China’s international specialization status of advanced technology industry: A case study of zhejiang pinghu optical-mechatronics industry cluster

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Introduction

- In 2007 the total volume and value of China's advanced-technology products(ATP) export ranked the second of the world. How could that happen? Figure 1
- What's the real situation about Chain's advanced-technology industry? How does it embed-in the international value and production?
- What is the position of China's advanced-technology enterprises and their groups in the international specialization?
- What can we learn from the development of advanced-technology industry of China?
- We tried to analyze and answer the above questions using Pinghu as a case.

Overview of Pinghu optical-mechatronics industry cluster

- Location:surrounded by Shanghai, Hangzhou, Suzhou and Ningbo, with all four cities in distance about 100 kilometres. Figure 2
- The optical-mechatronics industry dates back to the cooperation between Shibaura Co., Ltd and Pinghu's firms in 1993.
- In 2007, the gross output of Pinghu's optical-mechatronics reached 12.457 billion RMB, with about 120 ATP related firms. Table 1
- The optical-mechatronics industry cluster is centred in Danghu town(Pinghu's economic and technology development zone), including three nearby towns. Figure 3

Overview of Pinghu optical-mechatronics industry cluster

- Main enterprises and Organization Structure of Pinghu cluster
  - Nidec Copal (Zhejiang) Co. Ltd; NTN-Nidec (Zhejiang) Co. Ltd; Nidec Mechanism (Zhejiang) Co. Ltd and Nidec Copal (Zhejiang) Co. Ltd. Figure 4
- The main products of Pinghu firms
  - Include digital camera shutter, cellphone camera, motors, flash disk, MP3, fiber optical transceiver, optical fiber branching device, sophisticated hydrodynamic bearing, micromachine, pricision mold, optical fibre cannula, digital photo printer, overhead projector, measuring instrument, electronic part sensor, etc.

Research design

- Collect information publicized by the government, such as administrative divisions and geographic location of Pinghu, economic and social statistics; Preliminarily interview local officials, members of industry associations and entrepreneurs to design and improve questionaires.
- Huang and Yang (2009), through cross-country comparison of *Total Domestic Value Added*(TDVA) and *Labour Productivity*(LB) , explore a country's advanced-technology industries' position in the international world, We follow similar lines.
- From June to July, 2009, interviewed 108 firms in Danghu town, and 20 in towns of Zhongdai, Huanggu and Lindai, receiving 120 effective questionaires. Table 2

The driving force of optical-mechatronics industry cluster's formation and growth in Pinghu

- Difference between forming and sustaining force of industry cluster. Table 3
  - Existing researches (Zeng, 2006 ;Saxenian ,1996; Wang & Cai ,2009) usually equate the force for forming the cluster with the sustaining force that pushes its development.
  - Our study shows Pinghu does not follow this pattern.
- Primary driving force
  - The vigorous support of the government attracted some leading enterprises to transfer their production to Pinghu.
  - Specialized service of the government prompted the growth of optical-machatronics industry cluster.

The driving force of optical-mechatronics industry cluster's formation and growth in Pinghu

- Sustaining driving force
  - The establishment of public technology platform promotes self-innovation and the upgrading of local firms of Pinghu. (In August, 2003, the Optical-Mechatronics Advanced-technology Industry Promotion Centre and the Advanced-technology Business Service Centre was set up).
  - Founded a service platform for public scientific innovation(In July, 2003, Pinghu formed alliance with Tsinghua University, setting up Pinghu Institution of Zhejiang-Tsinghua Yangtze River Delta Research Centre).
  - Pinghu avoids to be an enclave of foreign investment, which means even without foreign capital, local companies can develop by themselves.

The status of Pinghu optical-mechatronics industry cluster in international specialization

- Zhang Hui (2006), studied the Pinghu optical-mechatronics industry cluster using the case of motor's production processes (Figure 5) and its global industrial and value chains, he found that Pinghu optical-mechatronics industries are in the assembly of low value-added sectors in the global value chain hierarchy. Figure 6
- Our analysis of the survey data finds that foreign enterprises just regard Pinghu as a manufacturing base, doing very little R&D, designing and other high-value-added activities. Figure 7-10

The status of Pinghu optical-mechatronics industry cluster in international specialization

- All enterprises in Pinghu optical-mechatronics industry cluster are doing much more processing than design and innovation, they are in low value-added production processes in the international specialization. Figure 11
- Preliminary assessment: Pinghu optical-mechatronics industry cluster does not have a great advantage in international trade, and get relatively limited profit from international trade.

International Comparison

- Comparison shows that optical-mechatronics enterprises in Pinghu cluster perform better than the national average, but compared to other developed countries, the average ***Unit Product Prices*** and ***Value-added Ratio*** are in the low side, and ***Imported Intermediate Inputs Ratio*** is higher. Figure 12
- So we can conclude that Pinghu enjoys a relatively leading position in advanced-technology industry of china , but has got little profit in the international trade and lies at the assembly stage in the international production chain.

Lessons from this case

- The adjustment of layout of the downstream industry is the condition for the formation of industry clusters.
- Geographic and cost advantages are the basis of industrial agglomeration.
- "Seed" enterprises drive the transfer of upstream enterprises and the emergence of local supporting businesses.
- Effective government support and service system provide a strong guarantee for the development of industry clusters.
- Typical model of exogenous advanced-technology industry cluster of China.

Figure 1 Export volume of advanced-technology manufactures, by region/ country: 1985–2005

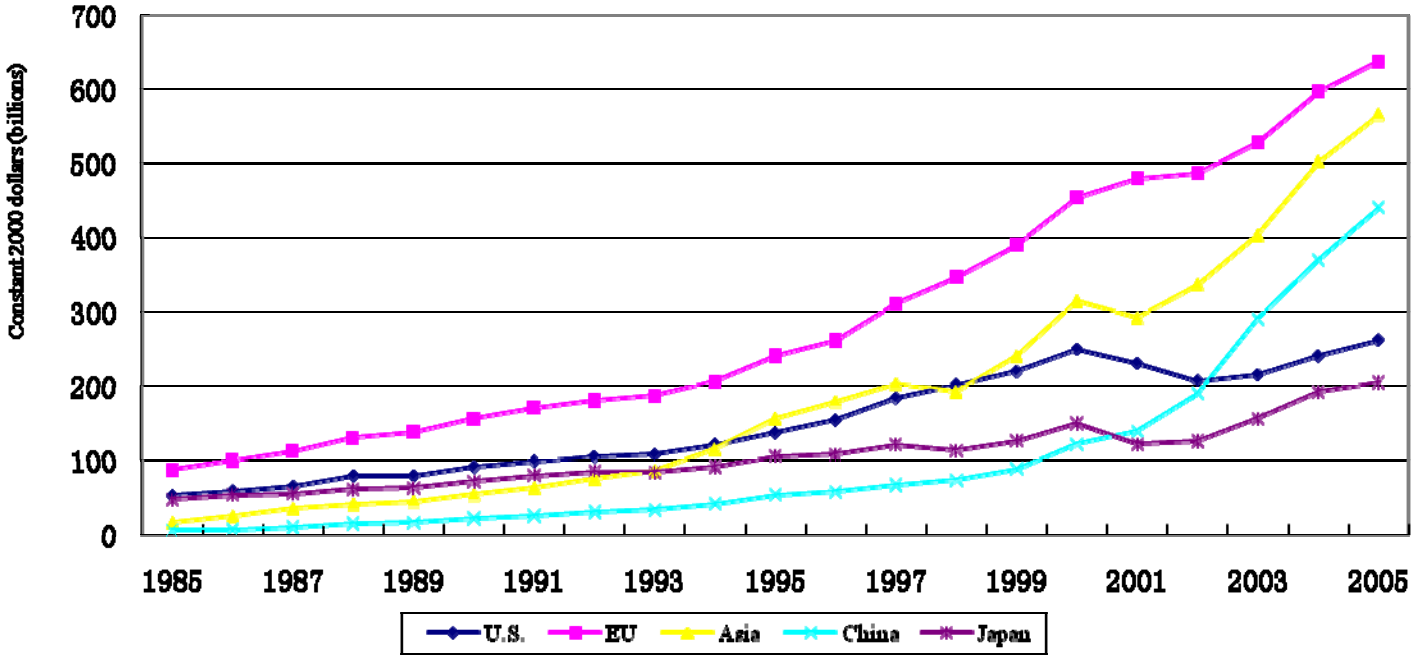

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Figure 2 Location of Pinghu optical-mechatronics industry cluster

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Table 1 Total Output of Optical-Mechatronics Industry in Pinghu, 2002-2007

Year	Number of Enterprises	Total Output (billion yuan)	Proportion of the Entire Industry (%)	Growth Rate (%)
2002	22	21.1	13.8	45
2003	65	40.2	17.9	85.2
2004	71	65.9	24.4	64
2005	91	78.6	19	21
2006	102	101.5	27.4	22.68
2007	**120**	**124.57**	22.72	21.9

- Source: http://www.zjgjd. com /index.asp.

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Figure 3 The distribution of Optical-Mechatronics Industry in Pinghu

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Figure 4 Organization Structure of Pinghu's Optical-mechatronics Industry Cluster

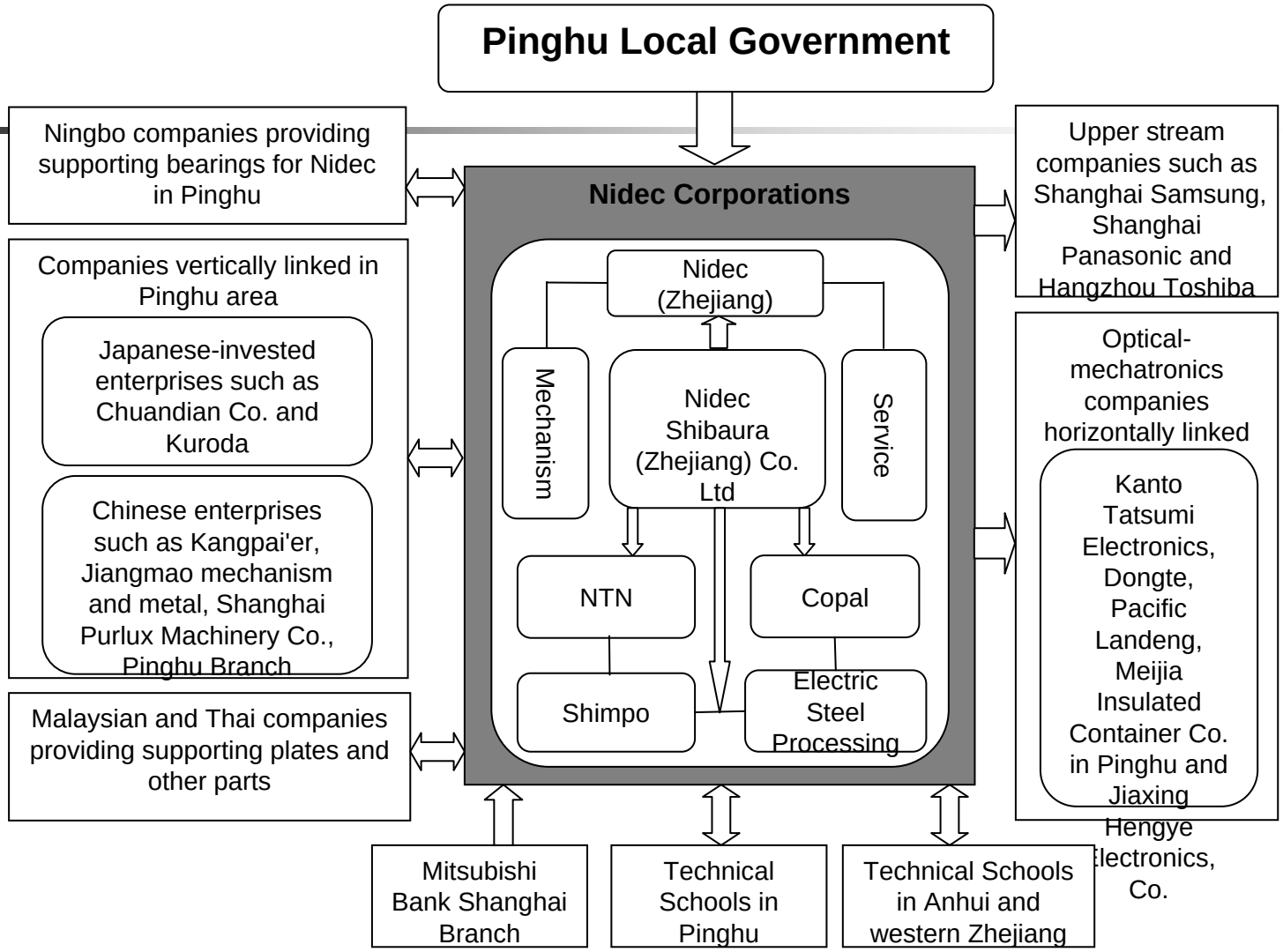

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Table 2 Basic Statistic Information of Investigated Companies

Type of the Company	Industry	Registered Capital	Annual Output Value	Staff Number
Wholly Foreign-owned 38 (31.6%)	Electronic Information 19 (15.8%)	Over 10 million 44 (36.7%)	Over 100 million 26 (21.7%)	Over 3000 37 (30.8%)
Private 56 (46.7%)	**Optical-Mechatronics 88 (73.3%)**	**5 to 10 million 50 (41.7%)**	**50 to 100 million 47 (39.2)**	**1000 to 3000 44 (36.7%)**
Joint-venture 22 18.3%		1 to 5 million 8 (9.6%)	10 to 50 million 33 (27.5%)	500-1000 12 (10%)
Others 4 (3.4%)	Others 13 (10.9%)	Below 1 million 18 (15%)	Below 10 million 14 (11.7%)	Below 500 27 (22.5%)

- **Note:** In the brackets are ratios compared to overall samples. This table does not reveal the whole information of our questionaires. Although our questionnaire included the questions from 2005 to 2008, answers are only given for 2008.

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Table 3 Primary Reasons for Investment in Pinghu, in Separate Times

Reason for Investment / Year of Foundation	Government Support and Service	Preferential Policy	Good Geographic Location	Following Up- and Downstream Companies	Market Potential	Available Supporting Industries
1999-2001(20)	**9 (45%)**	**5 (25%)**	3 (15%)	2 (10%)	0 (0%)	1 (5%)
2001-2004(51)	**16 (31.37%)**	**7 (13.73%)**	5 (9.80%)	5 (9.80%)	8 (15.69%)	10 (19.61%)
2004-2007(49)	10 (20.41%)	7 (14.29%)	7 (14.29%)	6 (12.24%)	**8 (16.33%)**	**11 (22.45%)**
2007-2008(13)	2 (15.38%)	2 (15.38%)	1 (7.69%)	2 (15.38%)	**4 (30.77%)**	**7 (53.85%)**

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Figure 5 Production Process of Motors and Parts

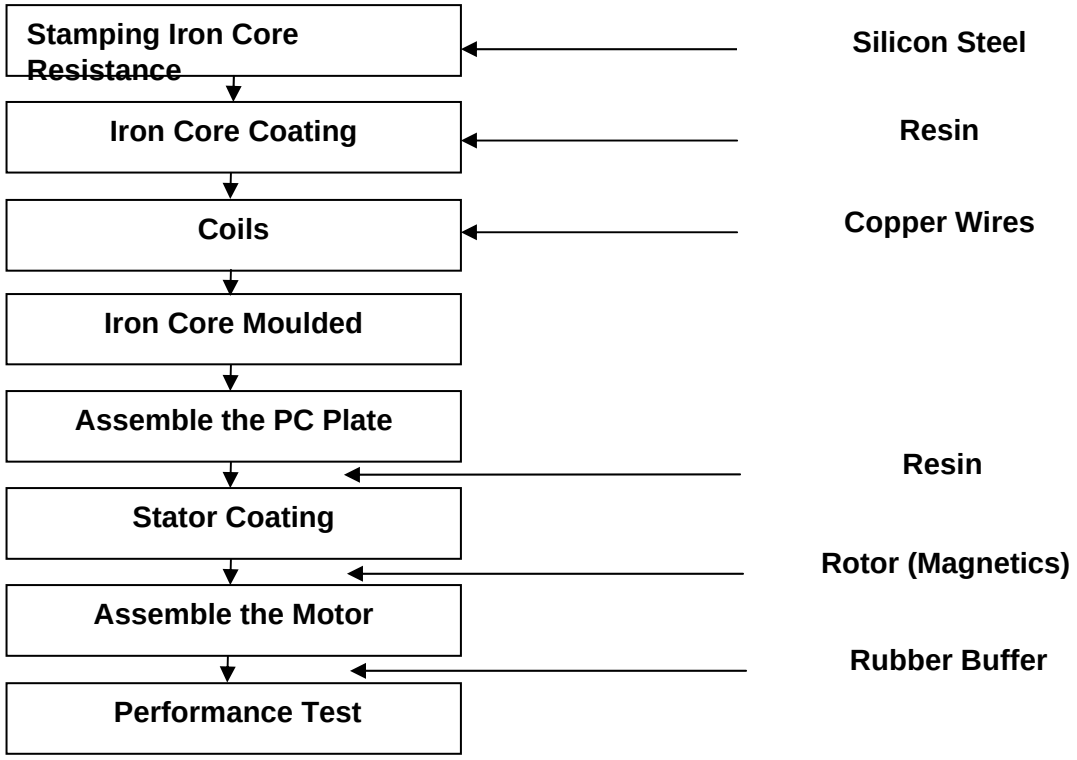

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Figure 6 Global Value Chain of Motor Production

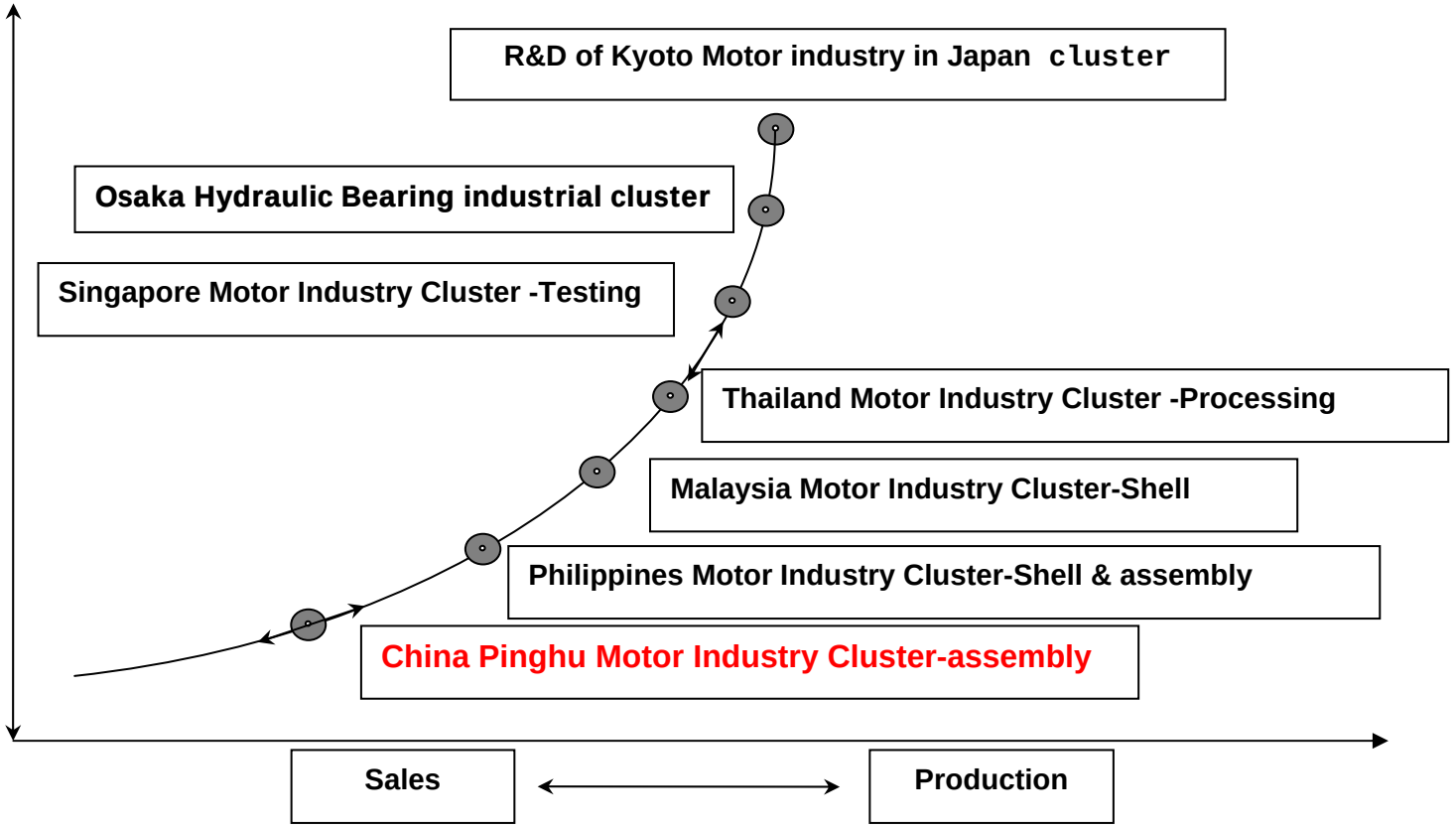

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Figure 7 Production Performance of Investigated Enterprises in 2008

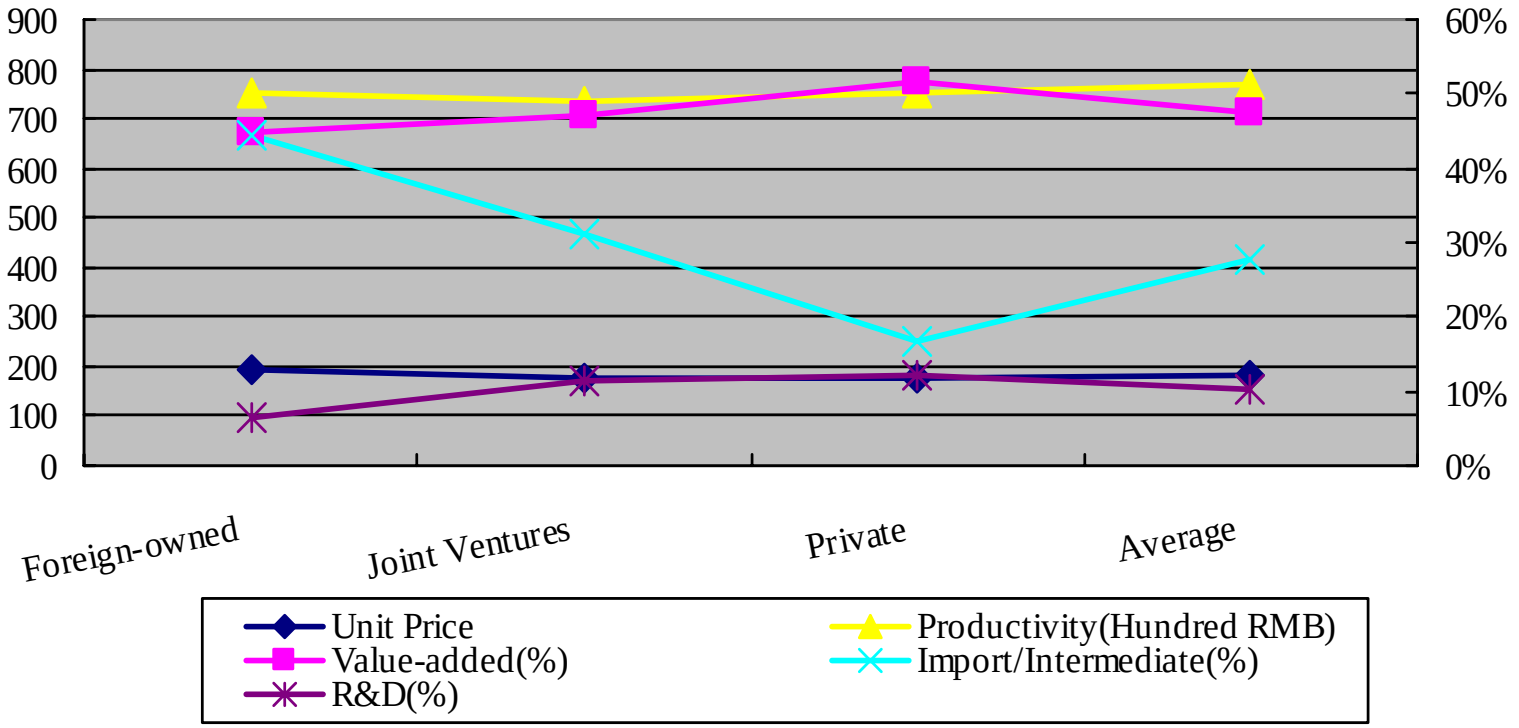

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Figure 8 Source of Production Equipment

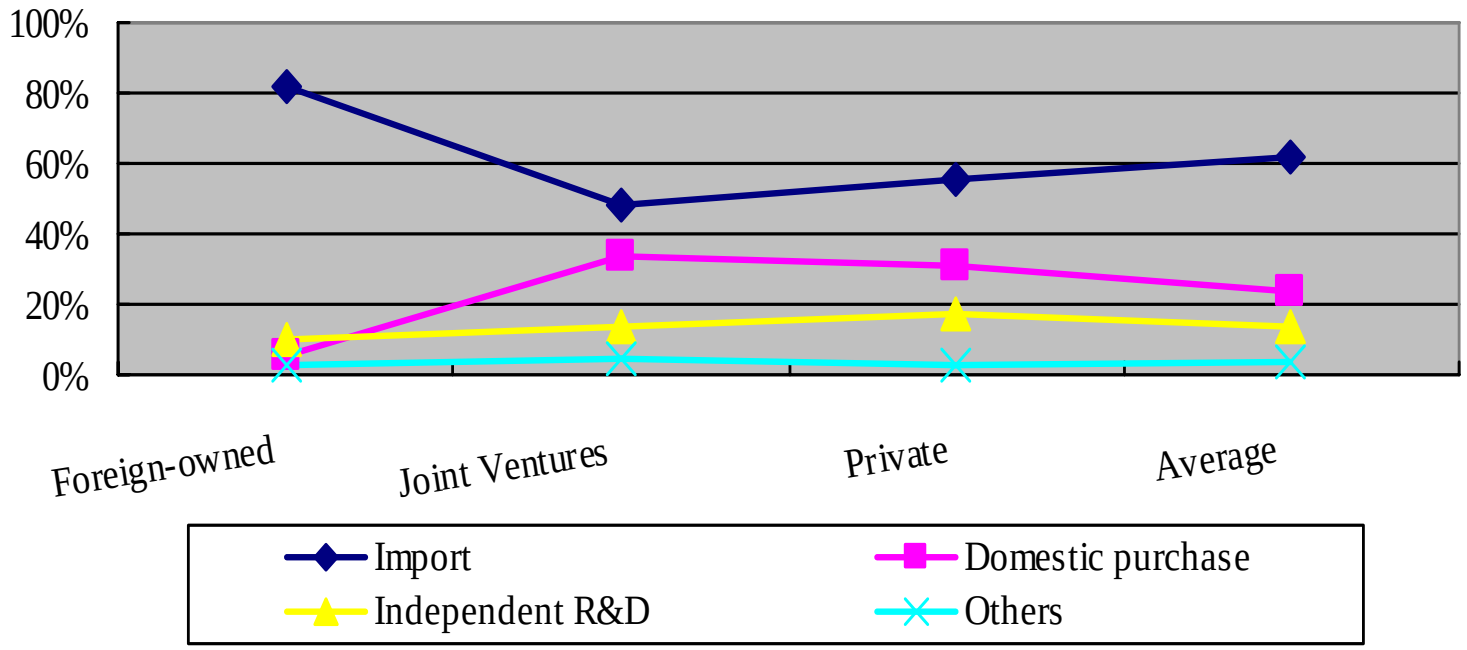

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Figure 9 Source of Products Design and R&D

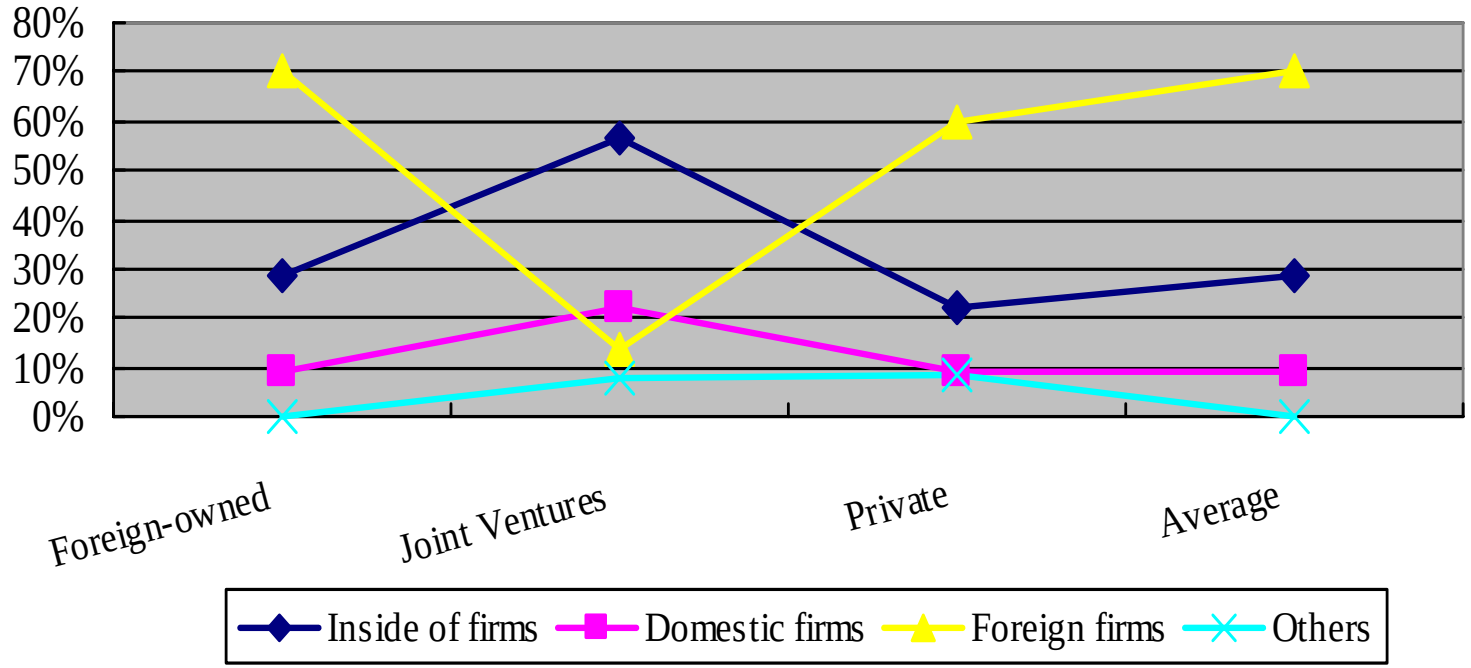

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Figure 10 Main Channels of Product Sales

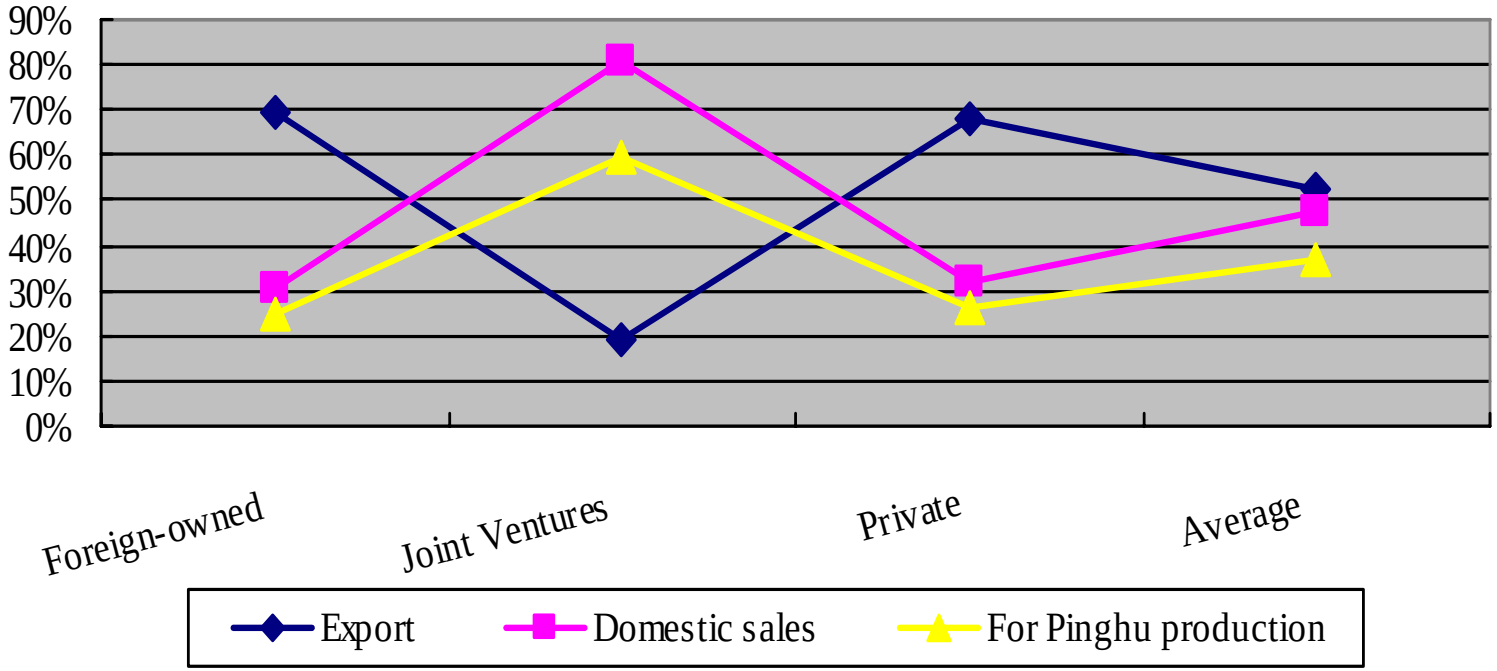

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Figure 11 Main processes of production

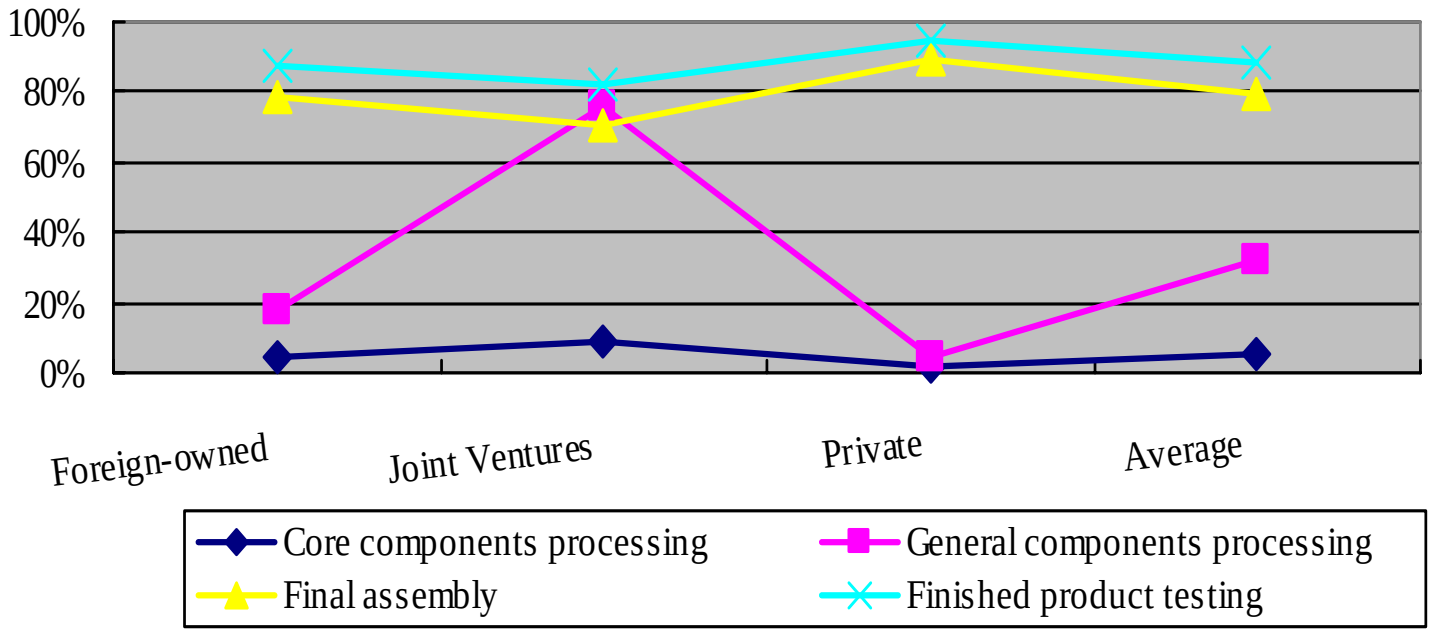

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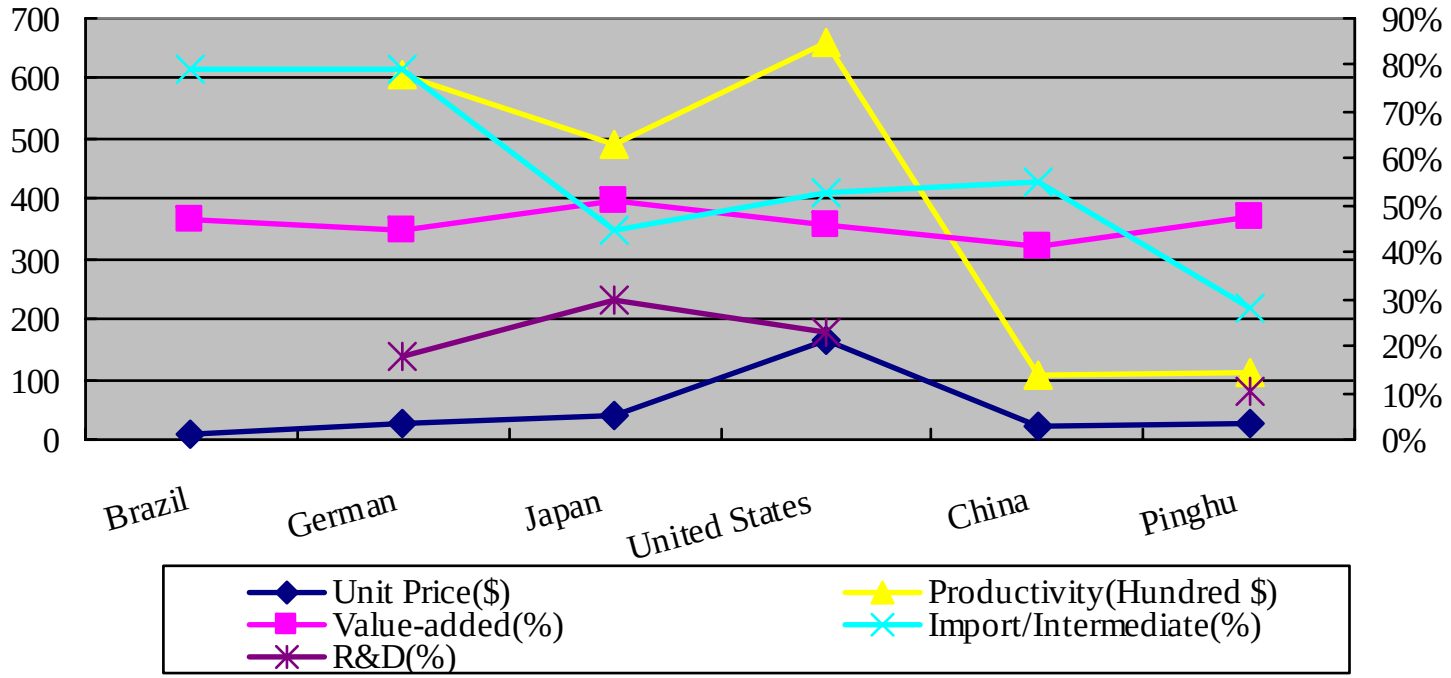
Figure 12 International Comparison



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