Windows of Opportunity, Learning Strategies
And the Rise of China’s Handset Makers

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AND THE RISE OF CHINA’S HANDSET MAKERS

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ABSTRACT

This paper examines the linkage among the industry and policy environment, firm-level resources and capabilities, and the success of learning strategies by China’s handset makers. Within a particular context—characterized by a large domestic market, disintegrated technological regime, established foreign firms, and supportive government policies—these firms were able to exploit their own specific advantages and also acquire new resources and capabilities, quite rapidly emerging as serious competitors in the domestic market vis-à-vis global incumbents. These latecomers have tightly linked their product innovation efforts to the local market characteristics and created competitive advantages through their distribution channels. Our findings have strategic implications for new entrants in other industry and national contexts, and also for research on the critical conditions and processes supporting successful technological learning.
1 INTRODUCTION

The objective of this paper is to identify the environmental and organization-level factors that created the opportunity for Chinese firms to enter the Chinese handset market that had been completely dominated by a few multinational incumbents. An extensive body of prior research in other context, particularly South Korea and Taiwan, has investigated the related issues of technological learning and capability accumulation (e.g., Amsden, 1989, 2001; Bell and Pavitt, 1993; Choung, Hwang and Choi, 2000; Dahlman and Sananiknono, 1990; Figueiredo, 2002, 2003; Hobday, 1994, 1995a, 1995b, 1995c, 1998; Kim and Lee, 2003; Kim, 1997; Kim et al., 1987; Kim and Dahlman, 1992; Kim and Nelson, 2000; Lall, 1996; Lee, Bai and Choi, 1988; Matthews and Cho, 2000). These and related studies come under what Figueiredo (2001, 2002) classifies as the latecomer company literature. Unlike studies of leading firms at the technological frontiers, the latecomer studies must address the process by which these firms acquire the basic technological capabilities to enter and subsequently compete in new industries.

These studies usually highlight two major disadvantages for most latecomers intent on entering new industries and markets: distance from main sources of technology, and distance from major markets. On the other hand, latecomer firms motivated to catch up may also have a number of advantages. Those often cited include cheap and well-trained labor, subcontracting opportunities based on cost-advantages, training by foreign buyers, a large and easily accessible pool of public knowledge, low sunk costs in earlier technology, educational and technology infrastructure, local market knowledge, and favorable governmental policies (export promotion incentives, local industry protection policies, financial subsidies, etc.).

To overcome these disadvantages and exploit any advantages they have, latecomers must successfully learn. In this context, technological learning involves the
absorption of external knowledge (from abroad or from adjacent multinationals), upgrading of technological capabilities, and acquisition of other competitively important resources and capabilities. Prior research has investigated how latecomers acquire needed technologies from advanced countries (e.g., Pack, 2000; Wu and Hsu, 2001; Hiraoka, 2001), manage the learning process and move up the value chain (Kuman and Bhat, 2000), and narrow technology gaps with firms in developed countries (Jegathesan, Gunasekaran and Muthaly, 1997; Bowonder, 1998; Matthews, 2001).

These and other studies at the firm level have basically confirmed the main characteristics of learning processes proposed by Lall (1992) and Bell and Pavitt (1993). Specifically, learning is usually costly and time-consuming, technological capability building is not an automatic process of production, firms are the central actors, learning is a cumulative process, the absorption and assimilation of new technologies by firms in a developing country involves a learning process which is often prolonged and risky, and latecomers often underinvest in the learning process. These studies also suggest that any analysis of the process and outcomes of firm-level technological learning initiatives must incorporate the industrial, policy, national and international features of the context in which it occurs (e.g., Hobday, 1995a; Kim, 1997a).

While scholars interested in latecomer issues typically focus on the acquisition of technological knowledge and capabilities, a large body of research on innovation highlights the role of the market as both source of ideas and direction for development efforts (e.g., von Hippel, 1988) as well as a selection mechanism. Regarding the latter role, technological capabilities and innovative outputs are valuable only to the extent that they have a value in the marketplace or provide some kind of competitive advantage. Conversely, as the literature on the resource-based view of the firm and organizational capabilities argues, any resources and capabilities that enhance firm performance (i.e., not
just technology-related ones) are valuable and should be acquired (e.g., Penrose, 1959; Nelson and Winter, 1982; Wernerfelt, 1984; Teece, Pisano and Shuen, 1999).

In this paper, we examine the emergence of China’s handset manufacturers from a broader perspective on technological learning to address the same basic questions of prior latecomer literature; namely, how did these firms acquire the resources and capabilities to enter the industry and eventually compete with incumbent multinationals, and what contextual factors (industry, policy, national and international) played a role in this process. Rather than a narrow focus on technological knowledge and capabilities, however, we consider a broader range of firm-level resources and capabilities that may explain the demonstrated success of these latecomers vis-à-vis incumbents.

2 RISE OF CHINESE HANDSET MANUFACTURERS

As a group, China’s handset manufacturers have been extremely successful in terms of acquiring and enhancing the resources and capabilities necessary to compete in the domestic handset market. From a collective market share of only 5.3% in 1999, they overtook the dominant incumbent multinationals in the Chinese market by 2003 (Figure 1). Given the extremely high market growth rates during this period, their increase in absolute production volumes and sales is even more dramatic. In terms of global production, Chinese manufacturers’ share rose from 2.3% in 1999 to 35% in 2003. These impressive gains were accomplished by a rapid increase in the number of domestic manufacturers and rapid production scale-up by each manufacturer.

***Insert Figure 1 about here***

As prior literature suggests, the factors behind such a spectacular emergence of latecomer firms lie in both the environment from which they emerged and within the
organizations themselves. The following sections describe those factors relevant to the rise of China’s handset manufacturers.

2.1 Environment: Opportunities outweigh barriers

Assuming that new entry is a result of strategic choice by firm managers, we must also assume that those managers not only perceived attractive opportunities for entry, but that those opportunities also outweighed barriers to entry. In the case of China’s handset industry in the mid-to-late 1990s, there were significant barriers to new entrants in the domestic market. First, the domestic market was highly concentrated and dominated by foreign firms. The leading global manufacturers had all established handset manufacturing and sales operations in China between 1993 and 1996 (Table 1), although most were in the form of Sino-foreign joint ventures. They were well financed and had successfully established production, marketing and sales operations in the domestic market.

***Insert Table 1 about here***

In the early years of the domestic market, from the late 1980s to early 1990s, Motorola controlled essentially 100% of the market. It had entered early with a major investment and long-term commitment to China. It also benefited from the Chinese government’s initial adoption of the TACS (Total Access Communications Service) standard, originating from AMPS (Advanced Mobile Phone System). Motorola supplied system equipment for this standard, and also supplied China Telecom with handsets. Nokia and Ericsson, using a different standard, entered China only in 1995 when China Unicom was created and began to build its GSM network1.

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1 Discussions with Fengyu Mao of Siemens Telecom Network Co. on 28 December 2004 and comments from one anonymous referee.
Motorola’s reluctant transition from analog to digital standard handsets and its slow pace of new handset model introductions created the space for Nokia and Ericsson to join Motorola as dominant firms; the three of them held a combined market share of 80% in 1998. The remaining market was split among Siemens, Samsung, Philips, Alcatel and Sony.

Besides the overwhelming dominance of foreign firms in the domestic market, the cost advantages of foreign firms were a second barrier to potential Chinese entrants. Unlike other labor-intensive industries such as garments, toys and other assembled products in which Chinese firms had distinct labor-cost advantages, this was not the case for handsets. The foreign firms were producing in China and were able to benefit from low local labor costs, so domestic firms would not have a significant advantage in terms of production costs. On the other hand, because the multinationals were already producing at high volumes, they could benefit from economies of scale in purchasing directly from suppliers of key components.

The foreign firms were also vertically integrated and had long-term supplier relationships, providing them with more reliable supplies of critical components. Nokia, for example, not only built a joint venture assembly base in Beijing, but also invited at least ten suppliers to establish operations in China to provide locally made components for its assembly operations. Nokia and its key suppliers were also located in close proximity of each other within the Beijing Economic and Technical Development Zone.

By the late 1990s, however, these barriers to new entry began to be offset by several attractive factors besides the growing size of the domestic handset market. Eventually, these came to make the handset industry attractive enough for new Chinese firms to enter.
2.1.1 Industry

Two features of the industry increased its attractiveness to potential entrants. First, the industry had passed the stage at which the market belonged to firms like Motorola, Nokia and Ericsson based on their lead in R&D. The technology had matured, and the basis of market competition was shifting from technical sophistication to product design, or the ability to make handsets that were stylish, comfortable to hold, and user-friendly. Competing no longer required expensive in-house R&D.

The second major change in the industry was the dis-integration of the value chain, resulting in the emergence of independent technology and component suppliers. As the technology supporting the components and subsystems of handsets became increasingly sophisticated and R&D costs increased accordingly, even the incumbent multinationals could not maintain all of the necessary technical expertise and produce all components internally. This, as well as the pressure to reduce product development cycle time, led to a product development model in the global handset industry based on networks of technology and component suppliers.

Because many of these foreign suppliers—primarily Taiwanese, South Korean and Japanese—had established production facilities in China, it was possible for new Chinese firms to source standardized components relatively easily. Other firms were even providing entire subsystems, such as Wavecom, a NASDAQ-listed French firm that began to supply WISMO modules commercially in 1997. WISMO modules are specifically designed compact devices for downstream handset assemblers. A module contains all of the digital, base-band and radio frequency hardware and software that assemblers need for a complete wireless solution. Not only does it remove the necessity for an assembler to

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2 Interview with Wanmeng Jiang, Wanyan TV Research Institute, 27 January 2003.
design and manufacture such modules, but it also reduces product development and field-test time.

The increasing availability of components from independent suppliers, and the removal of the high barriers to entry represented by R&D, product design and manufacturing expertise, made it more attractive for Chinese firms to enter the handset market. This is particularly relevant in the low-end handset market, for which hardware and software requirements are fairly standard. Indeed, this was the basis on which firms such as TCL Mobile Communications, now one of the leading local players in China’s handset market, initially entered and grew. TCL relied on WISMO modules and concentrated its resources on external handset design, marketing and distribution.

2.1.2 Government

The Chinese government had long had an impact on the handset industry through its control of telecommunications standards and the state-owned service providers. In 1999, however, it announced a set of measures that had the specific objective of promoting the development of local Chinese handset manufacturers (Table 2). The policy statement, “Several Opinions on the Development of China’s Mobile Communications”, usually referred to simply as “Document 5”, was jointly issued by the Ministry of Information Industry (MII) and the State Planning Committee. Their long-term objective was to promote employment and exports based on China’s local handset manufacturing\(^3\). The government hoped that Chinese firms would be able to capture 30% of the market by 2003, a target that was considered too aggressive at the time.

***Insert Table 2 about here***

\(^3\) Interview with Peigen Shi, Siemens China, 11 June 2004.
According to Document 5, the government would license handset manufacturers in China. By the end of 1999, 16 Sino-foreign joint ventures, one wholly-owned foreign subsidiary, and 10 local handset makers had obtained licenses. By 2004, the number had increased to 30 licenses for GSM handset manufacturers and 19 for CDMA. Although the financial subsidies to domestic firms suggested in Document 5 were not implemented, those policies providing preferential conditions to domestic firms were. These policies made it easier for domestic firms to obtain manufacturing licenses and allowed them to sell all of their production domestically.

### 2.2 Organizations: Resources and capabilities

Changes in the external context—both industry features and government policy—made the environment generally more attractive for new entrants. Firms differed, however, in their ability to exploit the new opportunities based on their existing set of resources and capabilities and, critically, their ability to learn; i.e., to deepen existing and acquire new resources and capabilities to enter and then continue to compete as the basis of market competition shifts.

***Insert Table 3 about here***

As a group, the domestic firms whom the government granted handset-manufacturing licenses were leading manufacturing firms in China, primarily in consumer electronics, appliances or telecommunication equipment. These firms had several important types of resources or capabilities that could support their entry into the handset market (Table 3). First, they are all manufacturers of assembled products and had successfully implemented quality control and inventory management processes. Second, most of them had well-established distribution channels, often nationwide, and valuable experience in managing distributor relationships and providing customer support. Third,
most of them had strong brand names among consumers. Their brands may not have been as strong as those of multinationals like Nokia and Motorola in first-tier cities such as Beijing and Shanghai. In third-tier cities and inner provinces, however, those domestic brands may be even stronger than leading multinationals who have not invested as much in penetrating those markets. The domestic firms also benefit from the brand name recognition driven by the other consumer products they sell, such as DVD players, PCs, TVs and home appliances. Of the four groups of firms in Table 3, the home appliance manufacturers have proven particularly successful as competitors in the handset market, and much of that success may be attributed to their having a strong initial base of relevant resources and capabilities.

Local firms also benefited from several resources and capabilities compared to multinationals.

2.2.1 Local market knowledge

The Chinese market presented two challenges to foreign handset manufacturers. First, there was no guarantee that models that had succeeded in other markets would succeed among Chinese consumers. Most multinationals followed, in practice, a one-size-fits-all strategy, launching models in China that had sold well in their other markets (Bout et al, 2004). Siemens was an exception when, at the end of the 1990s, it introduced colorful and specially designed handsets for the Chinese market based on local market research. Most other multinationals, however, missed key trends in China that differed with trends in their other major markets. For example, multinationals did not offer the clam shell design early enough to capture significant market share, and domestic firms came to dominate the market for this design by quickly recognizing its popularity among Chinese consumers and designing their own models. This design now accounts for 60%
of the domestic market. Other examples include the Chinese firms quickly offering a wide and rapidly changing range of style options, from colors and textures to options such as rhinestones embedded in the casing.

The second challenge is the diversity and pace of change within China’s national borders. Multinationals were initially successful primarily in the first-tier cities such as Shanghai, Beijing and Guangzhou, that are considerably wealthier markets than other regions. Experience gained in these wealthier markets, however, may not be relevant for second- and third-tier cities and poorer or more rural markets. Domestic firms, in contrast, are used to marketing across China’s diverse regional markets, and have also incorporated those differences into their product line development.

2.2.2 Distribution channels

Domestic and multinational firms implemented distribution channels that differed in simple yet critical ways in terms of the number of layers and geographic scope. The multinationals distributed their handsets through three levels of distributors—national, provincial and regional/county—before reaching retailers. They typically appointed 10 or so Level 1 national distributors, such as China Postal Mobile Communications Equipment, Telling and Cellstar. These Level 1 distributors were responsible for all sales and servicing, although the multinationals’ China offices did provide back-up support. These national distributors deliver handsets to province-level distributors (Level 2), who in turn pass them on to regional or county-level agents (Level 3), after which they finally reached retailers.

Although this distribution structure served the multinationals well enough during the early-mid 1990s, it had two fundamental weaknesses once the domestic firms entered the market and established their own distribution channels. First, the multinationals’
structure had, in practice, rather narrow geographic coverage. The Level 1 national distributors are cash-rich and large in scale.\textsuperscript{4} They also focus on the richer markets. China Postal Mobile Communications Equipment, for example, distributes handsets for Motorola, Nokia, Ericsson, Siemens, Philips, Panasonic and Mitsubishi. In 2000 it sold 8,360,000 handsets and generated revenues of RMB 12 billion. However, its operations are concentrated in large municipalities, primarily Beijing, Tianjin, Shanghai, Wuhan, Chengdu, Xian, Shenyan, Harbin and Shenzhen. By 1999 these regions already had high penetration rates (50-70%), and further growth would be very slow. In other provinces, such as Jiangsu, Shandong, Hunan, Yunan, Henan and the western provinces, penetration was much lower (10-30%) and meant better potential for volume growth. These provinces, however, were not covered by the Level 1 distributors that the multinationals had been relying on.

A second weakness of the multinationals’ distribution structure was that it did not provide strong incentives to Level 3 distributors and retailers. Their strong brand names had put multinationals in a position of power vis-à-vis these distributors and retailers, and these two levels split, for example, RMB 130 per Nokia handset that they sold. Similarly, front-line sales people, who have a very strong influence in customers’ purchasing decisions, received only a RMB 15 commission per Nokia handset.

These features of the multinationals’ distribution strategy were exploited by the new domestic entrants. First, the latecomers have fewer layers in their distribution structure. They typically by-pass the national-level distributors (the Level 1 distributors of the multinationals) and sell directly to province-level distributors. This provides two advantages. First, the thinner structure supports faster response to market information, feeding back into product development and marketing activities and also helping to

\textsuperscript{4} Interview with Lin Huang, China Unicom, 17 December 2004.
improve inventory turnover as handsets move more quickly from the factory to final customers. Second, the domestic manufacturers are able to pass on higher margins to the front-line sales people, increasing their incentive to recommend domestic firms handsets over those of multinationals. Manufacturers found that even a small difference in financial incentives would lead retailers and sales personnel to drastically alter the proportion of counter space devoted to a brand.

The domestic handset manufacturers have also been more aggressive in pursuing alternative distribution strategies. In terms of channels, they were the first to begin to distribute handsets through the emerging retail chain stores, such as Guomei, Suning and Dazhong, further reducing the layers in the distribution system. They are also pursuing direct sales via the Internet. In terms of geographic coverage, they are aggressively pricing low-end handsets that are in demand in small cities and towns, a large-volume but low-margin market segment that the multinationals have essentially left to the domestic firms.

2.3 Learning process: The case of Ningbo Bird

Domestic firms were only able to take advantage of the industry and policy environment and emerge as serious competitors to multinational incumbents in China’s handset market because they successfully implemented a learning strategy that enabled them to acquire the resources and capabilities critical at successively competitive stages of the market’s development. In this section we use the case of Ningbo Bird to illustrate the nature and progression of such learning and capability development.  

Bird was founded in 1992 and has become a major domestic provider of pagers. Since entering the handset market in 1999, Bird has been ranked the top-selling domestic

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5 Much of this material is drawn from interviews with Xieli Zhou, Ningbo Bird, 18 August 2004.
handset manufacturer in China, with unit sales rising from 700 thousand in 2000 to 12 million in 2003. It is also emerging as a major exporter, rising from 500 thousand in 2003 to 3 million in 2004, accounting for more than 50% of Chinese handset exports and ranked 8th among the world’s handset makers in 2004 after more established multinationals such as Nokia, Motorola, Samsung, Siemens, Sony-Ericsson, LG and Matsushita. In 2004 Bird also received factory certification from three European carriers—Vodafone, Orange and Bouygues Telecom—and Italy’s largest carrier has begun to purchase its handsets.

Bird’s entry into the domestic handset market and emergence, only 5 years later, as a leading and potentially first global Chinese handset manufacturer can be divided into three stages characterized by different learning processes and their implementation.

2.3.1 Knockdown-based manufacturing

At the end of 1998, before diversifying from pagers into handset production, Bird undertook an investigation of major handset manufacturers and the domestic consumer market. Bird’s managers found that most of the handsets sold in China at that time did not have reception capabilities strong enough to receive signals in the western provinces of China, where base stations were few and the geography limited users’ ability to use their phones. From its experience in providing pagers to the same market, Bird saw this type of territory as a niche market in which it could enter relatively easily because there were essentially no competitors, but which could provide a means of gaining initial market share.

Bird, however, had none of the necessary product design and manufacturing know-how, nor none of the critical components for producing handsets. Furthermore, none of the leading multinationals who already had their own manufacturing and sales operations in China were interested in Bird’s overtures for a cooperative venture.
Fortunately for Bird, Sagem Electronics of France had not received a handset manufacturing license from the Chinese government and was interested in some kind of partnership that would enable it to participate in the Chinese market’s growth. Sagem, at that time the sixth largest handset producer in the world, also supplied RF components to French Mirage fighter jets.

In January 1999, Bird and Sagem signed a cooperative production agreement. Under the terms of the agreement, Bird would import product designs, production equipment and quality assurance systems from Sagem. Bird would also import all components from Sagem, from the case, LCD, PCB, antenna and battery. Essentially, Bird’s primary responsibility was to assemble these components and sell the handsets in China.

To do this, however, Bird had to assimilate Sagem’s knowledge related to handset assembly and quality assurance. Meanwhile, Sagem’s French experts came to Bird to oversee the training and implementation of those processes. Bird also established a quality management committee consisting of sub-groups focused on different quality domains—design, suppliers, production, after-service—and continuous quality improvement. These sub-groups coordinate with each other to implement total quality control, as well as achieve improvements in quality performance measures. This system not only enabled Bird to maintain acceptable handset quality, but also lead to Bird becoming the first Chinese handset manufacturer to receive European CE production certification.

At this initial stage, Bird also made the strategic decision not to compete head-on with the multinationals who already had a strong presence in China. Instead, Bird focused its sales and marketing efforts on the western (i.e., non-coastal) regions of China, which had also been the primary market for its pagers. This region is less populated than much
of the coastal regions, and multinationals had decided not to allocate their marketing and
distribution efforts there. As a result, within a year Bird was able to quickly build up
market share in these provinces; for example, over 40% in Xingjiang and over 30% in
Gansu and Henan.

Bird’s products were all Sagem designs, including the RC818, Mirage RC838,
RC838L, MC858 and L968. Bird, however, did draw on its understanding of the customer
market in this region to decide which products to offer at what timing. It also linked the
product and consumer characteristics with its marketing message. For example, its
advertisements featuring pop singer Coco Lee positioned Bird’s products as the “fighter of
handsets”, emphasizing their greater signal reception capability that was particularly
important to consumers in these relatively remote and rural areas.

Bird faced a challenge in finding distributors for its products; established
distributors showed no interest in Bird’s products. Bird had no choice but to establish its
own distribution channels, again drawing on its sales and distribution experience in the
pager business. By the end of 2000, Bird had a distribution system in place that included
28 province-level sales branches, 30 province-level customer service centers, 400 medium
and small-size city customer service centers, 1,600 county-level consumer service centers,
and 50,000 retailers selling Bird’s products.

2.3.2 Module-based manufacturing

From mid-2000, Bird entered the second stage of its development as it undertook
module-based manufacturing. Bird continued to import the module—containing all of the
digital, base-band and radio frequency hardware and software that are central to a
handset—from Sagem. However, Bird would have to source the other components, such
as the microphone, battery, antenna, keyboard and volume switches.
This shift, while enabling Bird to capture more of the value-added production, also required additional skills besides those related to assembly and quality assurance acquired during the preceding stage. It had to be able to evaluate and select cost-effective suppliers globally, integrate all components and parts together at a competitive price, and design the casing and external features to offer models that attract consumers.

To acquire these skills, Bird undertook numerous cooperative alliances with both Chinese and foreign firms. For example, Bird began to work with component suppliers such as BENQ, Quanta and LG to source and establish procedures for testing and selecting components. It collaborated with Bellware and Mobile Link in R&D to develop new products, and brought in several Korean industrial design houses to develop handset designs. It also collaborated with software and hardware firms to introduce new technical features into its phones, such as its collaboration with TTP to develop handsets with fast Chinese short messaging service (SMS) capabilities.

2.3.3 Chip-based manufacturing

As competition with both multinational and domestic handset makers intensified, Bird responded by extending its activities even further upstream as it became a chip-based manufacturer. Compared to module-based manufacturing, chip-based manufacturing requires more knowledge and skills because it involves proprietary technology and integration of components, software and the operating system. It also requires more advanced manufacturing capabilities for the assembly of subsystems related to base-band, radio frequency and power supply. For example, Bird would have to integrate a handset’s power amplifier, transmitter, receiver, power controller, passive components, filters and crystals.
To acquire the new knowledge and skills required for this level of manufacturing, Bird used both alliances and internal capability development. First, it established a 50-50, $2.5 million joint venture in August 2002 with its first partner, Sagem. The joint venture, Ningbo Bird Sagem Electronics, focused on the development of handsets and related components and equipment and has the dual objective of expanding market share in China and entering the European market. Bird also formed an alliance with Siemens to co-develop, produce and sell handsets worldwide. Bird will provide marketing and distribution for Siemens’ handsets in China, and Siemens will provide technical assistance to Bird, including co-establishing a cooperative research institute.

As they have embarked on more technically demanding manufacturing and foreign as well as domestic markets, Bird’s managers have come to recognize the importance of internal R&D capabilities as a basis for faster and deeper learning from outside sources and alliance partners. Since 2002 they have increased R&D spending to 6% of sales, currently employ 600 in R&D, and have established 5 R&D centers in Nanjing, Chongqing, Chengdu, Hangzhou and Ningbo.

This upgrading of internal skills has already paid off in terms of Bird being able to enter the higher-end handset market in the first-tier cities for the first time in August 2003 with its DOEASY model. The DOEASY combines the functions of a handset, camera, computer and PDA. The DOEASY represents a major advance for Bird because, except for the microchips, it developed the handset’s core technology and operating system. Bird’s first experience in these markets went well, selling more than 20 thousand DOEASY handsets in Shanghai during the October 2003 national holiday week.
2.4 Strategic challenges for China’s handset makers

The success of their learning strategies so far have enabled the Chinese firms to emerge as significant threats to the multinational incumbents in the Chinese market and, in the future, some of them will likely emerge as significant competitors in markets outside of China. On the other hand, these firms continue to face significant challenges that they must address in order to continue to succeed in the domestic and foreign markets. First, many of their product, marketing and distribution strategies are easily imitated, and the multinationals in China have already begun to adopt some of them. Samsung and Motorola, for example, have also launched designs such as TCL’s rhinestone-studded handsets. Most are also using pop singers and actors in their advertising campaigns.

The multinationals are also fighting back by selling part of their production directly to Level 2 distributors, skipping over the national distributors. Nokia has even begun to provide handsets directly to large specialty retailers, such as Guomei and Sunin. They are also extending the geographic coverage of their distribution networks and introducing a wider variety of handsets.\(^6\)

The second challenge is when, if ever, Chinese firms will move up the global value chain (Caplinsky and Readman, 2000). As a group, Chinese handset manufacturers are still bunched at the low end of value-added manufacturing. Even the leading domestic firms, such as Bird and TCL, significantly lag multinationals such as Nokia and Motorola in core software and non-chip circuitry design. As for core chip design and manufacturing, that continues to be dominated by Texas Instruments and Intel, not even the leading multinational handset manufacturers. If the Chinese firms are not able to steadily move up, they may themselves suffer as subsequent latecomers enter and compete at the same technological level.

\(^6\) Interview with employee of Motorola (China) Electronics, 3 April 2004.
3 STRATEGIC ISSUES FOR LATECOMERS

What, if any, lessons do the experience of the Chinese handset manufacturers have for other latecomer firms in China or in other national contexts? We believe that the pattern observed in this industry is quite similar to that found in China’s personal computer industry. In their study of Lenovo, Xie and White (2004) also found that distribution channels and linkages to end-users formed a critical and enabling basis on which Lenovo entered the PC manufacturing business and eventually emerged as China’s largest PC manufacturer and one of the world’s largest by volume. Comparative research in the PC or other industry, such as the Chinese auto industry, could more systematically explore the short- and long-term costs and benefits of learning strategies and the specific activities of firms based in developing country markets.

For firms in other developing countries with large domestic markets, such as India, Brazil and Indonesia, this study may have several practical implications. First, managers wishing to enter an existing industry must identify both their existing resources and capabilities on which their entry into a new market could be based, as well as the technological and organizational capabilities that they must acquire in order to enter and compete in that market. Chinese firms were able to buy time and learn-by-doing by not competing initially with incumbents, but first addressing un- or underserved markets that allowed them to reach economies of scale, generate cash flow, and acquire further resources and capabilities that in turn enabled them to compete more and more directly with incumbents.

A further important implication is that distribution channels and connections to the market can be a critical competitive factor, even in high-tech industries. Compared to
foreign firms, domestic firms could have a stronger base for establishing and managing domestic channels, as well as insights into local customers’ needs and preferences. While focused on their domestic market, they have less pressure to follow global practices that may not be ideally suited for a particular local market. Ceterus paribus, they should be able to develop stronger relationships with their local customers and, thereby, compete successfully. Linkages to the market should also be used to provide input into any technological development efforts, to make sure that product and process development is in tune with the firm’s primary market.

4 CONDITIONS FAVORING NEW ENTRANTS

Our study of the rise of China’s handset makers makes two broad contributions to the literature on technological learning. First, the patterns found from this study resonate with findings from other industry and national contexts (e.g., Lee, Bae and Choi, 1988; Chong, Hwang and Choi, 2000; Xie and White, 2004). The Chinese handset makers learned and acquired resources and capabilities in a stage-wise manner, and each of these stages also required targeted learning efforts (e.g., Lall, 1987, 1992; Bell and Pavitt, 1993), the locus and channels for learning evolved over time (e.g. Hobday, 1995a; Kim, 1997a), and R&D capability building was an evolutionary process (e.g., Nelson and Winter, 1982). Furthermore, the experience of these firms reinforces findings from other developing and developed country contexts that Cohen and Levinthal’s (1990) concept of absorptive capacity is equally relevant for these firms as for firms in developed countries (e.g., Choung, Hwang and Choi, 2000; Lee et al, 1988).

The Bird case also highlights the role of dynamic capabilities (Teece et al, 1997) by which a firm can acquire new resources and capabilities. The Chinese firms’ ability to
learn not only enabled them to compete, but also to vertically integrate and undertake
more of the value-added production, as well as enter new market segments in terms of
geography and product sophistication. To support each stage of development, they have
added R&D capabilities that were successively more sophisticated in tandem with their
product development requirements. At first R&D was simply external product design, and
later extended into component integration, subsystem design and software development.

This study makes a more important contribution to the broader literature on
technological learning by identifying the particular configuration of environmental and
firm-level factors and process by which the Chinese handset makers were able to enter and
become significant threats to incumbent multinational firms. Initially, the incumbents
seemed destined to share the Chinese market among themselves. Not only did they have
leading and proprietary technology, but they also had established distribution channels and
brand names. They could also benefit from economies of scale in R&D, procurement and
production. Moreover, they had already entered and taken over the domestic Chinese
market, so they did not suffer from tariff or non-tariff barriers like firms in other industries
trying to enter China (for example, banks, insurance companies, and retailers).

By the late 1990s, however, the industry and policy environment had evolved so
that firms that had an enabling set of initial resources and capabilities, and who had the
motivation and ability to acquire new skills and knowledge, were able to successfully
enter the market. Similar to prior studies in other contexts (e.g., Kim, 1997a; Hobday,
1995a; Amsden, 1989), our study of the Chinese handset industry reveals two key aspects
of the industry environment that created a receptive environment for new entrants. First,
the market was in a period of rapid growth such that it could support a large number of
new competitors. Second, the incumbents were strong and established, but they were not
targeting several significant market segments; specifically, low-end products and areas
outside the wealthier urban markets. New entrants, therefore, did not have to compete head-on with the incumbents initially, and their entrance did not at first result in lower revenues for the multinationals. Even if the new entrants took some market share from the incumbents, revenues for all were still growing rapidly and so the new firms were not perceived, at least initially, as a threat.

The policy environment was also supportive of new domestic entrants. The government gave domestic firms preferential treatment in terms of where they could sell; namely, they could sell all of their production domestically, while the multinationals were required to export a significant portion of their Chinese production. Perhaps more importantly for the emergence of the domestic industry, however, was that the government managed the entrance of both foreign and domestic firms into the Chinese market, a policy strategy that it had also applied successfully to the television industry (White and Linden, 2002). By allowing some but not all foreign firms to enter, it struck a balance between bringing in technology and higher competitive standards and allowing a massive inflow of technically and organizationally stronger firms. At the same time, by granting manufacturing licenses to Chinese firms that had already demonstrated their ability to manufacture and market consumer goods and electronics, the government was in effect giving a chance to the firms with highest probability of successfully entering the handset market. Compared to other firms, they had the resources and capabilities that were relevant for this industry.

At the firm level, the case of Ningbo Bird illustrates the initial set of resources and capabilities and the subsequent learning activities that enabled these firms to enter and expand their share of the domestic handset market. Compared to the incumbent multinationals, these domestic firms had a deeper understanding of consumers and the various markets within China. They were also focused exclusively on the markets within
China and were willing to develop products specifically for them, while the multinationals had made development of global product models a fundamental element of their strategies. This stronger link to the domestic market was enhanced by the flatter structure of their distribution channels. The domestic firms also had extensive experience in operating and managing domestic distribution channels, albeit for other consumer products such as home appliances and electronics. These factors related to the importance of distribution channels have not been addressed by prior research on latecomer firms, which has tended to focus primarily on technological capabilities.

5 CONCLUSIONS

This paper has identified the particular configuration of environmental and firm-level factors that allowed latecomer firms from a developing country to enter and challenge dominant multinationals. It has shown how specific features of the industry—a large and growing domestic market and a disintegrated technological regime—and the policy environment—one favoring domestic firms with relevant resources and capabilities—created the environment in which aggressive new entrants were able to successfully learn. It also highlights the importance of market linkages—in this case, a firm’s distribution network and knowledge of important but ignored market segments—in the learning process. As a result, this study of Chinese handset makers has implications not only for latecomer firms in other industry and national contexts, but also for policymakers and researchers concerned with the process by which organizations acquire new capabilities that enable them to compete with incumbents.
REFERENCES


Jegathesan, J., Gunasekaran, A. & Muthaly, S. (1997) Technology development and


# TABLE 1

## MAJOR MULTINATIONAL HANDSET MAKERS IN CHINA

<table>
<thead>
<tr>
<th>Company</th>
<th>Joint venture in China</th>
<th>Ownership</th>
<th>Location</th>
<th>Employees</th>
<th>Revenue*</th>
<th>Profit*</th>
<th>Entry into China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorola</td>
<td>Motorola (China) Electronics Co., Ltd.</td>
<td>100%</td>
<td>Tianjin</td>
<td>12,161</td>
<td>17,575,882</td>
<td>2,523,153</td>
<td>1992</td>
</tr>
<tr>
<td></td>
<td>Hangzhou Eastcom Cellar Phone Co., Ltd.</td>
<td>42%</td>
<td>Hangzhou, Zhejiang province</td>
<td>1,700</td>
<td>4,632,000</td>
<td>77,487</td>
<td>1996</td>
</tr>
<tr>
<td>Nokia</td>
<td>Beijing Capital Nokia Mobile Telecommunication Co., Ltd.</td>
<td>50%</td>
<td>Beijing</td>
<td>735</td>
<td>6,384,277</td>
<td>540,028</td>
<td>1995</td>
</tr>
<tr>
<td></td>
<td>Dongguan Nokia Mobile Telephone Co., Ltd.</td>
<td>70%</td>
<td>Dongguan, Guangdong Province</td>
<td>834</td>
<td>6,828,911</td>
<td>508,114</td>
<td>1995</td>
</tr>
<tr>
<td>Siemens</td>
<td>Siemens Shanghai Mobile Communication Co., Ltd.</td>
<td>60%</td>
<td>Shanghai</td>
<td>568</td>
<td>2,040,718</td>
<td>59,180</td>
<td>1993</td>
</tr>
<tr>
<td>Ericsson</td>
<td>Beijing Ericsson Mobile Communications Co., Ltd.</td>
<td>49%</td>
<td>Beijing</td>
<td>612</td>
<td>3,482,206</td>
<td>158,282</td>
<td>1995</td>
</tr>
<tr>
<td>Philips</td>
<td>Philips Consumer Communications and Sed Co., Ltd.</td>
<td>Not available</td>
<td>Shenzhen</td>
<td>590</td>
<td>2,594,463</td>
<td>123,700</td>
<td>1996</td>
</tr>
</tbody>
</table>

Source: 1999 China Markets Yearbook, City University of Hong Kong Press. Hong Kong; 2001 China Markets Yearbook, Foreign Languages Press, Beijing

Notes: Data about Dongguan Nokia and Philips are in the end of 2000. Other data of the table are in the end of 1998.

*RMB thousands
TABLE 2

KEY POLICY MEASURES IN DOCUMENT 5

<table>
<thead>
<tr>
<th>Implications</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preferential treatment for local handset makers</strong></td>
<td>Local firms are allowed to sell 100% of their output domestically.</td>
</tr>
<tr>
<td></td>
<td>The MII would invest up to RMB 1 billion (about $120 million at former official exchange rate) for domestic handset and telecom equipment manufacturers.</td>
</tr>
<tr>
<td><strong>Requirements for foreign-invested enterprises</strong></td>
<td>With a few exceptions, foreign firms are not allowed to establish wholly-owned handset production facilities in China;</td>
</tr>
<tr>
<td></td>
<td>Sino-foreign joint ventures are required to export no less than 60% of their output;</td>
</tr>
<tr>
<td></td>
<td>The import content of joint venture’s product is no more than 50%;</td>
</tr>
<tr>
<td></td>
<td>Manufacturers with foreign involvement are required to establish R&amp;D centers in China.</td>
</tr>
<tr>
<td><strong>Manufacturing licenses</strong></td>
<td>Manufacturing license system will be adopted. Only firms granted manufacturing licenses can produce handsets in China.</td>
</tr>
<tr>
<td>Firms</td>
<td>Advantages</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Home appliance manufacturers</strong></td>
<td>Higher consumer recognition, strong marketing skills, well-established distribution channels and after-sales service networks.</td>
</tr>
<tr>
<td>TCL</td>
<td>Well-established nationwide distribution channels, and strong brand name.</td>
</tr>
<tr>
<td>Haier</td>
<td>Well-established distribution channels and strong brand name.</td>
</tr>
<tr>
<td>Amoisonic</td>
<td>Previous manufacturing and sale skills related to consumer electronics audio and video products.</td>
</tr>
<tr>
<td>Konka</td>
<td>Well-established nationwide distribution channels, and strong brand name.</td>
</tr>
<tr>
<td><strong>Telecom Equipment Manufacturers</strong></td>
<td>Relatively stronger R&amp;D and manufacturing capabilities, but have lower consumer recognition in the mass market.</td>
</tr>
<tr>
<td>Bird</td>
<td>Previous manufacturing and marketing skills with pagers; Knowledge about marketing and distribution in the West part of China.</td>
</tr>
<tr>
<td>ZTE</td>
<td>Strong technological accumulation in telecom equipment such as switches manufacturing, but without distribution channels and brand name.</td>
</tr>
<tr>
<td><strong>PC Manufacturers</strong></td>
<td>Strong marketing and sales skills, wider product coverage, but hesitation on moving into this sector</td>
</tr>
<tr>
<td>Lenovo</td>
<td>Well-established distribution channels and strong experience in PC manufacturing, but acted slowly.</td>
</tr>
<tr>
<td><strong>Electronics Manufacturers:</strong></td>
<td>Relatively higher technological capabilities, but less-developed distribution channels and brand names in the mass-market</td>
</tr>
<tr>
<td>Panda</td>
<td>Strong experience with electronics manufacturing and sales.</td>
</tr>
<tr>
<td>South High-Tech</td>
<td>Relatively stronger technological capability, but less experience with sales and marketing products in the mass market.</td>
</tr>
</tbody>
</table>
FIGURE 1
MOBILE HANDSET MARKET SHARES