

Why Japanese multinationals failed in the Chinese mobile phone market: a comparative study of new product development in Japan and China

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This industry case study examines the challenges experienced by Japanese MNEs as they transfer sources of competitive advantage to foreign markets. Despite holding certain technological advantages, Japanese mobile telephone manufacturers have performed poorly in the Chinese market. This is because the capabilities required differ between Japan and China: in Japan, handsets are sold as a part of a package that bundles together handsets and telephony services but in China they are sold as independent commodities. Japanese MNEs have the capability to develop sophisticated handsets according to the requirements of Japanese service operators, but such capability is not useful in China.

Keywords: China; distribution; Japanese multinational enterprise; mobile telephony; new product development

Introduction

Japanese multinational enterprises (MNEs) have been characterized as having a centralized organization, in which most strategic assets, resources and decisions are concentrated at their headquarters in Japan, while overseas operations are treated merely as pipelines to deliver products and services to global markets (Bartlett and Ghoshal 1998, Whitley *et al.* 2003). Typically, the innovation process is managed in the same manner, by which new product and process development activities are almost always undertaken at the headquarters and are subsequently transferred to the overseas operations. Japanese MNEs might occasionally modify their innovations to meet the specific needs of overseas markets, but generally with much reluctance. Although many Japanese MNEs have deployed their research and development (R&D) facilities abroad since the 1980s – for example to tap research resources or to appease political pressure in the host market (Cairncross 1994) – the basic structure of the innovation process remains largely unchanged.

By adopting such a centralized and innovative process, MNEs bear a risk of being insensitive to the local needs of overseas markets (Bartlett and Ghoshal 1998). The risk of maladjustment is even larger when not only consumer demand but also the distribution system differs in the overseas market from the MNE's home country, because the distribution system that stands between consumers and the manufacturers can often influence consumer demand. With respect to Japanese MNEs in particular, the centralized innovation process often makes it difficult for them to adapt to a foreign market where

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consumer demand and the distribution system are radically different from those in Japan. These differences can, at the same time, create room for local firms, which usually have poorer resources than MNEs, to expand their presence. Local firms, with better knowledge of the preferences and distribution system of the host nation, may be able to win market share against MNEs by creating innovative capabilities that are more adaptive and responsive to local conditions.

Given this backdrop, the purpose of this study is to assess the difficulties that Japanese MNEs can experience in developing new markets when the innovation process is centralized. This is done using a case study of Japanese mobile telephony companies and their expansion into the Chinese market. The study describes in detail differences in the product innovation and distribution systems of the Japanese and Chinese mobile telephony sectors, and shows how difficult it can be for Japanese electronics manufacturers to adapt to the Chinese market, and how local Chinese firms, despite a paucity of resources when they first appeared, have been able to out-compete Japanese MNEs in the Chinese market.

In the next section, data are presented to demonstrate that Japanese telephony manufacturers have underperformed in China relative to their foreign and local counterparts, and a number of possible explanations are discussed. This is followed by a statement of a research proposition derived from the theory of the innovation processes of MNEs which this study will evaluate. The fourth section describes the methodological approach to data collection, and this is followed by a brief account of the development of the Chinese mobile phone industry. In the fifth section, a comparison is made of the mobile phone distribution systems in Japan and China, while the sixth section presents a comparison of production development activities of Japanese and Chinese mobile phone manufacture based upon primary data collected in interview. The seventh section analyzes how Japanese phone makers have attempted to sell their products in China and gives reasons for the failure of their marketing strategies. This is followed by conclusions and suggestions for further research.

Literature review: theoretical explanations for Japanese MNE performance in China

Little scholarly attention has been paid to explaining the failure of Japanese mobile telephone manufacturers in foreign markets. However, the issue is widely discussed in the trade press and business circles in Japan. In the case of China, this poor performance is evident in data on the market shares of major mobile phone brands (Table 1). In discussions in Japan, three kinds of explanation for the failure have been put forward, which can be summarized as follows.

First, some scholars, including Funk (1998, 2002), argue that differences in the technological standards of mobile phones between Japan and foreign markets has made it difficult for Japanese manufacturers to succeed in foreign markets. During the second generation (2G) of mobile phone services' development, which started in 1993 and still continues today, Japan adopted an indigenous standard, PDC (Personal Digital Cellular), whereas most other countries adopted the Europe-based standard, GSM (Global System for Mobile).¹ To market mobile handsets abroad, Japanese MNEs are required not only to design handsets anew to accommodate GSM technology, but also to pay license fees and royalties, which can amount to 6–10% of the total price of a handset, to the owners of GSM patents. Conversely, European and American manufacturers face the same technical barrier when they try to sell PDC-compatible handsets in Japan. Although the 'technology standards' explanation seems convincing, two recent developments undermine it. Firstly, the Korean mobile phone makers, Samsung and LG, face much the same entry barrier

Table 1. Market shares of major mobile phone brands in China (%).

	1997	1998	1999	2000	2001	2002	2003	2004*	2005	2006
Nokia	2.5	11.7	32.3	25.1	22.3	18.2	11.2	17.0	23.8	30.2
Motorola	68.0	64.0	39.4	35.4	29.3	28.5	9.3	14.3	13.3	22.0
Samsung			—					8.3	9.6	9.6
Bird				3.2	6.4	9.9	13.2	7.8	6.1	5.2
Amoi								4.6	4.2	2.9
Ericsson (SonyEricsson)	5.0	11.4	6.4	9.2	6.5	2.1	1.3	3.9	4.1	5.7
Lenovo									4.1	6.2
TCL				1.0	3.0	8.7	11.2	6.8	3.7	1.1
Konka							5.5	3.9	2.8	1.6
Haier									2.8	1.0
NEC	1.7	1.6							2.1	—
Matsushita	6.6	2.9							1.0	—
Siemens		2.6	6.0	8.1	9.7	4.7	2.4			—
Philips		5.6						2.8		1.2

Notes: Data for 1997 and 1998 are based on production volumes; others are based on sales surveys. *For 2004, the data are for the period January to October.

Source: 1997–1998: China Electronics Industry Yearbook; 1999: China Electronics News; 1999–2003: China Electronics and Information Industry Yearbook 2003; 2004: CCID; 2005: Norson Telecom Consulting (2006); 2006: SINO-MR.

abroad as do the Japanese, because their home market has not adopted GSM either. However, this fact did not prevent them from gaining large market shares internationally, with Samsung having 10.6% and LG having 3.7% shares of the world's GSM market, placing them third and fifth, respectively, among the world's leading handset manufacturers in 2006 (Fuji Kimera Research Institute 2007). Secondly, Chinese mobile phone manufacturers in the Chinese market face higher entry barriers to the GSM market than do the Japanese and Korean manufacturers, because, lacking any sort of proprietary technology, they cannot resort to cross-licensing agreements (when two or more manufacturers with related patents mutually exchange the right to use patented technology and so economize on licensing fees) to gain market access. Nevertheless, at least some Chinese manufacturers have been able to out-compete the Japanese in the Chinese market (Table 2). Cheung (2005) attributes the rise of Chinese handset manufacturers to the standardization of product technology and cooperation between the Chinese firms and locally investing MNEs. Although these factors might explain why Chinese manufacturers were able to narrow the technological gap with MNEs, they do not explain why they were able to out-compete most foreign handset manufacturers, including the Japanese, in the Chinese market.

The second explanation for the poor performance, some might argue, is that the technological capabilities of Japanese manufacturers are simply weaker than their rivals, such as the world's top three mobile phone manufacturers, Nokia, Motorola and Samsung. However, as far as product technology is concerned, this is unlikely to be the case, because Japanese manufacturers have been leaders in mobile phone innovation for many years: for example, they were the first in the world to install colour liquid crystal displays (LCD), cameras, internet browsers, electronic money services and television receivers on a mobile phone handset. Furthermore, the high proportion of the latest third-generation (3G) mobile phone subscribers in Japan, occupying one-third of all 3G subscribers in the world,² indicates that the Japanese market has a strong demand for high value-added services and sophisticated handsets, and these are provided by Japanese manufacturers, for the most part.

Third, some commentators suspect that Japanese mobile phone manufacturers have ignored or place little importance on overseas markets. It is true that the major Japanese manufacturers, such as Sharp, Matsushita and NEC, generate more than 80% of their mobile phone sales in Japan (Fuji Kimera Research Institute 2007). However, this is more a consequence of their failure in overseas markets rather than of a strategy to concentrate resources on the domestic market. In the case of China, for example, the fact that Matsushita established a mobile phone production site there as early as 1995 – the same year that Nokia established a production site in China – shows that the Japanese company was as eager as its Finnish rival to gain a dominant position in the Chinese market, at least in the early stages of China's mobile market development. The above three explanations are not convincing, and alternate explanations are therefore required.

Research proposition

Given the characterization in the literature that many Japanese MNEs in the manufacturing sector are highly centralized and use their overseas operations merely to deliver products and services developed in Japan to global markets (see Bartlett and Ghoshal 1998, Whitley *et al.* 2003), this study evaluates the following proposition: the centralized innovation process of Japanese MNEs has made it difficult for them to adapt to the Chinese market, where the demand conditions for mobile handsets are radically different from those in the Japanese market.

Table 2. Volume of subscribers, production and trade of mobile phone handsets in China (million units).

	No. of subscribers	Annual increase of subscribers	Imports ¹	Exports	Production	Worldwide production ²	Share of China in world production (%)
1989	0.01						
1990	0.02	0.01					
1991	0.05	0.03					
1992	0.2	0.1	0.3	2.6			
1993	0.6	0.5	0.7	3.2			
1994	1.6	0.9	0.4	0.1			
1995	3.6	2.1	0.4	0.5	1.3		
1996	6.9	3.2	—	—	2.0		
1997	13.2	6.4	1.4	1.9	8.9	101.0	8.8
1998	23.9	10.6	1.6	2.2	11.8	163.0	7.2
1999	43.3	19.4	3.0	5.7	20.2	275.0	7.3
2000	84.5	41.2	6.0	22.8	52.5	405.0	13.0
2001	145.2	60.7	7.5	39.7	80.3	380.0	21.1
2002	206.0	60.8	17.2	63.3	121.5	405.0	30.0
2003	269.0	63.0	22.1	95.2	182.3	471.1	38.7
2004	334.8	65.8	12.7	146.1	233.5	643.0	36.3
2005	393.4	58.6	12.7	227.9	303.5	795.0	38.2
2006	461.1	67.7	28.9	385.4	480.1	978.0	49.1

Note: 1. Imports include completely knocked-down components; 2. From Nokia's annual reports.

Source: China Statistical Yearbook, China Electronics Industry Yearbook, Ministry of Commerce (various years).

Methodology

The study is based on the author's interviews at 47 companies conducted in China and Japan during the period 2004–2007. The names of the companies and their divisions interviewed are as follows: (1) the handset management divisions of mobile phone service carriers (namely NTT DoCoMo and China Unicom); (2) the product planning or product development divisions of Japanese mobile phone makers (Casio Hitachi Mobile Communications, Sharp, Toshiba Corporation Mobile Communications Company, Panasonic Mobile Communications and Hitachi); (3) the Chief Executive Officers (CEOs) of the subsidiaries of Japanese mobile phone makers in China (Matsushita Electric China Mobile Communications Company, Tianjin Sanyo and NEC Telecommunications China); (4) the product planning and product development divisions of Chinese mobile phone makers (Amoi, Konka, ZTE, Eastcom, Bird, Panda, Lenovo Mobile and Capitel); (5) the planning divisions of other mobile phone makers in China (UTStarcom and Sony Ericsson Mobile Communications); (6) the planning and marketing divisions of Chinese mobile phone design houses (Techfaith, Yulong, Ginwave, Shanghai Huaqin, Cellon, Longcheer, Sim and Shenzhen Elite); (7) the CEOs of the retailers and wholesalers of mobile handsets in China (Guangzhou Datianxing, Guangxun Dianxun, Shenzhen Telling, Guangzhou Yihaotong, Shenzhen Xinan Anshun and Beijing Putian Taili); (8) the marketing divisions of integrated circuit (IC) chip vendors and parts suppliers (Spreadtrum, Texus Instruments, Renesus Technology, Oki, Datang Mobile, NXP, Shenzhen Shangli, Seiko Epson Corporation and Dongguan Nocin); and (9) four consulting companies and media companies specialized in electronics (GfK Group, iSuppli, Beidou Shouji Wang and Shoujiqian).

Each interview lasted for two hours on average. Semi-structured interviews using a standard questionnaire were conducted at the mobile phone makers, design houses, retailers and wholesalers. The purpose was to understand issues surrounding the evolution of China's mobile phone industry, product development processes in Japan and China, the distribution systems used and overall firm strategy. Interviews with other types of company were unstructured but the questions posed were mainly related to product development and the distribution of mobile phones in China. Due to the rise and fall of business models and firms having been rapid and dramatic in the Chinese mobile phone industry – for example, a few companies interviewed no longer exist at the time of writing – interview questions were modified each year accordingly.

Data analysis

The development of the Chinese mobile phone industry

Mobile telecommunications services were first offered in China in 1987. During the first five or six years, mobile phones were considered a luxury good, which only foreign businessmen could afford to buy, and growth in the subscriber base was very slow (Table 2). Only foreign manufacturers provided handsets in China during this period, among which Motorola had a dominant share, occupying 60% of the market in 1993. The dominant position of Motorola was a result of China's adoption of the Total Access Communication System (TACS), a technology developed by Motorola, as the technical standard for its mobile telecommunications network. The number of subscribers began to grow when the monopoly of mobile phone service operation held by China Mobile came to an end in 1994 and when the second telecommunication carrier, China Unicom, started offering mobile phone services. The latter adopted 2G GSM technology, which had many advantages over TACS. China Mobile also began using GSM in the following year. The adoption of 2G digital technology, which can accommodate several times more

phone calls in a limited frequency spectrum than first-generation analogue technology, made the popularization of mobile phones possible. In 2001, the number of mobile phone service subscribers in China reached 145 million, and China became the world's largest mobile phone market in terms of subscriber base.

The policy to promote the domestic mobile phone industry

The adoption of GSM in China helped the European mobile phone makers, such as Nokia, Ericsson, Philips, and Siemens, to expand their market presence. Before 1998, China's mobile handset market was occupied by foreign brands, including the European manufacturers, the US firm Motorola, and the Japanese MNEs, Matsushita and NEC. Hoping to foster an indigenous mobile phone industry, the Ministry of Information Industry of China promulgated an industrial policy, named the 'Opinion on the Promotion of Mobile Phone Industry Development' in 1999. The 'Opinion', which was not communicated widely, obliged foreign handset manufacturers to export more than 60% of their output and to increase the local content of mobile handset production to 60%. It also allowed for subsidies to be given to domestic manufacturers for their R&D activities. The 'Opinion' restricted entry to mobile handset production to those companies that were granted production licenses (Kimura 2006).

The 'Opinion' was a tremendous success from the viewpoint of policy-makers. Domestic handset manufacturers, which were non-existent in 1998, emerged immediately after the promulgation of the 'Opinion', occupying 3% of the market in 1999. Their total share increased to 10% in 2000, to 23% in 2001, to 39% in 2002, and reached 55% in 2003 (Editorial Committee 2000, 2001, 2002, Institute of Industrial Economics 2003). In 2003, a domestic manufacturer, Bird, became the top seller of mobile handsets in China (see Table 1). The discriminatory regulations of the 'Opinion', which obligated only MNEs to export and to raise local content, helped domestic manufacturers to expand market share at the expense of the MNEs. However, the 'Opinion' received few criticisms from the MNEs. The reason for their silence seems to lie in the fact that the obligations of the 'Opinion' coincided with the strategy of major MNEs, who had decided to use China as an export base from which to supply mobile handsets to the industrialized countries. As shown in Table 2, the export of mobile phones grew rapidly after 1999. By 2006, China accounted for nearly one-half of global mobile handset production.

The export requirement of the 'Opinion', however, presented Japanese MNEs with a dilemma. Having only small market shares outside of Japan, the only market to which they could realistically export handsets from China in large volumes was Japan. Yet such a move would have sacrificed employment at their Japanese factories for the expansion of exports from China. Hence, exports were limited, which in turn limited expansion of their sales within China. The local content requirement of the 'Opinion', on the other hand, was not a difficult task to meet for any foreign handset manufacturer, because the Chinese authorities did not impose a strict definition of what constituted local components. In fact, whatever components were bought from a local trading company, irrespective of their place of manufacture, were regarded as 'local components' by the Chinese authorities.

The emergence of Chinese mobile phone makers

Even after taking account of the support of the 'Opinion', the rapid expansion of the Chinese manufacturers remains impressive. A mobile phone handset is undoubtedly a technology-intensive product, dealing with high-frequency radio waves in a small

enclosure, while having the functionality similar in many respects to that of a personal computer. It is easy to hypothesize that it must be difficult to acquire the technology and become a competitive mobile phone manufacturer in just a few years.

The reason for the quick expansion of Chinese manufacturers was their use of international outsourcing. During the first few years of their emergence, Chinese makers, such as Bird, TCL and Konka, relied on Korean and Taiwanese mobile phone manufacturers for the design and production of mobile phone handsets. The 'Opinion', which was intended to nurture the domestic mobile phone industry, had the effect of encouraging Chinese manufacturers to import handsets branded with the Chinese manufacturers' names but made by Korean and Taiwanese manufacturers. This was a consequence of a loophole of the 'Opinion': it did not place any local content requirements on domestic manufacturers.

The fact that outsourcing to foreign phone makers became rampant after the emergence of Chinese manufacturers in 1999 is reflected in data on mobile phone imports (Table 2), which increased alongside the expansion of Chinese phone makers' sales. The drop in imports in 2004 coincided with decline in the market share of domestic phone manufacturers, to 38%. It is possible to estimate that 70% of handsets sold by domestic phone manufacturers in 2002 and 50% in 2003, were actually imported, including those in the form of completely knocked-down components.

The history of Bird, or *Bodao*, the largest domestic mobile phone maker, reveals how Chinese manufacturers made use of outsourcing. Bird was established in 1992 as a manufacturer of pagers. After becoming the second largest pager maker in China, the management decided to diversify into the production of mobile phones. Not having the capability to develop and produce mobile phones, Bird sought the support of Sagem, a French electronics company, to provide production technology and completely knocked-down components of mobile handsets. For Sagem, supplying Bird with technology and components was the only way to enter the Chinese market, because it had not been awarded a production license in China.

With Sagem's support, Bird entered the domestic mobile phone market, but the company soon discovered that Sagem's European-style handsets did not fit the tastes of Chinese consumers. Therefore, Bird asked the Korean phone makers, Pantech and Telson, to provide handset design. The production line built using the technological support of Sagem was later transformed into a joint venture with Sagem, with the latter taking charge of production. Bird's advancement to a market-leading position can be attributed to the support it received from the French and Korean firms, which did not have the rights to manufacture and market mobile handsets under their own brand names in China. Along with expansion of production, however, Bird advanced its inhouse development capability. Bird's handsets are now designed partly by its own Chinese development centres in Ningbo and Hangzhou which employ more than 500 staff in total, and partly by Korean and Chinese design houses.

Japanese MNEs began producing mobile handsets in China before the Chinese makers came into existence. As mentioned before, Matsushita started its mobile phone joint venture in 1995, followed by NEC in 1997, and later by Sony, Toshiba, Sanyo, Mitsubishi and Kyosera. Before 1997, Matsushita enjoyed first newcomer advantage in China and held second position in terms of market share. However, since 1998, none of the Japanese manufacturers, except for Sony Ericsson (a joint venture between Sony Corporation and the Swedish telecommunications company Ericsson), which inherited much of its market share in China from Ericsson, has occupied more than 3% of the Chinese market (Table 1). The reason for this, which is discussed in detail below, is that the Japanese manufacturers failed to adjust their product innovation strategy to adapt to the demands and distribution systems of China, which were radically different from those of Japan.

A comparison of product development in Japan and China

This section compares the product development activities of Japanese and Chinese mobile phone manufacturers. Product development activities are the responses of firms to the demand presented to them from consumers, or from the intermediaries that stand between the manufacturers and end-users. Therefore, differences in product development strategy will, to a great extent, reflect differences in demand between Japan and China.

Number of models

The most striking difference between the Japanese and Chinese mobile phone markets is the number of handset models sold. In Japan, there were 83 models on the market as of June 2006, sold by three mobile phone operators (NTT DoCoMo, Vodafone and au, which is marketed by KDDI Corporation and Okinawa Cellular), and a personal handyphone system (PHS) operator (Willcom). Each of the mobile phone makers had fewer than 13 models in their portfolio (Table 3). Mobile phones in Japan form part of the service operators' product line-up: all mobile phones have the corporate logos of the service operators on their case, while the manufacturer's logo appears less conspicuously, or in some instances, not at all.

In China, the leading manufacturers usually sell more than 60 models at a time. Nokia, for example, had 63 models, Motorola had 67, Samsung had 89 and Bird had 67 models as of June 2006. Even NEC, which sold only eight models in their home market, had as many as 59 models in China, gaining only 2.1% of the market. According to *Beidou shouji wang*, an internet handset shop that boasts the extent of its coverage, there were 70 brands in China and 1460 different models of mobile phone as of June 2006. Mobile phones in China always have the manufacturer's logo clearly marked but seldom show the service operator's logo. The difference in the number of models per manufacturer between Japan and China is a reflection of differences in the organization of product line-up. Broadly speaking, in Japan, each operator prepares a product line-up that covers various consumer demands and tastes, whereas, in China, each handset manufacturer prepares its own product line-up. The diversity of income levels and tastes also explains why there are so many types of mobile phones in China.

As there are so many models in China, the average sales volume per model is much smaller than that in Japan. In Japan, phone makers usually set sales targets per model to between 500,000 and one million units. Yet in China, the target is 100,000–200,000 units and, often, actual sales only amount to around 50,000 units on average.

In Japan, the replacement of models strictly follows the service operator's plan. NTT DoCoMo, for example, issues two series of handsets, the '700' series and '900' series, every six months. Three generations of models appear simultaneously in the company's catalogue, which means that one model will be sold for a year and several months. In China, the replacement of models is not planned. Handset manufacturers release new models every month, and sales of each model continue as long as it sells well. The duration of sales usually ranges from five months to two years, but there is no rule. Replacement is left to natural selection in the market.

The process and cost of product development

In Japan, service operators are heavily involved in the development of handsets. It is the operator who plans the line-up of products and determines the concept of each model. In some cases, the operators even provide the exterior design of handsets, but usually the

Table 3. Supply relationships between mobile handset makers and service operators in Japan (no. of models).

Service operators	Handset manufacturer	
NTT DoCoMo	6	5
Vodafone ¹	2	1
Au	6	2
Willcom	1	2
Mitsubishi		
Fujitsu		
LG Electronics		
NEC		
Nokia		
Matsushita		
Sanyo		
Sharp		
Sony Ericsson		
Motorola		
Toshiba		
Samsung		
Kyosera		
Hitachi		
Casio		
Pantech		
Nihon Musen		

Note: 1. Vodafone has now changed its brand to 'Softbank'. 2. The data are based on information collected in June 2006.
Source: Author, based on operators' marketing materials.

entire design is undertaken by the manufacturers. Therefore, the role of manufacturers in Japan can be likened to that of Taiwanese 'original design manufacturers' (ODM) that design and manufacture personal computers for international brands based on the requirements of the latter.

Typically, manufacturers in Japan start planning for a new model around 14 to 18 months prior to the date of release (Figure 1). Planning is based on suggestions received from the service operator about what functions they wish to have installed in future models. For example, operators will tell the manufacturers that they want to have a handset that can receive digital television broadcasting and can be used as electronic money and has a large display. Manufacturers examine the feasibility to realize such requirements with the components and technology that are available to them. Around one year prior to release, service operators formally announce the concept and specification of the handset they want to purchase and invite manufacturers to submit their plans. At that time, manufacturers have already spent several months making a plan, so they quickly submit their plans and compete for the order. The operator compares the plans and decides to whom the order should be placed. After the contract between the operator and manufacturer has been signed, the manufacturer starts circuit design, exterior design, and software development for the handset. Since a detailed and feasible plan has been made during the planning period, the first prototype will be developed quickly, typically within a month or so. However, since new handsets in Japan typically employ many new components, the first prototype is usually problematic. Thereafter, a cycle of trial production, detection of defects, and mending of defects will be repeated several times. During the research interviews, one Japanese manufacturer revealed that it had once had 13 iterations in trial production in order to develop a single model. Normally, the design will be finalized three months prior to product release.

Product development in China is quite different. In particular, it is conducted independently by the manufacturer without the involvement of the service operator. As shown in Figure 1, the time devoted to the development of a single model in China is less than half of that in Japan. The most different aspect is the time assigned to planning.

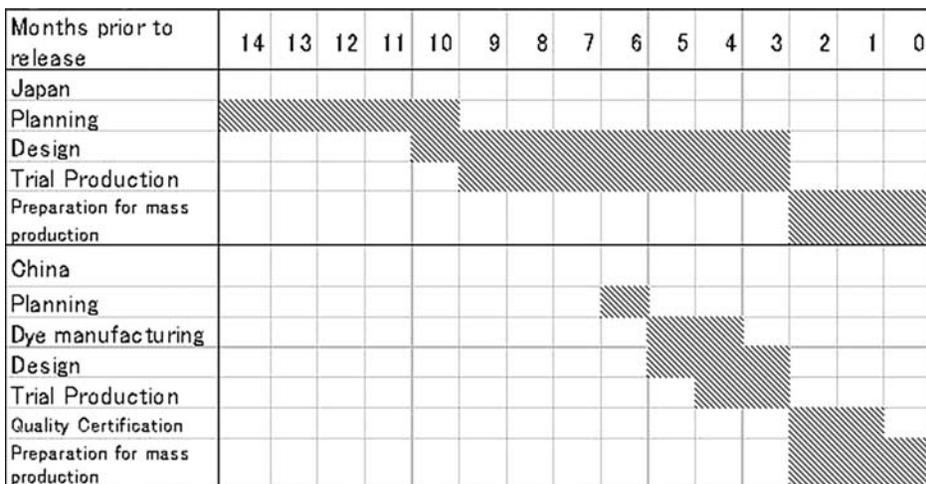


Figure 1. Typical schedule of handset development.

Source: Interviews with Japanese and Chinese handset makers and design houses.

In Japan, planning is as important as the design, because without a good plan manufacturers cannot win orders from the operator. In China, most handsets are sold by manufacturers to consumers without the involvement of operators, so planning involves the manufacturer determining for itself the concept of the new model. Even when Chinese operators purchase handsets from manufacturers and resell them to consumers, operators usually do not decide to buy handsets that are still at the planning stage; they generally select from the handsets that are ready for mass production.

The subsequent design period is also shorter than in Japan, because Chinese manufacturers only use mature components. In some cases they simply make use of the printed circuit board designed for a former model and change the exterior. Designing the case and making the dye for it are often the most important parts of the development process, and usually take approximately two months. Circuit design is conducted simultaneously, which normally takes between one and two months. Only two or three cycles of trial production are needed to finalize a new handset. After the design is fixed and the total amount of units produced reaches 2000, the model must pass through two quality certifications: (1) the 'full-type approval' (FTA) and (2) 'China-type approval' (CTA) conducted by an independent certification organization, which usually take two months in total.³ If the certification procedures are excluded, it takes only four months to develop a new model in China. In Japan, too, new handsets must pass through quality certification, which usually takes place around six months prior to release but, unlike China, the certification process does not slow the whole development process.⁴

Why is the design process so time-consuming in the case of Japan? The first reason, as mentioned before, is the adoption of several dozens of newly developed components for a new handset for the Japanese market. When adopting a new component, the Japanese manufacturer must certify its quality and durability, and sometimes the component needs to be redesigned several times to achieve the required quality. One Japanese phone maker revealed that it once took more than a year to finalize a new hinge, for example. Secondly, in Japan, the development of software is very time-consuming. To illustrate, 70% of the total man-hours that Japanese manufacturers spend on the development of a handset is occupied by software development. Software cannot be made simply by assembling components. Recently, Japanese manufacturers have been trying to create a common software platform that can be reused by several makers. But even this has not helped them shorten lead times significantly.

The total man-hours needed to develop a new model in China is only around one-quarter of that in Japan. The development cost per model is around 100 million Japanese Yen (converted from Chinese Yuan by official exchange rate) in China, compared with 5 billion Yen in Japan. This is an important reason why Chinese handset makers can achieve a break-even point much lower than that set by Japanese manufacturers.

The procurement of components

A mobile handset consists of various components, including the case, LCD panel, camera module, printed circuit board and integrated circuits (ICs), each produced by specialized manufacturers. There is little difference in the scope of component manufacturers that comprise the Japanese and Chinese mobile phone industries. However, the manner of procuring components from suppliers does differ significantly.

In the case of Japan, the phone manufacturer frequently requests suppliers to customize components. With regards to cameras, for example, Japanese phone makers may require the supplier to shorten their length. To shorten the camera the supplier needs

to redevelop the lens and sensors, which requires considerable time and cost. Yet Japanese makers are willing to bear the cost of this because a shorter camera will enable them to make a thinner handset than their rivals, which is a key selling point in Japan. Another component that Japanese manufacturers often require is customization of the display panel. As the LCD is the 'face' of the mobile phone, Japanese makers frequently want to make this aspect different from others in order to differentiate their product offering.

Chinese phone makers, on the other hand, only buy components that are already available in the suppliers' catalogue. At present, they almost never require the customization of components such as cameras and LCDs because customization is often expensive, and Chinese manufacturers are highly cost-sensitive. The customization of an LCD, for example, can require as much as 100 million Japanese Yen – the total amount a Chinese maker typically assigns to the development of one model of handset.

The manner of procuring ICs is also different. In Japan, the service operator and phone makers are deeply involved in the development of new IC chips for mobile handsets. Japanese phone makers are often the first in the world to use the most up-to-date chips. As ICs are highly complex, they may contain many bugs at the moment of their release. This often proves problematic to early adopting handset manufacturers and can require that the IC supplier is called in to fix them. Hence, using a brand new chip is more time-consuming in terms of product development than using a more mature chip, but the manufacturer that is willing to accept this shortcoming may be in a position to develop more advanced handsets than rival firms.

Chinese phone makers, on the other hand, rely on 'platforms' provided by the IC suppliers. A 'platform' is a set of ICs and software that support the basic function of a mobile handset, consisting of a radio frequency IC, which modulates and remodulates the radio waves, a 'baseband' IC that processes the digitalized signals, and operation system software. Along with the platform, IC suppliers provide a 'reference design' for the handset, which includes the list of recommended components that should be assembled along with the platform. Chinese phone makers and design houses depend heavily on reference designs, which Japanese manufacturers never do. Japanese manufacturers generally believe that they can design a circuit that is better in quality and efficiency than any reference design.

Spillovers of the fruits of development

As mentioned above, Japanese phone makers are often the first in the world to adopt new components. In order to install components, several cycles of testing and problem fixing are needed. After a lengthy period of such effort, the component will become mature enough to be installed in a handset. However, the fruits of such efforts by the Japanese makers soon spill over to other mobile phone makers, because once the component becomes mature, component suppliers will consider selling it to others. For the supplier, it is better to have as many customers as possible in order to recover the initial investment and Japanese phone makers cannot prevent them from doing so. When the component is sold to others, it is generally cheaper than its initial price, and the quality more stable, because of learning-curve effects. Hence, the fruits of the development efforts of Japanese phone makers are often utilized by European and Korean phone makers at a much lower cost, and when the Chinese phone makers buy the components they will be even cheaper.⁵

Such technological spillover is inevitable in the vertically disintegrated structure of the mobile phone industry. Should Japanese phone makers want to reduce such spillovers, they must either require suppliers not to sell new components to others, or to integrate

production through acquisition or in-house development. A large company such as Nokia, which occupies around 35% of the global handset market, can afford to integrate key component production: in fact, Nokia has integrated the design of key IC chips, for example. However, due to their relatively small sales volume Japanese manufacturers cannot easily bear the opportunity cost of losing global sales to suppliers.

Division of labour in development and production

There is a considerable difference in the division of labour of mobile handset production between Japan and China. In the case of Japan, most tasks are internalized within the phone maker itself, while Chinese phone makers rely heavily on subcontractors and suppliers.

The division of labour between firms in China has changed drastically since the emergence of Chinese phone makers. From when they began business activities in 1999 until around 2002, Chinese phone makers generally outsourced most development and production tasks to Korean and Taiwanese mobile phone manufacturers. After 2002, the role of Chinese phone makers in production became larger, but design was still outsourced to Korean design houses. Since 2003, however, Chinese phone makers have drastically reduced the volume of orders given to the Koreans, driving some of the latter to bankruptcy (Abe 2006). Instead, they have increased inhouse development and the orders they give to Chinese design houses. There were more than 60 independent design houses in China in 2005. Around one-half of the production by the Chinese phone makers is designed by domestic design houses, while the rest is designed by the phone makers themselves or by Taiwanese phone manufacturers.

The pattern of division of labour which is dominant in China in recent years is shown in Figure 2. The 'phone maker', which has its brand on the handsets, is only engaged in a part of product planning, wholesaling and a part of retailing. Most of the development activities, ranging from planning, design, trial production and evaluation are conducted by design houses. The end product of design houses are blueprints of the handset and a list of components. This material is then sold to the phone maker, which buys the components and delivers them, together with the blueprint, to 'electronic manufacturing services' (EMS) companies (independent electronic product manufacturers working as subcontractors), which then assemble the handsets.

The task of design houses is not necessarily limited to product design. Large design houses in China act as turnkey suppliers (Sturgeon 2002) that undertake many tasks for the sub-contracting firm. For example, some of the Chinese design houses provide printed circuit boards for the handset so that the phone maker can shorten the time to market. Some will contact component suppliers to ensure that particular catalogue components are currently available, or send engineers to the EMS companies to provide support for mass production. As most of the tasks of development and production are handled by design houses and EMS companies, the Chinese phone 'maker' can concentrate on the planning of product line-up and sales.

An important reason why Chinese phone makers outsource a certain part of their product development is that they need to release many models in order to compete with giant manufacturers like Nokia, which can easily release several dozens of models in China. The relationship between Chinese phone makers and design houses is not a fixed, long-term arrangement compared to the long-term customer-supplier relationship that is seen in Japan (Sako 1992). Chinese phone makers usually use two or three design houses, and the design houses in turn try to increase customers. Therefore, it is not unusual for

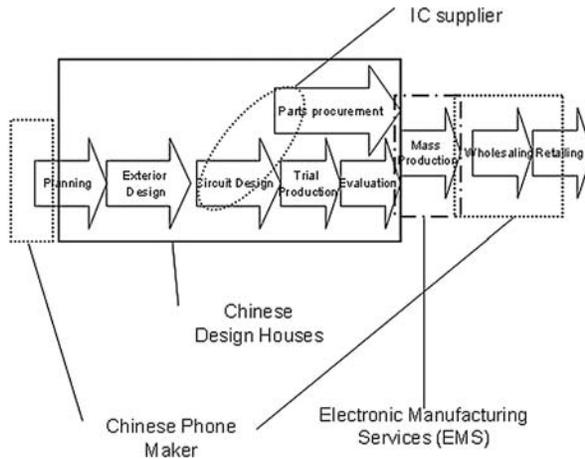


Figure 2. The division of labour within the Chinese mobile phone industry.

more than two phone makers to release very similar models at the same time in China, because they have bought the design from the same design house.

Design houses in China depend heavily on the IC suppliers platform and the reference design attached to it, so that circuit design and the selection of components are partly determined by the IC supplier. Chinese design houses, however, try to avoid depending on a single IC supplier by diversifying the source of platforms. This behaviour has opened up opportunities for new entrants. Some Chinese and Taiwanese IC suppliers have taken advantage of this and have entered business sectors once dominated by Western suppliers. The most prominent among the new entrants is the Taiwanese firm, Mediatek (MTK). Since MTK's platforms were cheaper and much easier to design a handset for than previous platforms, they were enthusiastically welcomed by Chinese phone makers and design houses. Mediatek's share among the platforms of Chinese-brand handsets rose from 13% in 2004 to 71% in 2005. The dominance of MTK's platforms, however, has intensified competition among Chinese phone makers. As MTK's platform contains not only basic operation software but also application software, all handsets that use it have almost the same functionality. It is difficult to differentiate one handset from another except for the case. Besides this, as MTK's platform is so easy to work with, more than 100 small businesses in China have started producing handsets using it. Though such firms are classified as 'illegal' producers under the production license system, they nevertheless produced more than 20 million handsets in 2005.

In the Japanese mobile phone industry, by contrast, the phone maker manages the entire manufacturing process, from planning to mass production (Figure 3). Some parts of the value chain, such as software development and mass production are, occasionally, outsourced to suppliers but under the close control and coordination of the phone maker. Compared with Figure 2, we can see that the position of Chinese 'phone makers' resembles that of service operators in Japan. Japanese firms tend to build fixed and exclusive relationships with their suppliers. Japanese phone makers, for example, typically will not try to diversify component suppliers but, instead, buy customized components from a single source. The supply relationship between the phone makers and the service suppliers is also relatively fixed and exclusive. Six out of twelve Japanese phone makers are exclusive handset suppliers to a single service operator, for example (Table 3).

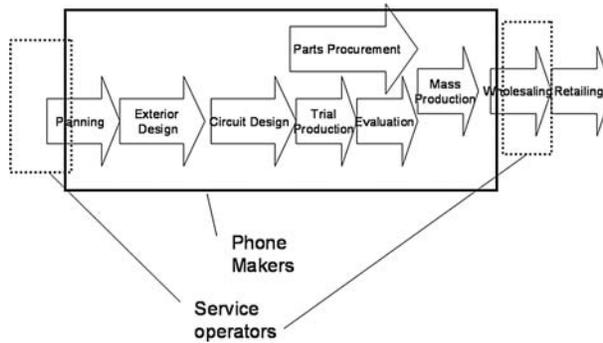


Figure 3. Division of labor within the Japanese mobile phone industry.

A comparison of the distribution system of Japan and China

In Japan, mobile handsets are technology-intensive products that require considerable time and cost to develop. They are released strictly according to the service operator's plan. Yet in China, handsets are developed more cheaply and rapidly, and they are released rather randomly in comparison. One reason for this difference is the fact that China is a rapidly growing market with a large disparity between regions and consumer segments. In such a volatile market, phone makers often have to resort to trial and error in order to detect and understand the underlying demand structure. The main reason, however, lies in the different levels of operator involvement in the distribution of handsets between the two countries.

Japan's bundle sales system

In Japan, all the handsets produced by phone makers carry the operator's brand and are sold to consumers through the operator. Retail shops never sell handsets alone: they are always bundled together with the operator's services. A handset is in effect a lure to attract the consumers to the service. Consumers are required to pay only a fraction of the real value of the handset, but they must at the same time subscribe to the service for at least 12 months. Japanese phone shops sometimes sell handsets at a price of only one Yen, but receive substantial commission from the service operator. An example was provided by one Japanese chain store selling mobile handsets which reported an instance of consumers paying 7800 Yen for a handset, and the store receiving 46,700 Yen as commission from the service operator. Operators gain because they can recover the commission they have paid from the subscriber's monthly fee.

Distribution channels in China

In China, operators are not involved much in the distribution of handsets. Mobile handsets are sold just like any other household electronic appliance. In the case of international brands such as Nokia and Motorola, handsets are distributed through large wholesalers. The wholesaler signs a contract with the phone maker to become the exclusive sales agent for some models, which are then sold to tens of thousands of retailers. Wholesalers hire sales staff at their branches and dispatch them to the retailers to help them sell the handsets to consumers. In the case of Chinese brands such as Bird and TCL, on the other hand, phone makers are directly involved in sales because large domestic wholesalers will not

help them sell handsets. Phone makers sell handsets to retailers through their sales branch network in each province. Sales branches hire sales staff and assign them to retailers.

This sales system is one of the main factors that helped Bird and TCL to grow their market shares in China to become the first and second largest, respectively, by 2003 (Table 2). However, the system did not work well. Some of their sales branches failed to establish relationships with local wholesalers and retailers, forcing them to stockpile handsets in their warehouses. At the point of output from factories, Bird and TCL were indeed the top two sellers in China but sales volumes at the point of retailers ranked them third and fourth, or even lower. In 2005, Bird reformed the direct sales system and started using local wholesalers. TCL also drastically downsized their sales personnel (Li 2007), but that reform might have accelerated its decline of market share.

During the early years of mobile phone diffusion, the sales system in China was similar to the Japanese bundled sales system. However, since Chinese phone operators adopted the GSM standard, handset sales have been disconnected from phone service sales. The change is related to a technological feature of GSM handsets, in which the subscriber identity module (SIM) card, which records the subscriber's telephone number and other information, can be separated from the handset. When the two can be separated, those who have bought discounted handsets together with phone services can cancel the latter and use the cheap handset to subscribe to another service operator. If there are a lot of such informed consumers, a bundled sales strategy is not sustainable. Thus, bundled sales became virtually extinct in China. However, since around 2003, phone operators have restarted to bundle sales in order to attract phone users from their rivals. By 2005, bundled sales accounted for 11% of total handset sales in China.

A comparison of retailers

Mobile handset retailers in Japan and China are quite different in terms of size and the number of models sold. A handset shop in China is about twice the size of that in Japan, and sells around 200 models, which is more than double the number of models sold in a Japanese shop, typically. Secondly, the nature of competition that takes place at the retail level is different. In China, competition between phone makers takes place inside individual retail outlets, where each brand occupies one or a few showcases, each of which are staffed with sales people dispatched from the phone makers. In Japan, competition between service operators is visible at the retail level. Some outlets specialize in selling only one operator's handsets. In outlets that sell several operators' handsets, each operator occupies one showcase and sometimes, sales staff are provided by the service operators.

Table 4 compares some basic indicators for a number of representative outlets in Japan and China. There is a large difference in the number of employees at one shop. In China, there are more than 30 employees if the sales persons sent from phone makers are included. Table 4 also shows a striking difference in the price of handsets. The average value of handsets is more than 54,000 Yen in Japan, if commissions from the operators are included. This price zone belongs to the high end in China, which accounts for approximately 20% of China's market. The average retail price is less than 27,000 Yen even in Guangzhou and Shenzhen, two of the richest cities in China. Even the cheapest handset in Japan is not as cheap as this.

Discussion: Japanese phone manufacturers in China

As the aforementioned comparison shows, handsets in Japan exist only as a component of a bundled package of hardware and services, while in China they are independent

Table 4. Comparison of mobile handset retailers.

Name and location of retailer	Sakai (Japan)	Yihaotong (Guangzhou, China)	Anxun (Shenzhen, China)
Monthly sales per shop (units)	232	833	1000
Monthly sales per employee (units)	57	39 (19)	67 (33)
Price per unit (yen)	54474	27000	25350
Employee per shop	4	22 (43)	15 (30)
Sales amount per employee (million yen)	3.1	1.0 (0.5)	1.7 (0.8)

Notes: Figures in parenthesis include the salespersons hired by phone makers. The price per unit for Sakai includes the commission provided by the operator. Values in Chinese yuan are converted to Japanese yen at the exchange rate of 1 yuan = 15 yen.

Source: Author's interviews and various company materials.

commodities. In a sense, mobile phone makers in Japan can be regarded as component suppliers, while in China they are end-product makers. This means that to succeed in the Chinese market, Japanese phone makers need to acquire capabilities that are not needed in Japan. In Japan they only have to win the competition for service operators' orders, but in China they need to have the capability to overcome competition in consumer markets. In Japan, phone makers need to develop only a few very sophisticated handsets but in China they need to develop several dozens of models every year. In Japan, phone makers are not required to undertake distribution activities but in China, phone makers must learn how to establish and manage complex distribution channels and how to promote sales.

From their entry to China in 1995 until 2002, the operations of Japanese phone makers in China followed a typically highly centralized pattern; they released only a few models that were adapted from their models in Japan to match the GSM technology. They invested little in marketing, believing that a good product would open up a market by itself. In fact, some individual models, including Matsushita's 'GD88', which was one of the first handsets in China to have a camera, did sell well. Yet the Japanese quickly recognized that they could gain only tiny market shares in China. Japanese makers had only high-end models and with a small number of models, they only had a modest presence in retailer outlets. The pressure was strong for them to increase the number of models, especially middle- and low-end models, so that they could compete with European and Chinese brands.

Since 2003, the Japanese phone makers, especially Matsushita and NEC, began to increase the number of models offered in China. They learned from the Chinese manufacturers how to increase the line-up, and outsourced the development and production of handsets to Chinese design houses and Taiwanese manufacturers. By making use of outsourcing, NEC, for example, which formerly sold only two models in China, released seven models in 2003 and 32 models in 2004. NEC also hired a Chinese manager, who had formerly worked for Motorola, as the head of its mobile phone company in China, expecting that this would help transfer distribution management know-how in China. These efforts contributed to the expansion of NEC's market share in China from 0.2% in 2003 to 2.1% in 2005.

However, by autumn 2005, Japanese phone makers recognized that the cost of increasing market share in China was substantial. Their market shares expanded but so did their losses. The reasons why the new strategy failed can be summarized as follows. First, competition from Chinese makers became very severe in 2005 – large numbers of 'illegal' handsets using MTK's chips flooded the market, and this posed a major threat to low-end handsets. Even major Chinese brands such as Bird and TCL were making losses in 2005.

Second, as some Chinese wholesalers interviewed reported, the product line-up of Japanese manufacturers did not fit the tastes of Chinese customers and their distribution channels were not well organized. Around the end of 2005, both NEC and Matsushita decided to withdraw their mobile phone business from China. With the exception of Sony, who now operates as Sony Ericsson and remains one of the top brands in China, all the Japanese phone makers had given up their business in China by 2006.

Conclusions

The observations and insights expressed in this analysis are based on a relatively small number of interviews conducted during a narrow time frame, and the mobile phone industry is changing very rapidly, especially in China. Nonetheless, it is clear that, during the period under study, the Japanese and Chinese mobile phone markets each stand at opposite ends of a spectrum. In Japan, the market is strictly controlled by the four service operators, and handset manufacturers act as suppliers to the operators. Entry barriers are very high, and even global giants, such as Nokia, Motorola and Samsung, struggle in this market. In China, on the other hand, the influence of service operators on handset manufacturing is slight, and manufacturers sell handsets independently of service operators. Entry barriers are low, and this explains why there are so many phone makers in China. In Japan, handset manufacturers need to develop only a few models every year but, in China, manufacturers need to release several dozens of models every year to be ranked among the top brands. Mobile telephone markets in most other countries fall somewhere between these two extremes: arguably nowhere in the world is the control of operators as strong as in Japan, and nowhere in the world are manufacturers as free as in China.

This study has found that the reason why Japanese phone makers failed in China largely lies in differences in distribution structure and demand conditions between Japan and China. The centralized organization and innovation process, which is a common feature of Japanese manufacturing MNEs, made it difficult for them to adapt to China. They were required either to adopt a more decentralized approach, in which their Chinese subsidiaries managed innovation independently from the headquarters in Japan, or to allocate more resources for overseas market development within a centralized organization. After several years of struggle in China, NEC and Matsushita adopted the former approach, but they failed again. Samsung adopted the latter approach: the Korean company maintained a centralized organization, but because its domestic market is small the company allocated a large amount of resources for the development of handsets for overseas markets. The success of Samsung in China reveals that a decentralized approach is not a necessary condition for overcoming competition in China. At the same time, the reason for the failure of NEC and Matsushita's decentralization should not be attributed to the approach itself. After all, competition in China was tough for all players in 2005. Having said that, the lack of experience in managing a decentralized innovation process may have been a contributory factor. The fact that after a few years of experimenting with decentralization NEC and Matsushita hastily withdrew from China and returned to a centralized approach, suggests that they could not find a suitable way to manage a decentralized organization in that market. It would be interesting for further research to compare the market development strategy of Japanese mobile handset manufacturers in China with those they have used in other developing and transition economies in order to gauge to what extent the challenges faced were specific to the China context.

Some observers expect that the start of 3G mobile phone services in China, which is forecast (at the time of writing) to take place in 2008, will open up opportunities for

Japanese manufacturers to succeed in China. 3G services will enable operators to provide various services so there will be more technological requirements placed on handsets than the current GSM demands. Operators may resort to bundling sales of handsets and services to promote the use of 3G. In short, it is likely that in future the Chinese mobile phone market will contain a segment that resembles aspects of the Japanese market. Consequently, Japanese phone makers may be in a better position in future to exploit in China the capabilities they have developed in Japan.

Differences in the technical standard, however, may prevent the Japanese from taking full advantage of 3G: for example, the Chinese authorities are eager to let their indigenous standard Time Division Synchronous Code Division Multiple Access (TD-SCDMA) succeed in the competition among 3G standards. Since Japanese manufacturers are not involved in the development of this technology, they will be handicapped in competition among TD-SCDMA handsets. Moreover, the fact that Chinese authorities are setting a low price target for TD-SCDMA handsets will also make it difficult for the Japanese to adapt to the market, because they still do not have the capability to develop competitive low-end handsets.

On the other hand, it might be the Japanese side that is going to change. In 2006, a research unit organized by the Japanese government concluded that the government must consider restrictions on the bundling of handsets and services by the operators to enhance competition. If handsets and services are unbundled, there will be more opportunities for foreign manufacturers to sell their products in Japan, and Japanese manufacturers will be required to face stiffer competition in consumer markets and to act more like independent handset manufacturers.

Notes

1. The following mobile telephony technologies are referred to in this study. Personal Digital Cellular (PDC) is a second-generation digital mobile communications technology created by the dominant telephone operator, Nippon Telegraph and Telephone (NTT) and several Japanese mobile phone manufacturers. Global System for Mobile (GSM) communications (originally from Groupe Spécial Mobile) is a second-generation digital mobile communications technology created as a pan-European mobile phone standard by European telecommunication authorities. It was adopted by mobile phone operators in more than 220 countries and regions around the world. Total Access Communication System (TACS) is a first-generation analogue mobile phone system standard developed by Motorola on the basis of AMPS, or Advanced Mobile Phone System, the primary standard in the United States. The personal handyphone system (PHS) is a type of mobile phone system developed by Nippon Telegraph and Telephone (NTT), and is characterized by low transmission power and small cell, making it unsuitable for rural areas or for calling from rapidly moving vehicles. In addition to being operated in Japan by Willcom, it is operated by two telephone carriers in China. Time Division Synchronous Code Division Multiple Access (TD-SCDMA) is a technology originally proposed by Siemens, but is being commercialized by a Chinese research consortium led by the state-owned enterprise, Datang.
2. Japan accounted for 39% of the worldwide subscribers of W-CDMA (Wideband Code Division Multiple Access) at the end of 2006 and 28% of the worldwide CDMA1xEV-DO (Code Division Multiple Access, Evolution-data Optimized) subscribers.
3. All companies, including both Chinese and Japanese manufacturers, wanting to sell handsets in China need to have their handsets pass these certifications.
4. Quality certification and dye manufacturing are part of the handset development process in Japan, but because their relative importance in the whole process is much smaller than in the case of China, they are omitted in Figure 1.
5. If a non-Japanese manufacturer tries a new component first, then Japanese manufacturers can theoretically enjoy the fruits of component development cheaply, but this is rarely the case in practice.

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