period, the planning for new energy automobile industry has been introduced, and great importance has been attached to the development of new energy vehicles, especially the safety management and the promotion of technology in the whole industry. New energy vehicles industry welcomed so far largest scale policy support. These new energy vehicle technology innovation policies are as follows (Figure 1).

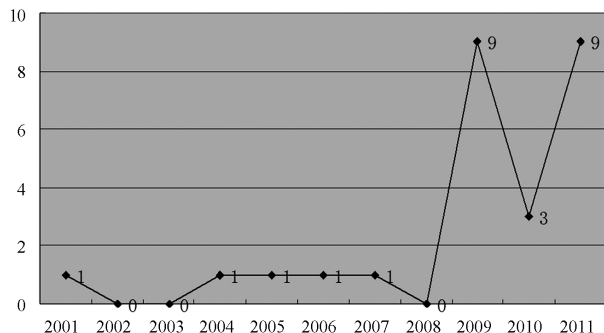


Figure 1
New Energy Vehicle Technology Innovation Policies

Table 1
New Energy Vehicle Innovation Policies in the Twelfth Five-Year Plan Period

time	Policy name	Release organization	Content	Purpose	Effect
2001	863 major projects for electric vehicles	Department of science and technology	Proposed “three vertical and three horizontal” layout for research, direct state investment totaling 880 million yuan	Reduce dependence on oil resources to keep up with the United States , Japan and EU.	Develop new energy vehicle at the same starting line as developed countries making a precedent for the development of new energy vehicle
2004	Automotive industry development policy	NDRC	Develop energy saving and sustainable technology for new energy vehicle determine	Guide the industry to the road of healthy and sustainable development	Provide policy support for the development of new energy vehicle
2005	Optimize the structure of the automotive industry	Ministry of development and reform commission	Beijing, Tianjin, Wuhan, Hangzhou, Weihai to be the demonstrative cities for electrical automobiles	Ownership of electrical automobiles reached 5%-10% in 2010; 50%+ in 2030	Expanding the market for electrical automobiles and making people to understand the new energy vehicles

Note. Source: gathered by the author.

1.2 The “Eleventh Five-Year” Period (2006-2010)

“Eleventh Five-Year” period is a culmination of the development of new energy vehicles. 2008 international oil prices continued to rise, in July 2008 the oil price reached \$ 147.27. Influenced by The rising oil prices, some customers began to consider buying less petroleum fuel consuming vehicles—the new energy vehicles. Car companies also saw the enormous potential of new energy vehicles, and began to increase R & D and promotion . The Government also began to introduce a large number of policies to promote the development of new energy vehicles.

1.1 The Fifth Five-Year Plan Period

At the end of 2001, China’s domestic demand for automobiles reached 2,380,000, automobile owners reached 1,820,000. With the rapid growth of automobile ownership, fuels are in great demand for automobiles. However, the slow growth of crude oil output in domestic market could not satisfy the increasing demand in the domestic market , which was generally made up by imported crude oil. Large demand and lack of crude oil call for China to develop new energy vheichles.

According to Liu Xieling, China’s new energy vehicle innovation policies in the fifth five-year plan period presents the following characteristics: for the supply aspect, in 2001, the “863” plan , the government put into totally 880,000,000 rmb into the major research of electrical automobiles. As for the demand, no complete product has been made, so the demand was still a blank. As for the enviorenment, the introduction of “863” plan provided a good development environment for new energy vehicles in 2001, in 2005, six cities has been identified as the electrical automobile demonstrative city for a larger market so that more people could start to understand new energy vehicles. Chronologically, the new energy vehicle innovation policies in the tenth five-year plan period are as follows: (Table 1)

According to the analytical framework Liu Xieling, China’s new energy vehicle technology innovation policies in the “Eleventh Five-Year plan” period showed the following characteristics: as for the supply, in 2006 nearly 20 billion yuan was invested for the development of new energy vehicles; in January 2009, 10 billion yuan was invested to support the industrialization of new energy vehicles and its key spare parts = in industrial production, in April, 60,000 yuan subsidies were provided to pure electric vehicle purchasers , in May 20 billion yuan fund was allocated to support the technical innovation. Supports to the supply aspect contributed greatly to the

industrial development of new energy vehicles; as for the demand: in 2008 the government purchased more than 500 new energy vehicles, which were put into use during the Olympic Games, in 2010 a total of 1,017 pure electric vehicles, hybrid and fuel cell and other types of new energy vehicles were put into use in Shanghai World Expo. Government procurement on the one hand played an exemplary role in the use of new energy vehicles, and on the other hand, brought economic benefits to new energy vehicle enterprises, ensuring the sustainable development

of new energy vehicles; as for the environment: in 2006 a new excise tax policy was introduced; in 2007 the new energy automobile production and access management rules was issued ; the Sino-US cooperation to jointly build US-China Clean Energy Research Center and a series of other new energy vehicles policies provided a good environment for the development of new energy vehicles.

China's new energy vehicles innovation policies in the 11th five-year plan period (see Table 2).

Table 2
Major Innovation Policies in the “Eleventh Five-Year Plan” Period

Time	Policy	Release organization	Content	Purpose	Effect
May 6	New consumption tax policy	Ministry of finance	Tax break for energy-saving vehicle	Tax relief to support the development of new energy vehicles	Tax breaks encouraged more companies to develop new energy vehicles
November 7	Regulations for the production and management of new energy vehicles	MIIT	Set 15 thresholds for companies to launch new energy vehicle projects (Luo, 2008)	Raise up the thresholds for producing new energy vehicles and regulate its development	Standardize the new energy automobile products
December 7	Guiding catalogue of industrial structure adjustment ,2007 edition	NDRC	Development and Reform Commission officially listed new energy vehicles to the favored industry directory	Promote the industrialization and large scale production	Point out the direction of development in the new era for the automobile industry
January 9	“Notice on the extension of demonstration of new energy and energy-saving vehicles Launched the “ten cities, one thousand electrical vehicle ”demonstrative project	Ministry of finance ministry of science and technology	Identified 13 cities as the new energy vehicle demonstrative pilot cities	Promote the sustainable development in a large scale and industrialization	Expanded the market from public service area and eased the price disadvantage of new energy vehicle
February 9	100 hybrid buses put into use	Ministry of science and technology, ministry of finance	Each city launched 1,000 new energy vehicle to do the pilot running.	Expanded the market for the new energy vehicle	More people are beginning to know the new energy vehicle
March 9	The restructuring and revitalization plan for the automobile industry	State council	Proposed the implementation of new energy vehicle strategy	Promote the use of energy-saving and new energy vehicles	New energy vehicles were promoted to be used in the public domain and thus accelerated the construction of public charging facilities
May 10	“Notice on the expansion and promotion of the use of energy-saving and new energy vehicle in the public service domain and ”	Ministry of finance, ministry of science, the ministry of industry, development and reform commission	Energy-saving and new energy vehicle expanded to as many as 25 cities	Expand the market of the new energy vehicles	By the end of 2010, the ownerships in 25 pioneer cities reached a total of 10,000
June 1, 2010	“Subsidies to the private purchase of new energy vehicles”	Ministry of finance	Subsidies for infrastructure to private purchasers	Promote the personal purchase of new energy vehicles	By the end of 2010, private purchases of new energy vehicles reached over 1,000

Note. Source: gathered by the author

1.3 The 12th Five-Year Plan Period (2011-Present)

In the 12th five-year plan period, China's automobile production capacity will be able to reach 40 million, and more than 50% of our oil relied on imports, if there is no alternative energy or new energy sources, it would be difficult for the development of China's automobile industry, on the other hand, it is imminent to solve

the environmental pollution caused by automobile exhaustions. In 2011, PM_{2.5} density in many Chinese cities ranked the highest in the world, as a result of vehicle gas emissions. Together with lack of oil supplies, environmental pollution pressures force the government to accelerate the pace of developing new energy vehicles.

According to Liu Xieling’s analytical framework, China’s new energy vehicle technology innovation policies in the 12th five-year plan period represents the following characteristics-as for the supply, owing to the huge investment to support the development of new energy vehicles in the 11th five-year plan period, the government focuses on the independent innovation and development of new energy vehicles and safety management this time with less direct monetary support. As for the demand part, although there are

no explicit government procurement policies, in fact there are a number of government procurements in those demonstrative cities; as for the environment, the blueprint for the new energy vehicle industry has been constantly put forward, giving away a clear direction for the development of the whole industry, and also strengthened safety management, ensuing a good policy basis for the development of new energy vehicles in the long haul. New energy vehicle innovation policies in the 12th five-year plan period (Table 3).

Table 3
Major New Energy Vehicle Innovation Policies in the 12th Five-Year Plan Period

Time	Policies	Release organization	Content	Purpose	Effect
March 11	“The 12 th five-year plan”	NPC	List the new energy vehicle as one of the strategic newly-emerged industries	Promote the application and industrialization of new energy vehicles	Many cities has begun to focus on the development of the new energy vehicles
August 17, 2011	“Notice on strengthening the safety management and demonstratively promotion of the new energy vehicle”	Ministry of science and technology Ministry of development and reform commission	Required the pioneering cities to strengthen the safety management of new energy vehicles	Fully realize the importance of the demonstratively promotion and safety management of new energy vehicles	Accidents of new energy vehicles reduced
September 8, 2011	“Guidance on the industrial globalization of the newly-emerged industries”	Ministry of commerce, development and reform commission Ministry of science and technology	Focusing on the lack of core technology , build the innovation system for the new energy vehicles to increase innovation	Increase the innovation capacities	To be seen
April 18, 2011	Plan for energy-saving and new energy vehicle industry	State council	Focus on the promotion of electrical vehicles and plug-in hybrid vehicle industry	Enhance the overall technological level of China’s automobile industry	To be seen

Note. Source: gathered by the author

2. THE COMPARISON OF THE NEW ENERGY VEHICLE INNOVATION POLICIES WITH OTHER THOSE IN OTHER COUNTRIES

2.1 Sorting and Evaluating of New Energy Vehicle Innovation Policies in China and Other Countries

a) U.S. the first electrical car was born in the United States, which has always been in the leading position in the development of new energy vehicles. The main feature of innovation policies in the United States is: Leaders in successive administrations have attached great importance to the development of new energy vehicles.

In the Clinton administration (1993-2001) period, “next generation automobile partnership program” was developed, encouraging the development of pure electric vehicle. However , due to the deficiencies in technology, the short distance after charging , battery pollution, problem in recycling, there was a slow development in the pure electric vehicles. In the Bush administration(2009) period, policies began to support the development of

fuel cell vehicles, not only developed incentives for the production of fuels, and for the purchasers of new energy vehicles, tax subsidies could be enjoyed. Also, a great amount of funding was put into the research of new energy vehicles. Under the encouragement of government policies, America’s technology and research of fuel cells are at the advanced level in the world.

In the Obama administration (2009-present), Obama’s new energy policy in the policy agenda occupied an important position, after Obama took office, a series of new energy vehicle innovation policies has been adopted to promote the development of new energy vehicle; large amounts of money has been invested to batter research, development and production of core spare parts, the construction of charging infrastructure, purchase subsidies and government procurement. With the support of a range of policies, new energy vehicles in the U.S. have developed with remarkable achievements.

b) Japan. Owing to the oil drain and a huge number of car ownerships, Japan is one of the first countries to start the development of electric vehicles. According to Liu Xieling’s analytical framework, Japan’s new energy vehicle innovation policies presents the following characteristics: as for the supply, first, nearly 500 yen were invested for the development and construction of new

energy vehicles, second is to build infrastructure, according to a 1993 plan, 2,000 alternative fuel supply stations were to be built, including 1,000 pure electric vehicle fast charging stations, the number of which could reach 5,000 from 2010 to 2020. Besides, 2,000,000 home-use charging equipment would be completed. Third is to provide technological support; as for the demand, the Japanese government launched priority procurement of low-pollution cars; as for the environment, “special measures law on the promotion of new energy utilization” and “energy strategy 2030” were issued, a variety of tax incentives for the development of new energy vehicles were introduced to provide a good environment for its development.

c) E.U. Europe is the origin of new energy source, also in the leading position in the development of the low carbon economy. For the development of new energy vehicles, the European Commission and European countries have developed a number of policies and measures to promote its development and consumption, but due to the different economic and social level, the degree of support to support new energy vehicles varied.

According to the research on innovation policies in EU countries, new energy vehicle innovation policies has the following features: a) in Britain, apart from the subsidies, loans rather than direct fund were provided, modification of ownership tax, taxation according to the amount of carbon dioxide emissions per unit distance are all to encourage the development of new energy vehicles; b) in France, supports include not only direct investment, subsidies, loans but also cash “reward or punishment” according to newly bought car’s emission. c) in Germany, great importance is attached to the development of new energy vehicle technology, the lithium battery technology is listed in the “high-tech strategy”, large amounts of money were invested to researches concerned, and also, strategically, “National electric vehicle development plan” was issued to promote the development of new energy vehicles; d) in Sweden and Netherlands, subsidies and reduced tax were adopted to support the development of new energy vehicles.

2.2 The Comparison of New Energy Vehicle Innovation Policies

2.2.1 Three Similarities in the Innovation Policies in China and Other Countries

a) invested a lot on R&D and consumption areas, b) put new energy vehicles on the government procurement list, c) increased investment in infrastructure.

According to the national “automobile and new energy vehicle industry development plan” (2011-2020), only the central government would invest 10 million Yuan in R&D and consumption area to support the development of new energy vehicle. In Japan, more than 200 billion yen has been invested for the R&D of fuel cells. The U.S., Germany etc. also invested heavily in support of new energy vehicles.

For the government procurement, China purchased a

large number of new energy vehicles during the Olympic Games and the Shanghai World Expo. The United States set up a special fund for new energy vehicles, and Japan, EU has launched the plan to purchase new energy vehicles using public funds.

As for the infrastructure, China has provided subsidies for the charging stations from 2009, Germany, the United States and Britain have taken similar measures.

2.2.2 Three Differences in Innovation Policies

Tree aspects: a) different paths to develop new energy vehicles. Path of development means different routes to support new energy vehicle technology, and new energy vehicles include hybrid, pure electric vehicle, fuel cell vehicle, hydrogen engine vehicle and gas burning vehicle and glycol ethers. China mainly develops electric vehicles while other countries have focus. b) different way to guide consumers. There are different ways to guide consumers, like financial subsidies, tax incentives and punish-reward policy. China focused on consumer guidance while other countries varied. c) different thinking paths. Supports to new energy vehicles include supports to the production, the infrastructure and the key spare parts. China focused on the production of the whole vehicle, while other countries worked on core technologies.

CONCLUSION

New energy vehicle is the trend for the automobile industry, while the direct impetus of it comes from the country’s supporting policies. through sorting and evaluating innovation policies for new energy vehicles at home and abroad, we can find there are three similarities and three differences. Three similarities mean substantial investment in R&D and consumption; procurements of new energy vehicles; emphasis on the investment in the infrastructure. Three differences refer to: different path of development; different way of consumers guide; different policies to support the idea.

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