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**NOTE: The following paper from the Shanghai Institute of Foreign Trade is included in PCIC's publications list at the request of the authors. It addresses research related to inter-country trade in the personal computing industry. It is complementary to PCIC studies of notebook computers, MP3 players (iPod), smart phones (iPhone), tablet computers (iPad) and other computing products.**

## Trade Modes and Benefits of Notebook Computer Processing Trade in Mainland China

(Abstract)

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The notebook computer (NB), one of main products in PC industry, has accounted for a large share of total export value in Mainland China since 2003. This report shows the NB trade modes and benefits in mainland China, and ideas of upgrading of NB processing trade in mainland China.

The research objects of this report include notebook computer (HS code: 84713000) and its related 260 kinds of components.

## 1. Motivation and Research Process

See details in the Chinese version report.

## 2. Trade Value of Notebook Computer and Related Components in Mainland China

### 2.1 Trade Value of Notebook Computer

The export value of the notebook computer has enjoyed a large increase since 2003 and reached 66.65 billion US dollars in 2009. Meanwhile, the trade surplus of the notebook computer in China rose to 66.35 billion US dollars and accounted for 33.48% of total goods trade surplus in 2009. (Table 1)

**Table 1: The Trade Value of Notebook Computer in Mainland China (2000-2009)**

Year	NB Export Value(1)	NB Import Value(2)	Value of NB Trade Surplus(3)	Billion USD, %	
				Value of Total Trade Surplus(4)	(3)/(4) %
2000	0.207	0.181	0.026	24.145	0.11
2001	0.688	0.158	0.53	22.841	2.32
2002	2.202	0.268	1.935	30.339	6.38
2003	11.314	0.524	10.791	25.377	42.52
2004	20.774	0.736	20.038	32.836	61.02
2005	29.902	0.654	29.248	102.105	28.65
2006	38.522	0.597	37.925	177.53	21.36
2007	53.091	0.493	52.598	261.894	20.08
2008	65.589	0.396	65.193	297.401	21.92
2009	66.651	0.306	66.345	198.155	33.48

Source: Database of World Trade Atlas

Whatever trade in goods or services, China achieved great trade surplus of current account with US and EU27. China's total trade surplus to US and EU sharply increased in 2009 compared with that in 2003. Meanwhile, China's trade surplus of notebook computer rose from 3.24 billion US dollars in 2003 to 21.74 US dollars in 2009, and its share of total surplus increased from 5.53% to

15.15%. (Table 2)

**Table2: Trade Value and Surplus of Notebook Computer of Mainland China and Major Trade Partners**

		Billion USD, %							
Trade Partner	Year	China's Goods Export Value	China's Goods Import Value	China's NB Export Value	China's NB Import Value	China's Total Trade Surplus in Goods	China's NB Trade Surplus	NB Surplus/Trade Surplus	Trade Total %
US	2003	92.51	33.88	3.25	0.00	58.63	3.24	5.53	
	2009	220.80	77.46	21.74	0.00	143.34	21.74	15.16	
EU27	2003	79.04	55.06	3.38	0.00	23.98	3.38	14.11	
	2009	236.28	127.86	22.29	0.00	108.42	22.29	20.55	
Japan	2003	59.45	74.20	1.53	0.13	-14.75	1.41	NA	
	2009	97.21	130.75	3.19	0.17	-33.54	3.02	NA	
Korea	2003	20.11	43.16	0.06	0.12	-23.06	-0.05	NA	
	2009	53.63	102.13	2.87	0.00	-48.50	2.87	NA	
China	2003	9.01	49.36	0.12	0.17	-40.35	-0.05	NA	
Taipei	2009	20.47	85.71	0.92	0.01	-65.24	0.91	NA	

Source: Database of World Trade Atlas; China Customs; *China Customs Statistics Yearbook (2009)*

## 2.2 Trade Value of NB Related Components

It is necessary to mention that some of NB related parts are universal that may be used to produce others besides NB. The statistics below neglects this possibility.

China has large amount of trade surplus of NB related components with US and EU27, but it's not the case for other major trade partners. China's trade surplus of NB related components with US and EU27 rose up respectively to 11.2 billion US dollars and 10.4 billion US dollars in 2009. However, China's total trade deficit of NB related components with Japan, Korea and China Taipei are as large as 40.9 billion US dollars. (Table 3)

**Table 3: Trade Value and Surplus of NB related components of Mainland China and Major Trade Partners**

		Billion USD, %					
Trade Partner	China's Export of NB Related Components	China's Import of NB Related Components	China's Surplus of NB Related Components	trade (Deficit) of NB Related Components	China's Surplus with Partners	Trade (Deficit) Trade	China's Trade Surplus (Deficit) of NB Related Components/ Total Trade Surplus(Deficit) with Trade Partners %
US	21.52	10.33	11.19		143.27	7.81	

EU27	22.53	12.12	10.42	108.42	9.61
Japan	9.09	30.42	-21.33	-33.54	—
Korea	7.86	44.22	-36.36	-48.50	—
China, Taipei	6.49	47.38	-40.89	-65.24	—

Note: Trade data of 78 kinds of NB related components are added up in table 3. The details of 78 kinds of parts are reported in the report of Chinese version.

Source: Database of World Trade Atlas; China Customs; *China Customs Statistics Yearbook 2009*

In short, the trade value of NB and its related components in mainland China has two important characteristics: firstly, mainland China enjoys great trade surplus of NB which accounts for large share of China's total trade surplus; secondly, there is a great variance of trade surplus (deficit) of NB related components between mainland China and major trade partners.

### 3. Trade Modes of Notebook Computer and Related Components in Mainland China

Trade modes of NB in mainland China reflect the position and function of mainland China in global NB industry chain. Now, affiliates of China Taipei OEM/ODM companies dominate the NB trade in mainland China by "Import-and-Assembly" mode.

#### 3.1 Export

The NB export value in mainland China reached 66.65 billion US dollars in 2009, in which 65.51 billion US dollars of NB exported by processing trade mode. Processing trade includes two modes, one is "Import-and-Assembly", and the other is "Pure-Assembly". In 2009, China exported NB of 64.99 billion US dollars with "Import-and-Assembly" and 0.52 billion US dollars with "Pure-Assembly". Therefore, "Import-and-Assembly" was the major mode for China's NB trade. (Table 4)

**Table 4: China's Trade of NB Classified by Trade Modes (2009) Billion USD, %**

Trade Mode		Types of Enterprise Ownership	Export Value	Import Value	Export and Import value	Net Value of Trade	Total Export Value	Total Import Value	Total Export and Import Value	Surplus/Deficit of Trade
Processing Trade	Pure-Assembly	state-owned	0.03	0.00	0.03	0.03	0.52	0.00	0.52	0.52
		private	0.03	0.00	0.03	0.03				
		foreign-owned	4.94	0.00	4.94	4.94				
		others	0.23	0.00	0.23	0.23				
		subtotal	5.23	0.00	5.23	5.23				
	Import-and-Assembly	state-owned	0.11	0.00	0.11	0.11	64.99	0.09	65.08	64.90
		private	0.20	0.03	0.22	0.17				
		foreign-owned	632.77	0.89	633.67	631.88				
		Joint-venture	16.80	0.00	16.80	16.80				
		subtotal	649.88	0.92	650.80	648.97				
Garner Trade	state-owned	0.77	0.15	0.92	0.61	0.56	0.16	0.73	0.40	
	private	2.18	0.07	2.24	2.11					
	foreign-owned	2.53	1.37	3.90	1.16					
	Joint-venture	0.09	0.03	0.12	0.06					
	others	0.07	0.00	0.07	0.07					
	subtotal	5.64	1.62	7.26	4.02					
Trade in Bonded areas	state-owned	0.05	0.00	0.05	0.04	0.11	0.00	0.11	0.11	
	private	0.18	0.01	0.19	0.17					
	foreign-owned	0.11	0.01	0.12	0.10					
	others	0.78	0.00	0.78	0.78					
	subtotal	1.11	0.02	1.13	1.09					
Trade in Bonded Warehouses	state-owned	0.18	0.00	0.18	0.18	0.45	0.05	0.50	0.40	
	private	0.85	0.01	0.86	0.85					
	foreign-owned	3.46	0.49	3.95	2.97					
	Joint-venture	0.01	0.01	0.02	0.00					
	subtotal	4.51	0.51	5.02	4.00					
Other modes	state-owned	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.01	
	private	0.10	0.00	0.11	0.10					
	foreign-owned	0.00	0.03	0.03	-0.03					
	subtotal	0.13	0.04	0.16	0.08					
Total						66.65	0.31	66.96	66.34	

Source: Trade data of enterprises lever is from China Custom classified by HS code, trade modes, types of enterprise ownership, import source and export destination bought by author.

China's NB production and trade network is comprised by three kinds of players: brands, OEM/ODM companies, and components suppliers. Brands are the sponsors of production and trade, components suppliers are the participants, and OEM/ODM companies are the organizers and performers of this network. The business relationship between them above is that the brands have the right to purchase of key components and come to terms with key components suppliers. However, the OEM/ODM companies are just performers of purchase and production in terms of OEM/ODM contract. Figure 1 shows the relationship between them.

Some brands adopt whole outsourcing of manufacture, such as Acer, but others outsource partially, such as Dell, Lenovo, Toshiba. With outsourcing becoming more and more prevalent, brands focus only on marketing, and OEM/ODM companies manufacture and deliver NB to global customers of brands.

As brands outsource manufacturing, OEM/ODM companies become the performer of product and trade. In 2009, affiliates of Taipei OEM/ODM companies, such as Quanta, Compal, and Inventec, Wistron, and Foxconn, export NB of 53.27 billion US dollars (accounting for 82% of total export value of NB) from mainland China to the whole world by "Import-and-Assembly". (Table 5)

While brands manufacture products by themselves, they also prefer to export NB by "Import-and-Assembly". In 2009, brands export NB of 9.60 billion US dollars under "Import-and-Assembly", on the contrary, of 0.24 billion US dollars by "Pure-Assembly".

It can be seen that the trade performers are not brands but OEM/ODM companies in mainland China. Core capabilities of brands are purchasing and marketing. OEM/ODM companies are good at manufacturing and delivering. Meanwhile, the preference of "Import-and-Assembly" is due to the convenience to import components in bond.

**Table 5: Trade Performers of NB Processing Trade in Mainland China (2009)**

Name of Parent Company	Name of Affiliates in Mainland China	NB Export Value	Billion USD, % Share of Total Export Value %
Quanta (China, Taipei)	Tech-Trend (Shanghai) Computer Co., Ltd. (TTC)	17.56	27.02
	Tech-Giant (Shanghai) Computer Co., Ltd. (TGC)		
	Tech-Com (Shanghai) Computer Co., Ltd. (TCC)		
	Tech-Front (Shanghai) Computer Co., Ltd. (TFC)		
Compal (China, Taipei)	Compal Information(KunShan)Co., Ltd	12.71	19.56
	Compal Information Technology (Kunshan) Co., Ltd.		
Wistrom (China, Taipei)	Compal Electronics Technology (Kunshan) Co., Ltd.	10.63	16.37
	Wistron InfoComm (Kunshan) Co., Ltd.		
	Wistron Optronics (Shanghai) Corporation("WOS", China)		
Inventec (China, Taipei)	Wistron Optronics (Shanghai) Co., Ltd. ("WOSH", China)	9.76	15.02
	Inventec (Shanghai) Co., Ltd.		
	Inventec (Pudong) Co., Ltd.		
	Inventec (Shanghai) High-Tech Co., Ltd.		

Foxconn (China, Taipei)	Foxconn (Yantai) Co., Ltd. Foxconn (Shenzhen) Co., Ltd.	2.53	3.9
Asus (China, Taipei)	Asus (Shanghai) Co., Ltd. Asus (Suzhou) Co., Ltd.	4.26	6.56
Lenovo (China)	Lenovo (Shenzhen) Co., Ltd. Lenovo (Shanghai) Co., Ltd.	2.33	3.59
Samsung (Korea)	Samsuang (Suzhou) Co., Ltd.	1.95	2.99
Toshiba (Japan)	Toshiba (Hangzhou) Co., Ltd.	0.66	1.02
Dell (US)	Dell (Xiameng) Co., Ltd.	0.39	0.61
		62.8	96.64

Source: Trade data of enterprise level classified by HS code, trade modes, types of enterprise ownership, import source, export destination is from China Customs.



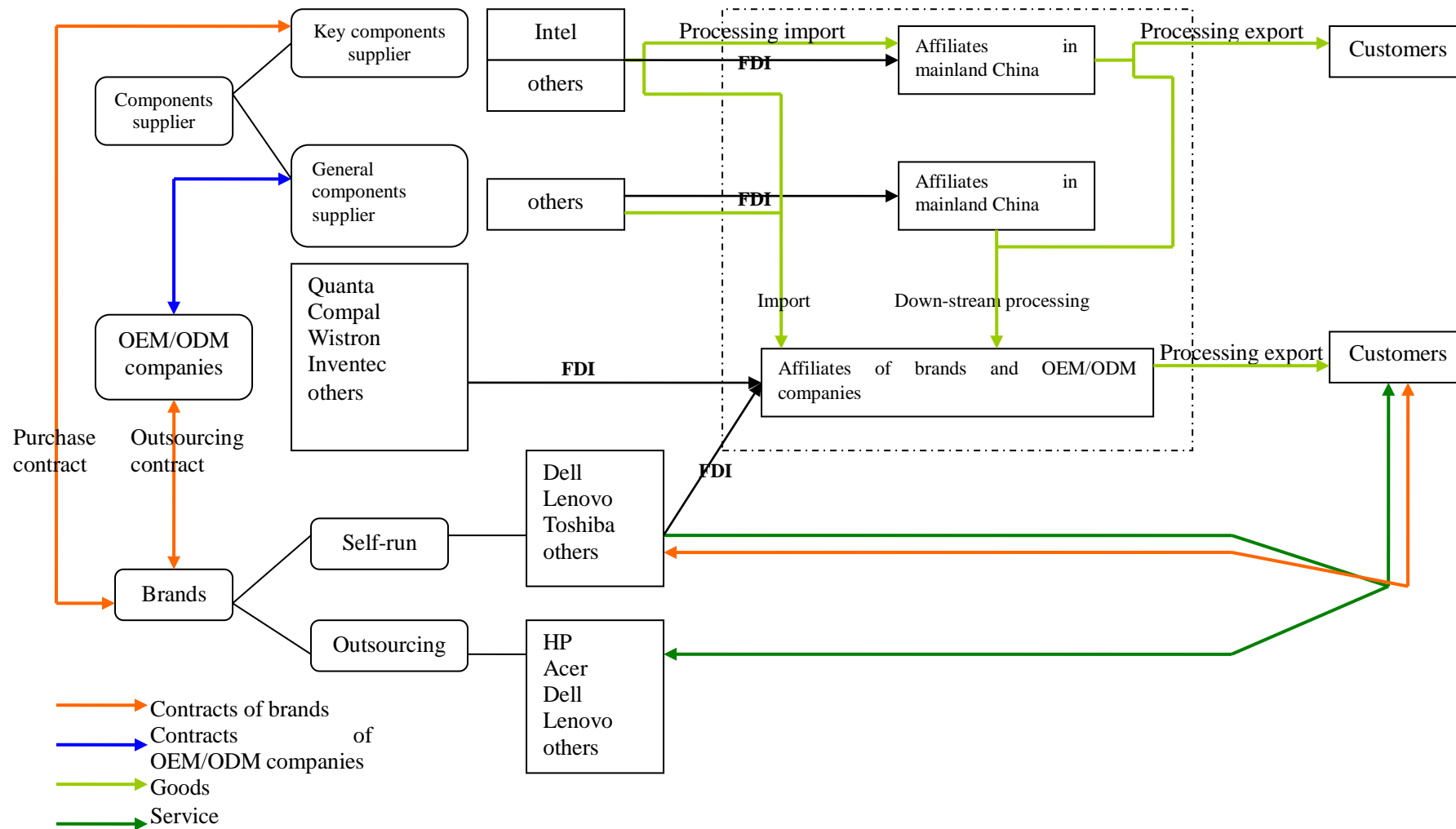


Figure 1: Relationship of Participants in the NB Global Production Network

### 3.2 Import

OEM/ODM companies and brands import components from two sources. Some components are imported from bonded areas in mainland China. Now, it is very prevalent to import components from bonded areas in mainland China by re-import. We take the largest OEM/ODM Company “Compal” of PC products for example. In 2009, the affiliates of Compal in mainland China imported PC related components of 2.43 billion US dollars in all, and 40.82% of total were imported from mainland China. (Table 6)

PC related components imported from mainland China are mainly supplied by two types of companies. Some are general components companies from Taipei who followed OEM/ODM companies and transferred their factories to mainland China. At present, Taipei PC components companies enjoy the largest market share in many components industries, such as printed circuit board, radiator, power adapter, plastic structural components and passive components. After China’s entry to WTO, most of them invested in Yangtze River Delta and Pearl River Delta region in mainland China and formed vertical division with OEM/ODM companies like Quanta, Compal, Inventec, Wistron, etc. Others are affiliates of key components companies from US and other developed countries such as Intel.

**Table 6: Trade Data of the Affiliates of Compal in Mainland China (2009)**

		Billion USD, %			
Trade Mode	Trade Partner	Import Value	Percentage of Total Import Value %	Export Value	Percentage of Total Export
Import-Assembly	US	4.68	32.04	0.01	0.49
	Germany	1.50	10.27	0.02	0.82
	Netherlands	1.38	9.47	0.00	0.00
	Malaysia	0.97	6.66	0.35	14.50
	Taipei	0.13	0.88	0.55	22.85
	<b>China</b>	<b>0.00</b>	<b>0.00</b>	<b>0.99</b>	<b>40.82</b>
	Japan	0.88	6.00	0.02	0.82
	Korea	0.05	0.34	0.15	6.19
	Other	4.79	33.33	0.65	26.89
	subtotal	14.37	98.49	2.40	98.89
Importing equipments in export processing zones	US	0.00	0.00	0.00	0.04
	Germany	0.00	0.00	0.00	0.00
	Japan	0.00	0.00	0.01	0.54
	China	0.00	0.00	0.00	0.04
	Taipei	0.00	0.00	0.00	0.08
	Korea	0.00	0.00	0.00	0.00
	Other	0.00	0.00	0.00	0.04
	subtotal	0.00	0.00	0.02	0.78
	US	0.00	0.00	0.00	0.08
	Germany	0.00	0.00	0.00	0.00
General trade	Japan	0.00	0.00	0.00	0.12
	Taipei	0.00	0.00	0.00	0.04
	Korea	0.00	0.00	0.00	0.00
	Other	0.00	0.00	0.00	0.12
	subtotal	0.00	0.00	0.01	0.33
Other	US	0.02	0.14	0.00	0.00
	Germany	0.00	0.02	0.00	0.00

	Japan	0.01	0.07	0.00	0.00
	Taipei	0.00	0.01	0.00	0.00
	Korea	0.00	0.00	0.00	0.00
	Other	0.19	1.27	0.00	0.00
	subtotal	0.22	1.51	0.00	0.00
Total		14.59	100.00	2.43	100.00

Source: Trade data of affiliates of Compal in mainland China classified by HS code, trade partners, trade modes, import source and export destination is from China Customs bought by the authors.

Others are imported from outside border. Currently, PC related components are imported mainly from East Asia rather than US and EU. For example, in 2009, the value of parts Compal imported from Taipei, Malaysia, and Korea reached 1.06 billion US dollars in all, and accounted for 43.56% of total (Table 6), but the share of parts imported from Germany was less than 1% and from US was as low as 0.5%.

Why do companies in mainland China import PC related components mainly from East Asia? Firstly, suppliers of PC related components from Japan and Korea, such as Toshiba, Hitachi, Samsung, are the leading companies of PC related parts industries and have strong competitive strength in the world. Secondly, components suppliers from US and other developed countries located their factories in East Asia or outsourced their manufacture to this area. In the earlier 1990s, many MNCs invested in East Asia areas, such as Malaysia and Singapore before their movement of PC industry to mainland China. Thirdly, due to restrictive policies of investment outside from home countries (or area) in some high-tech industries, companies retain some factories there, such as Taipei. Therefore, East Asia, such as Taipei, Malaysia, Japan and Korea, is still the main global production base of PC parts.

#### 4. Distribution of Benefits in Global Notebook Computer Product Network

##### 4.1 Benefits of Brands, OEM/ODM companies, and components suppliers

See details in the Chinese version report.

Product	Name	2001	2002	2003	2004	2005	2006	2007	2008	2009
operating system	Microsoft	85.69	85.57	84.52	81.98	84.71	84.31	82.51	80.56	81.09
	Intel	46.2	49.8	56.7	59	59.4	51.5	51.9	55.5	55.7
Processor	AMD	NA	NA	34	39.4	40.9	37.8	37.4	40	42.1
	VIA	33.9	28.2	27	28	24	26	24	36	36.7
	SIS	21	28	28	26	27	28	NA	30	NA
	Seagate	NA	NA	NA	22.2	23.2	19.2	25.2	14.4	14.4
Storage	WDC	10.7	13.1	16.3	15.1	16.2	19.1	16.5	21.5	NA
	Hynix	NA	NA	NA	39	36	NA	19	NA	NA
	Infineon	NA	NA	NA	38	30	31	34	35	35.2
LCD	Samsung	NA	NA	NA	24	7	8	12	11	10
	CHIMEI	NA	NA	13.9	-1.4	4.8	7.2	12.9	5.7	0.1
OEM/ODM	Quanta	11	NA	5.2	5.9	4.6	3.7	4.2	4.5	5.4

Brand Marking	Inventech	NA	9	8	NA	5	5	5	3	4
	Wistron	12	7.2	6.4	5.2	6	6.7	6.4	5.6	4
	Compal	NA	6.8	7	3.1	3.8	2.9	4.8	5	4.6
	HP	25.4	26.1	26.3	23.9	23.4	24.3	24.4	24	25
	Acer	NA	NA	NA	12.1	10.7	10.9	10.3	10.5	10.2
	Dell	20.2	17.6	17.9	18.2	18.4	17.7	16.5	19.9	17.9

Source: Annual Reports of these companies above

#### 4.2 Distribution of Benefits between OEM/ODM Parent Companies and Affiliates in Mainland China

See details in the Chinese version report.

**Table 8: Distribution of Benefits of major OEM/ODM parent companies and affiliates in mainland China (2003-2009)**

NT \$										
Name	Year	Revenue of Parent companies (1)	Revenue of Affiliates in Mainland China (2)	(2)/(1) %	Net Interest of Parent Companies (3)	Net Interest of Affiliates in Mainland China (4)	(4)/(3) %	profit margin of Parent Companies(5)	profit margin of Affiliates in Mainland China (6)	(6)/(5) %
Quanta	2003	1,123	60	5.34	119	-1	—	10.62	-2.16	—
	2004	1,422	NA	NA	109	5	4.59	7.63	NA	NA
	2005	2,923	4,002	136.91	133	11	8.27	4.53	0.29	6.4
	2006	3,245	2,980	91.83	120	13	10.83	3.69	0.42	11.38
	2007	4,031	4,143	100	109	15	13.76	2.71	0.36	13.28
	2008	7,324	8,844	100	184	44	23.91	2.52	0.49	19.44
	2009	7,631	8,008	100	202	23	11.39	2.65	0.29	10.94
Compal	2003	772	116	15.03	54	2	3.7	7	1.3	18.57
	2004	1,165	692	59.4	79	-2	—	6.8	-0.27	—
	2005	1,622	1,197	73.8	113	-2	—	6.97	-0.14	—
	2006	2,114	818	38.69	66	-3	—	3.11	-0.34	—
	2007	2,209	581	26.3	84	0	0	3.81	-0.01	—
	2008	4,275	1,092	25.54	137	6	4.38	3.2	0.57	17.81
Wistron	2004	767	92	11.99	17	-4	—	2.22	-4.45	—
	2005	777	119	15.32	16	-4	—	2.07	-3.12	—
	2006	1,166	634	54.37	-8	-4	—	-0.71	-0.64	—
	2007	1,549	1,276	82.38	32	1	3.13	2.05	0.05	2.44
	2008	2,769	2,452	88.55	66	13	19.7	2.39	0.55	23.01
	2009	4,223	3,869	91.62	69	27	39.13	1.63	0.7	42.94
Inventec	2004	683	261	38.21	33	2	6.06	4.9	0.65	13.27
	2005	816	851	100	42	7	16.67	5.21	0.85	16.31
	2006	1,314	1,767	100	24	-4	—	1.85	-0.21	—
	2007	1,626	2,600	100	33	4	12.12	2	0.15	7.5
	2008	2,392	3,248	100	—	29	51.79	2.36	0.89	—
	2009	3,507	4,248	100	53	4	7.55	1.52	0.1	6.58

Source: Annual Reports of these companies above

### 4.3 Case Study: Notebook from HP and iPad from Apple

#### 4.3.1 HP Pavilions DM3T

See details in the Chinese version report.

**Table 9: Component Value of HP Pavilions DM3T**

Home Country of Component supplier	Component Value (USD)	Percentage of total PC value (%)
US	266.74	51.09
China Taipei	83.62	16.02
Korea	45.62	8.74
Japan	2.72	0.52
Switzerland	0.99	0.19
China Hong Kong	0.34	0.07
Netherland	0.22	0.04
Other	121.84	23.34
Total	522.1	100

Source: supply database

**Table 10: Major Components Suppliers or HP Pavilions DM3T**

Component	Home Country of Component supplier	Name of Component supplier	Component Value (US dollar)	Of total PC value (%)
CPU	US	Intel	\$151.62	
Northbridge	US	Intel	\$26.96	
Hard disk	US	Seagate	\$55.00	49.03
WLAN	US	Atheros	\$10.35	
Southbridge	US	Intel	\$10.19	
LCD	China Taipei	AUO	\$60.50	11.57
PCB	China Taipei	TRIPOD	\$10.26	1.96
Memory	Korea	Samsung	\$45.60	8.72
Battery	NA	NA	\$54.60	10.44
Camera	NA	NA	\$7.20	1.38
Other	NA	NA	\$75.77	15.37
All components			\$508.04	98.03
Processing /Assembly	China Taipei	Quanta, Compal, Inventek	\$10.23	1.97
Total			\$518.27	100

Source: supply database

**Table11: Gross Profit Margin of Major Suppliers of HP Pavilions DM3T (2009) %**

Home Country of Component Supplier	Name of Component Supplier	Component	Gross Profit Margin %
US	Intel	CPU	
		Northbridge	55
		Southbridge	
	Broadcom	Bluetooth	
		Chip of Input-Output	50
		WLAN	49
TI	Chip of Power Supply	48	

	IDT	Chip of Input-Output	41
	Reltek	Clock	41
	Parada	Chip of Input-Output	38
	HP	Brand Marking	21
	Seagate	Hard Disk	14
Korea	Samsung	Memory	20
	Delta	Power Supply	21
	Novatek	Input-Output	20
China Taipei	AUO	LCD	11
	TRIPOD	PCB	8
	Quanta, Inventek	Compal, OEM/ODM	5

Source: Data bought from iSupply database and Annual Report of Component Suppliers

#### 4.3.2 iPad 16G

See details in the Chinese version report.

### 5. Effects of Chinese Companies in NB Industry Chain and International Trade

See details in the Chinese version report.

### 6. Proposals for Restructuring and Upgrading of Processing Trade in China

See details in the Chinese version report.

#### Conclusion

Firstly, there are few important components from Chinese suppliers in the NB global production network till now, although China has enjoyed the largest amount of export value of notebook computer all over the world.

Secondly, brands are the sponsor of NB and related component trade. They control the production and trade network of NB by the power of purchasing and the channel of sales, although manufacture of products has been wholly or partially outsourced. In spite of being major performers of PC and related component trade in mainland China, OEM/ODM companies have little right to control. However, the effect of mainland China is just to provide a convenient processing trade mode and low-cost labor force for OEM/ODM companies to finish the global production under the outsourcing contract from NB brands.

Finally, the benefit distribution of global NB industry is in accordance with “smiling curve”. The cases of HP and iPad show that components suppliers from US gain the largest share of total benefits of NB industry, and those from China Taipei and Korea enjoy more benefit due to the updating in NB value chain, OEM/ODM companies get the least amount of benefits and suffered decrease of benefits in recent years. However, mainland China achieves little from the huge amount of NB trade value.

#### Appendix

Table: The investment of global Major PC Brands and Components players of 30 in Mainland China

See details in the Chinese version report.