THE GLOBAL VALUE CHAIN AND CHINA AUTOMOTIVE INDUSTRY UPGRADING STRATEGY[1]

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Abstract: The automotive industry is often thought of as one of the most global of all industries. In the globalization era, cost competitiveness alone will not be sufficient to guarantee further success. The China's Local Industrial Clusters（LICs）faced a serious challenge between the top-down (global) and bottom-up (local) governance pressures. This paper uses the Global Value Chain(GVC) framework analysis to explain China Automotive Industry industry's development stage, position of the GVC, demonstrate that the relationships with these global actors and upgrading opportunities of China Automotive Industry.
Key words: Global Value Chain, Automotive Industry, Upgrading Strategy

The large number of supply bases formed in China in recent years has contributed significantly to the nation's manufacturing competitiveness. This production structure, which is built on the Local Industrial Clusters (LICs) concept--- a group of firms in the same or closely related industries are in close geographic proximity to each other, have became the home base for Chinese export activities. Many LICs entered the Global Value Chain (GVC) according to their different technology capabilities and competitiveness, but also are under increasing pressure to improve the position of GVC. This paper is intended to raise and answer the emerging question as to how the labor-intensive and low value-added manufacturing LICs could "grow up" and "graduate" to more technology-intensive and high value-added business through the challenging process of industrial upgrading and innovation. This paper will focus only on products that are made by Chinese LICs for consumption in other countries.

1. INTRODUCTION: AUTO INDUSTRY GVC

The auto industry is often thought of as one of the most global of all industries. Its products have spread around the world, but the industry is dominated by large manufacturing firms such as General Motors. 2005, world auto products export accounted for $914 billion, occupied by 9 percent of world

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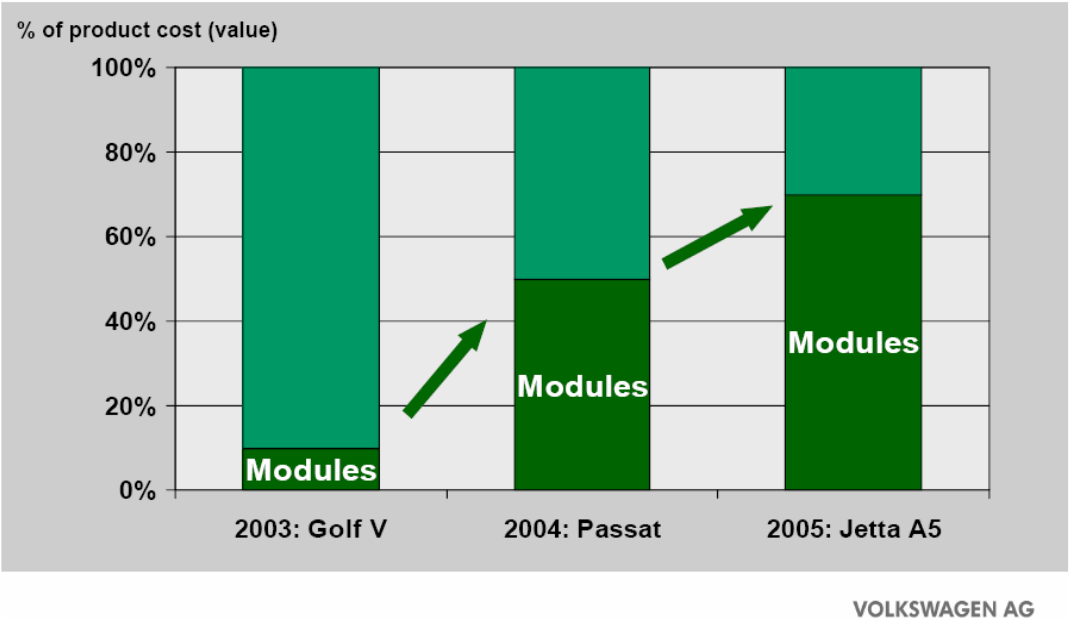
merchandise trade[5]. In the view of GVC, the auto industry's characteristic is complicated.

First, in assembly sector, this is typical hierarchy model; the governance of auto industry is characterized by vertical integration. The spread of vehicle production in developing countries increased markedly since 1990s, but the geographical spread of vehicle output and sales in developing countries has not been accompanied by a spread of ownership in the auto assembly. Top 15 auto's output accounted for 87.3 percent of world production in 2005[6]. In fact, the figures underestimate the degree of concentration. A number of leading companies have significant shareholding in smaller vehicle producers. For example, GM, has a 49 percent stake in Isuzu and a holding in Fiat, Wulin (China Guangxi).

This has arisen as a result of two tendencies: 1) the adoption of strategies of follow design (using as far as possible the same design in multiple locations) and follow sourcing (using as far as possible the same suppliers in a multiplicity of locations) as a means of reducing the costs of producing vehicles in many different countries and increasing the speed of introduction of new vehicles. 2) the increasing role given to "tier-0.5" and first-tier suppliers in the design and supply of components, modules and systems. Leading global auto assemblers increasingly look for global first-tier suppliers which can provide components in multiple locations around the world. The rapid internationalization and consolidation of the auto components sector has been widely discussed (Sadler, 1999; Sturgeon and Florida,1999).

Chart 1 Increasing modularization within the product range



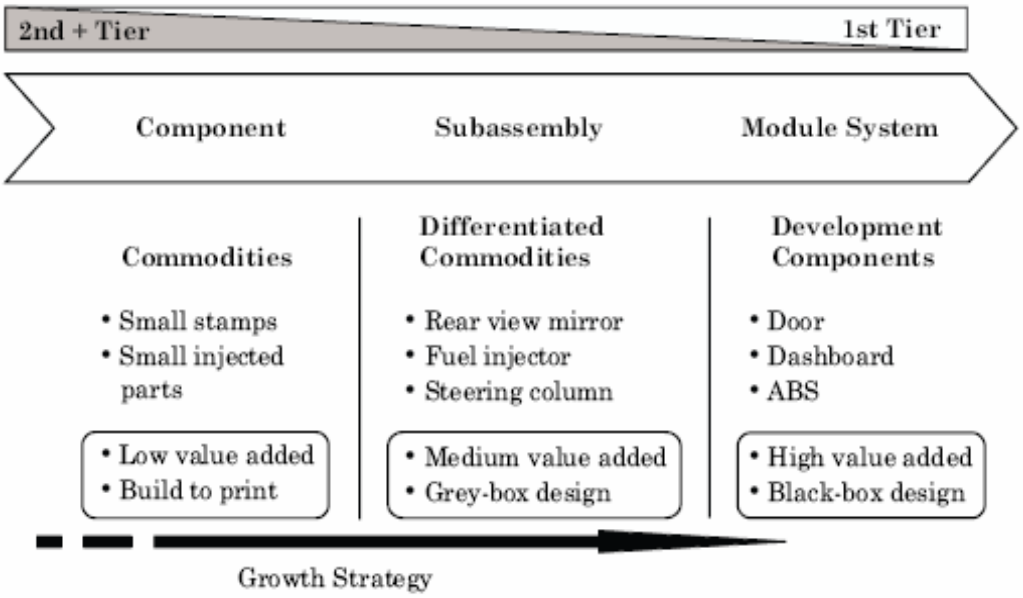
Second, in modular system, this is typical modular value chain. In global auto industry has been characterized by increased outsourcing by assemblers to "tier-0.5" and first-tier suppliers, which have been taken responsibility for designing and supplying modules and systems for vehicles (Humphrey and Salerno, 2000). E.g. Volkswagen AG, 70 percent of Jetta auto's product cost is modular product, but 10 percent of Golf V at 2003. New materials are changing production methods and modular assembly is more feasible. Vehicle electronics, fuel cells and telematics take on new important, the kinds of products

[5] www.wto.org
[6] www.oica.net/statsitic

are feasible for modular production. Suppliers should rely on independent technological innovation and cost-effective modularization.

Third, in component sector, there are too many second and third-tier suppliers, its contemporary have market, captive value chain and relational value chain' characteristic. Part of reason is lots of LICs are emerging in the developing counties, its establishing relational value chain in the local areas. Another reason is internet emerging, it makes global uniform purchase possible, leading firms purchase components through internet. OEMs and suppliers must do business and operate production where the markets dictate—with costly capital requirements. Of course, in the some component, this is low value add stage.

Chart 2 Supply position in the value chain



Source: Veloso et al. (2000).

In top 15 automakers, the manufacture services are big resource of profit. The National Automobile Dealers Association's (NADA) industry-analysis division estimates that 48% of automobile dealer profit in 2004 came from the service-and-parts department, compared with 31% from new-car sales. In addition, a 2004 Accenture study of one of the largest automakers revealed that sales of $9 billion in parts and services contributed $2 billion in profits. While by comparison, car sales of $150 billion produced profits of just $1 billion for the automaker. In fact, some industry experts indicate that spare part sales represents less than 5% of total revenues but more than 30% of profits[7].

2. CHINA AUTOMOTIVE INDUSTRY AND LICS

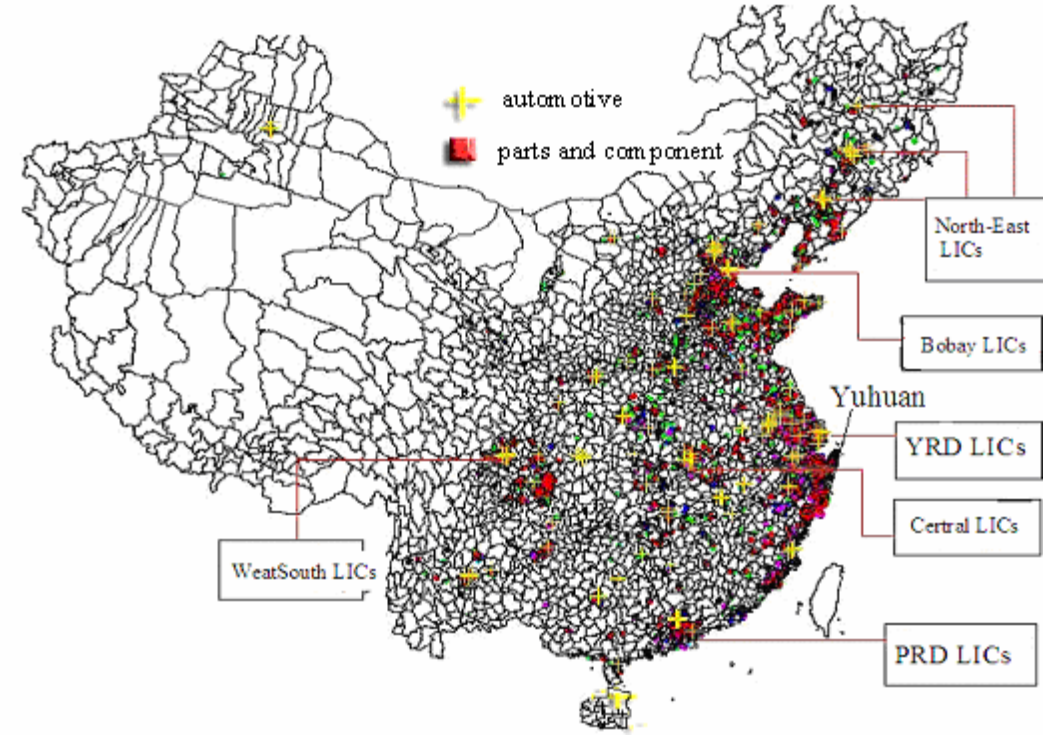
Out of the expectations of many economic institutions which forecasted that China's entry to WTO would seriously damage the growth of China's auto industry, its production volume has literally doubled during the two years after the agreement for China's WTO membership was made in late 2001. China has become the fourth largest automobile producing nation in the world, only next to the United States,

[7] provide by John Snow, vice president, marketing and business development, Enigma, Feb 9,2006

Japan and Germany in 2005. Although the final outcome of the tariff reduction is yet to be seen, we can fairly conclude that China's automobile industry as a whole has proven that at least with the present level of tariffs it can bear the competition with imported automobiles.

In 2005, China's vehicle sale was about 5.7 million. In 2005, China exported $9957 millions automotive products, but vs. only $1587 million in 2000. In the past 5 years, China export growth quickly, One of the reasons of the rapid progress of its competitiveness is the growth of LICs which supply components to the auto makers at competitive prices. In terms of geography, there are six geographic clusters of the auto industry in China: Northeast, Bobai-rim, YRD, PRD, Central and Westsouth.

Chart 3 China Auto and Component LICs



When one visits the major auto makers in China, one will soon be aware that component suppliers are clustered around the auto makers. Large state-owned automobile manufacturers such as China First Automobile Works Corporation (FAW) and Dongfeng Motor Corporation (Dongfeng) have a full set of suppliers in the same city. Besides the clusters centered around automobile assembly plants, a cluster of automobile and motorcycle component manufacturers specialized in spare parts has emerged in PRD and YRD. The top three provinces of automobile component production, namely Shanghai, Jiangsu, and Zhejiang, which account for 45 per cent of component production in 2005, are adjacent to each other. Since the latter two provinces do not have large automobile production, the rise of these provinces in component production results in the widening gap between the distributions of automobile and component production.

Table 1 China's passenger car production by region (1000 units)

Ranking	2002		2003		2004		2005	
1	Shanghai	390.5	Shanghai	588.4	Shanghai	549.9	Shanghai	480.9
2	Jilin	226.9	Jilin	350.7	Jilin	336.8	Guangdong	407.4
3	Hubei	97.4	Guangdong	183.3	Guangdong	266.5	Tianjin	325.6
4	Tianjin	92.1	Tianjin	172.5	Tianjin	219.6	Jilin	304.6
5	Chongqing	67.8	Hubei	132.3	Beijing	182.2	Beijing	220.9
6	Guangdong	59.4	Chongqing	120.6	Chongqing	157.3	Hubei	216.1
National Wide	1,099.3		2,068.9		2,261.4		2,958.4	

Source: Compiled from data provided by the National Bureau of Statistics of China.

The paper introduce an auto component LICs—Yuhuan. The "largest auto parts and accessories industrial base in eastern China", turns out a wide variety of products with assorted specifications, suitable for heavy-duty, medium-range, and mini cars, sedans, light trucks, agricultural vehicles, and commercial vehicles. Producing almost every kind of parts and accessories except engines and auto bodies, the sector is capable of labor-intensive and technology-intensive items. The auto and motorcycle parts and accessories sector consists of nearly 2,000 suppliers, with a total workforce of 80,000, including eight firms whose annual production value exceeds 50 million RMB and another eight over 100 million RMB. In 2004, the sector racked up a production value of 11.3 billion RMB. Private enterprise is the backbone of the Yuhuan auto and motorcycle parts and accessories industry, whose operations mainly focus on the domestic OE market and aftermarket abroad, they started export since 2000. Over 90% of the local auto parts and accessories sector cluster in the provincial auto and motorcycle parts and accessories industrial zones inside the 10 square-kilometer area of Zhugang Town. The sector commands a complete supply chain and comprehensive production processes, including material supply, casting and forging, precision processing, thermal treatment, electroplating, assembly, packaging, and shipping. In recent years, Yuhuan has been stepping up investments in and assistance to its auto parts and accessories industry, with the set up of up the first Auto and Motorcycle Technology R&D Company and Taizhou City Auto and Motorcycle Production Quality Inspection and Testing Center, which have helped to speed renovating and upgrading of manufacturing and inspection equipment.

Yuhuan is only one of LICs of China. According to the author data, there are nearly 40 LICs produce auto part and related products (chart 3). Some of them compass with assemblies, some of them specialized certain parts and component.

3. GVC ANALYSIS AND UPGRADING STRATEGY

The global auto industry is composed of a number of different parts, the requirements of these different sections are quite distinct, so GVC analysis will cover the different stage and basic elements of competitiveness.

Assemblers SAIC, FAW, Dongfeng, Beijing AIG, Chana, Guangzhou, Chery, Hafei, Jinbei and Chery are top 10 auto manufacturer in China， the top 10 output accounted for 84 percent of total auto in

forward of ten month of 2006[8], but the output include the foreign leading firm brand products. According to International Organization of Motor Vehicle Manufacture (OICA) statistics, the Dongfeng is biggest carmaker in China. The table 5 shows the outputs are all staked by China companies. In other words, they are real Chinese manufacturers, the manufacture capacities account for 50 percent of total, the others are ownership by global auto firms,(all of them are joint venture), particular in passenger car sector. In fact, the indigenous companies have had some advantage in bus&coaches, heavy trucks, Light-commercial vehicles and specialized auto. E.g, 2005, China became largest bus&coaches manufacturers, Yutong, Xiamen Jinglong and Jianghuai auto have become world class bus manufacturers. In Light-commercial vehicles, top 14 companies output reach 3 million, occupied domestic market 90 percent. Some indigenous manufacturer capacities still don't meet the economies of scale, promoting manufacture achieve economies of scale still is important task for China auto industry.

Global mega-suppliers these firms supply major system to the assemblers. They are sometimes referred to as "Tier 0.5", because they are closer to the assemblers than the first-tier suppliers. These companies need to have global coverage, in order to follow their customers to various locations around the world. In Tier-0.5, Delphi, Visteon, Bosch, Denso, Siemens and so on also are global leading manufacturers, Delphi designs, engineers and manufactures a wide variety of component, integrated systems and modules on a world basis. They need design and innovation capabilities in order to provide "black box" solution for the requirements of their customers, as well as financial resources. Black-box solutions are solutions created by the suppliers using their own technology to meet the performance and interface requirements set by assemblers. The three parts categories with the highest degree of foreign (nonChinese) production were suspension systems, brake calipers and ABS systems in China. In 2003, 100% of the engine managements systems manufactured in China were produced by foreign (nonChinese) firms. China component companies are shortage of design and innovation capabilities, lag in "Tier 0.5" domestic market.

First-tier suppliers The companies involves delivery of production directly to OEM and Tier 0.5 suppliers. First-tier suppliers require design and innovation capabilities, but their global reach may be more limited. E.g. ZF Friedrichshafen, Valeo, Johnson Controls, Lear Corporation, ArvinMeritor, Magna, Eaton are typical first-tier suppliers. Almost all of first-tier suppliers have invested in China, global leading car factories also have supplier clusters located nearby the plant, consisted of global first-tier suppliers. Tianjin has at least 21 Toyota-related suppliers that supply Tianjin Toyota. Guangdong province, which gathers three Japanese carmakers' plants, has hosted at least 40 Japanese-invested suppliers. Shanghai Volkswagen has 201 suppliers, more than half of them are in Shanghai and neighboring provinces, Jiangsu and Zhejiang (Tomoo Marukawa, 2005). Some China State-own companies affiliated full set of parts suppliers, but this is inter-firm manufacturing, so it isn't first-tier supplier. In general, large suppliers increasingly grow in importance through technological innovation and cost-effective modularization, small suppliers become more focused, pursuing niche positions in the market.

Second-tier suppliers these companies deliver components to higher tier companies, usually include specific aspects or module or large component. Some China companies focus on a broad portfolio of products and services to meet all customers' mobility needs. Others trade off low margins for high volume. In 2005, several parts categories were manufactured entirely by Chinese firms, including wheel bolts, wheel rims, steel wheels, rear axle housings, axle shafts, etc. The common characteristic of all these parts is that they are low-end mechanical components. In general, Chinese domestic suppliers are better positioned to supply low-end parts to the Chinese JVs and vehicle manufacturers, and foreign suppliers are better positioned to supply complex modules and sophisticated components.

Third-tier suppliers these firms supply basic products, in most cases, only rudimentary engineering skills are required. At this point in the chain, firms compete predominantly on price. The bargaining power of suppliers is very low in the third-tier suppliers. There are so many parts that are used to produce an automobile, that it takes many suppliers to accomplish this. The United States imported $5.4 billion in parts from China in 2005, which is a 39 percent increase from the previous year and. In fact, China

[8] www.auto-stats.org.cn

component export are mainly third-tier suppliers' products, most of them are original from the LICs in coasted areas. A further important segment of the automotive value chain is the market for replacement parts. In this area, China LICs increasing play a big role.

Independent brand and innovation China has grown into the world's fourth largest auto producer and second largest auto market, but Chinese brands currently account for about one quarter of China's auto sales. In top ten car manufacturers, domestic independent brand output accounted for 17.6 percent in forward ten month of 2006. Chinese auto brands Great Wall, Hafei, Chery, Geely and Foton started export independent brand to global market, but still is some proportion of total. **C**hinese R&D capability is far behind nonChinese competitors. The automotive development process, the process of conceiving, designing, engineering, planning a vehicle from concept to customer, is a highly complex process. The Chinese automakers have not optimized this process to the extent that their foreign joint venture partners have. Chinese vehicle manufacturers generally have a strong mechanical product development capability, but are quite weak in high-end electronics and software. China is still heavily dependent on foreign design and technological know-how. Witness the rise in shareholder value of BMW and Mercedes Benz—or Porsche, whose assembly is now 50 percent outsourced—compared to the decline for commodity or volume-driven manufacturers. The competitive advantage in this focus on branding is not to the product, but to the perception. So improve Chines indigenous companies brand and innovation are basic strategy for China auto industry at least in domestic market.

Table 2 China top 14 carmaker ranking in 2005[9]

In unit	Total	Passenger cars	Light-commercial vehicles	heavy	Bus & coaches
Dongfeng	593,055		403,055	180,000	10,000
Beijing AIG	559,190		559,190		
FAW	539,029	58,817	397,266	75,753	9,193
SAIC-Sangyang	518,353	131,536	378,255		8652
Chana Auto	422,168		422,168		
Harbin Hafei	225,260		225,260		
Chery Auto	185,588	185,588			
Anhui Jianghuai	167,436		155,359		12,077
Zhejing Geely	149,532		149,532		
Changhe Aircraft	115,652		115,652		
Nanjing Auto	111,,397	111,397			
Jinbei Auto	109,505		109,505		
Great Wall Motor	67,657	67,657			
Soueast Auto	58,649		58,649		

[9] www.oica.net/statsitic

Chart 4 The relationship between the auto and component company[10]

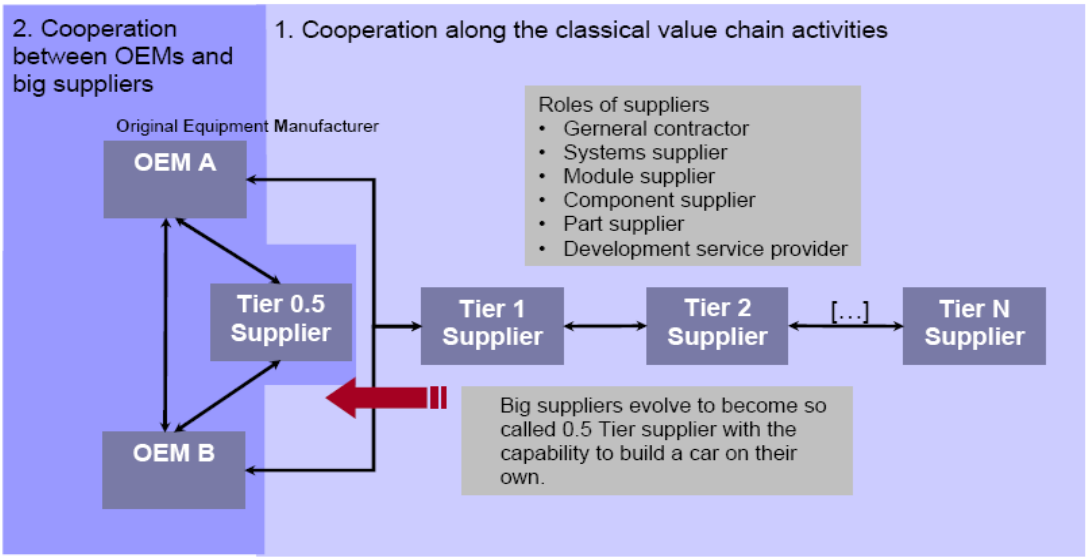


Table 3 Regional Distribution of the Suppliers of Carmakers[11]
(Number of suppliers)

SVW		SGM		DCAC		FAW-VW	
Shanghai	89	Shanghai	57	Hubei	48	Shanghai	41
Jiangsu	25	Jiangsu	14	Shanghai	26	Jilin	34
Zhejiang	15	Zhejiang	12	Jiangsu	10		16
Guizhou	12	Other	12	Zhejiang	8	Zhejiang	15
Hubei	10					Hubei	10
Jilin	7					Hebei	10
Other	43						

4. CONCLUSIONS

Since China's accession to the WTO, the Chinese government has placed a growing emphasis on developing world-class auto and auto-parts industries. China auto industry develop status shows liberalize access to domestic market could create greater possibilities of integration into global value chain. China created sustainable national or regional production system within the context of a more

[10] The global automotive industry value chain, www.unido.org
[11] Tomoo Marukawa, www.moeasmea.gov.tw/Eng/APEC/soic/paper_ToomoMarukawa.doc, 2005

liberalized global auto industry. In top 48 global carmakers in 2005, 14 carmakers from China and China has become No.8 automotive products exporter[12]. The latest Five-Year plan—the eleventh—adopted in 2006, identifies new auto upgrade strategy: enhance the auto industry's ability for independent innovation; accelerate the development of auto engines; auto electronics; and key assemblies and parts that possess independent intellectual property. Give play to the role of mainstay enterprise in increasing the market share of proprietary passenger cars, guide enterprise to merge and reorganize during the course of competition so as to form enterprise capable of producing 1 million automobiles each year.

Export-led is mainly strategy for China auto industry. Ministry of Commerce and Notional Development and Reform Commit ion denominated 8 export supply base and 118 export companies, promote auto products export. Capacity has already outstripped domestic demand by 10 percent to 20 percent and China has begun exporting domestically manufactured vehicles to EU and Australia. China ranks just behind Japan and Germany in the value of auto parts shipped to the U.S. At LICs and firms level, might prosper within the global auto parts industry: 1) Enlarge second-tier component export with cost advantage. Customization of the vehicle presents one such opportunity for OEMs. E.g.Zhejing Wanxiang Group's universal joint kits account for 70% market share. 2) Developing first-tire suppliers. SORL Auto Parts, will list in NSADQ in 2006, China's leading manufacturer and distributor of automotive air brake valves, air brake valves ranks first in market share in the segment for commercial vehicles weighing more than three tons, such as trucks and buses. 3) Allied with transnational companies and supplying specialized products for global markets, in fact, top 100 auto parts in China, FDI occupied 52 seats. Continue encourage FFCs cooperated with LICs firms. 4) Promote automotive electronic component and IC developing.

REFERENCES

Porter, M. E.. *Cluster Innovation: Regional Foundations of U.S.* Competitiveness. Council of Competitiveness, Washington, D.C., 2001

Gereffi, Gary John Humphrey, Timothy Sturgeon. The governance of global value chains. *Review of International Political Economy*, 12:1 February 2005:78-104

Gereffi, Gary Olga Memedovic, the Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries? UNIDO, Vienna, 2003.

Gereffi, Gary Development models and industrial upgrading in China and Mexico: the role of international trade and foreign direct investment, presented at the workshop on "Foreign Direct Investment and Economic Development in Comparative Perspective," DUKE University, April 8-9, 2006.

[12] www.oica.net/statsitic