

# EFFECTIVE STRATEGIES TO CATCH UP IN THE ERA OF GLOBALIZATION: EXPERIENCES OF LOCAL CHINESE TELECOM EQUIPMENT FIRMS

*Chinese telecom equipment firms illustrate successful models for local firms in emerging economies to catch up to and compete with multinationals.*

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**OVERVIEW:** *Firms in emerging markets have traditionally followed one of two strategies to catch up with multinational enterprises (MNEs): developing customized products, services, or innovative business models or buying and absorbing technology from MNEs. In the era of globalization, these strategies are no longer effective. The new strategy to succeed is innovation-based differentiation, developing core technologies and advanced product offerings that are delivered at a low cost and with excellent customer service. Using this strategy, leading local firms are quickly catching up with MNEs in market development, technology development, or both. In this paper, I analyze the strategies these firms used to catch up and discuss the implications of these strategies for both local firms and MNEs.*

**KEY CONCEPTS:** *Emerging markets, Globalization, Strategy, Technological innovation, latecomer disadvantage*

“Catching up” is a central theme for local firms in emerging markets because multinational enterprises (MNEs) enjoy huge first-mover advantages in both developing advanced technologies and capturing market share (Chandler 2005; Amsden 2001). Local firms have traditionally followed one of two strategies to catch up with MNEs. Some have taken advantage of foreign firms’ “liabilities of foreignness,” developing products, services, or business models based on a deep understanding of the local environment that MNEs cannot easily duplicate (Hymer 1976; Kogut and Zander 1995). Others have focused on transferring and absorbing

technologies from MNEs to develop strong manufacturing capabilities (Amsden 2001; Kim 1997). However, in the current wave of globalization, these strategies are no longer effective; MNEs now have the tools to develop deep understandings of local environments and may choose not to transfer advanced technologies, especially when local firms are perceived to be direct competitors.

As a result, local firms must develop new strategies to compete. Successful local firms in the telecom equipment industry in China are pursuing a strategy that focuses on innovation-based differentiation, developing core technologies and offering advanced products and excellent service at a lower price than MNEs can offer. For example, in 2000, when the former China Unicom decided to build its CDMA network, it invited bids from a group of MNEs. The bids offered by these suppliers exceeded China Unicom’s budget of RMB 20 billion Yuan dramatically, and the company initiated a new round of bidding in 2001. In this round, local firm ZTE was the winner; three key aspects stand out in ZTE’s presentation:

1. Technical superiority: the equipment offered by ZTE got higher technical evaluation scores than that of most competing MNEs;
2. Low cost: ZTE was able to offer lower prices to China Unicom, so much lower, in fact, that the project came in about 40 percent below budget, at RMB 12.1 billion Yuan; and
3. Customized technical solutions: ZTE’s deep understanding of China Unicom’s business and network allowed the company to offer a range of innovative solutions that were not obvious to MNE competitors (Mi and Yin 2005).

The combination of lower prices, technological superiority, and innovative, localized services put ZTE ahead of much-larger MNEs.

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Using similar strategies, leading Chinese firms such as Huawei and Datang Telecom Technology & Industry Group (Datang) have been very effective in catching up with MNEs, as measured by increases in market share, rates of new technology development, or both. These firms represent the leading edge of a wave of local firms in emerging economies who are beginning to catch up to the MNEs that have dominated their local markets. Increasingly relying on strategies that focus on low-cost, innovative differentiation, these local innovators are leaving behind both MNEs and other local firms. In this paper, I study five representative Chinese telecom equipment firms using a case study method, analyze the strategies these firms are using to catch up to their MNE competitors, and discuss the implications of the findings for both local firms and MNEs.

### **Catch-Up Strategies in the Chinese Telecom Equipment Industry**

This study includes five Chinese telecom equipment firms: ZTE, Huawei, Datang, Great Dragon Information Technology Group (Great Dragon), and Eastcom Communications Co., Ltd (Eastcom). These firms were selected for two reasons: (1) They are using different strategies to catch up, and (2) there are significant variations in the effectiveness of their catch-up efforts.

Following a case-study methodology (Eisenhardt 1989; Yin 1989), I relied mainly on interviews to collect data, while utilizing secondary sources (Shen 1999; Shi 1998; Zhang 2000) to provide further support. From 2002 to 2010, I interviewed more than 30 people in the five firms, with some participants interviewed several times. I also interviewed industrial and academic experts familiar with the five firms (for example, people at the TD Alliance). Interviewees included senior vice presidents; vice presidents for R&D, marketing, human resources, and public relations; and senior engineers; at Datang, I also interviewed the former CEO and the chief engineer. The interviews typically lasted 90 to 120 minutes, although in some cases they ran as short as an hour or as long as four hours. The majority of the interviews were semistructured, focusing on the specific strategies and practices the company used to develop capabilities and capture market share.

The five firms represent a range of competitive strategies and have experienced varied degrees of success in catching up to MNEs. Eastcom has followed a traditional catch-up strategy, buying technology from MNEs and developing strong manufacturing capabilities to produce products developed by MNEs. Founded in 1958, Eastcom became one of the key telecom equipment makers

<sup>1</sup>The MPT later evolved into the Ministry of Industry and Information Technology (MIIT) by combining and restructuring with other ministries. Eastcom is a joint stock firm, with the state as the key shareholder.

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directly managed by the former Ministry of Post and Telecommunications (MPT).<sup>1</sup> In the late 1980s, Eastcom began to transfer more-advanced technologies from MNEs such as Motorola and quickly became a star among local telecom equipment firms. Shi Jixing, Eastcom's CEO, also became a well-known manager in China. In 1998 Shi received a reward of 260,000 RMB Yuan from Eastcom's parent company, PTIC, because Eastcom's 1997 revenue reached 4.7 billion RMB Yuan, making it the 94th-largest firm among China's top 1000 industrial firms (Zhang 2000, 173). However, the strategy of buying technology and neglecting internal development of core technology increasingly became a constraint for further growth, and Eastcom has been struggling to survive since the late 1990s, as indicated by the fluctuations in its revenues (Figure 1).

But simply developing innovative technology is not a guarantor of success, either, as the cases of Datang and Great Dragon illustrate. Both Datang and Great Dragon have close connections with research organizations: Datang is the result of the 1999 conversion of the Post and Telecommunications Institute of MPT, which was established in 1957 to conduct R&D for state-owned telecom firms, into a for-profit firm. Great Dragon was founded in 1995 as a joint venture between PLA Information Engineering University's National Digital

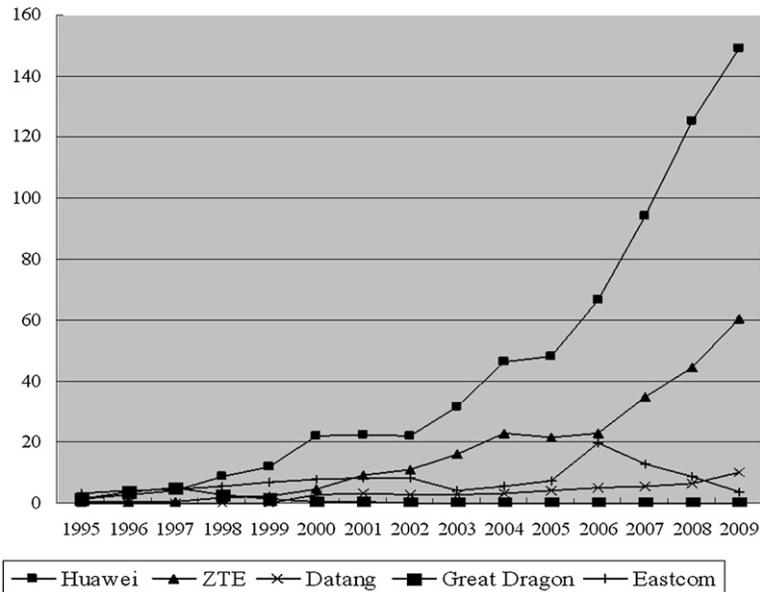


Figure 1.—Chinese firms catching up: Revenue 1995–2009 (Billion RMB Yuan)

Switching System Engineering & Technological R&D Center (NDSC) and PTIC to commercialize the first locally originated large-scale digital switch, developed by NDSC. Datang and Great Dragon have both followed the same strategy of competing with MNEs by developing leading technologies and products. However, these two firms have not been very effective at developing strong complementary capabilities to turn technological innovation success into commercial success. For example, Datang is the main developer of the key technologies for TD-SCDMA, one of the three international standards for 3G wireless telecommunication. However, although Datang’s revenue has grown steadily in the past few years, ZTE and Huawei have both captured more market share than Datang in the TD-SCDMA market. Great Dragon’s profile is similar. Its revenue reached a peak of 5 billion RMB Yuan in 1997 but has declined since then. In 2002, Great Dragon was restructured and broken into several firms, none of which is recognized as an active player in the market today.

The final two participant companies, Huawei and ZTE, have found more success by balancing innovative core technologies with unmatched customer service. Both companies were established in the 1980s, Huawei in 1988 and ZTE in 1985. The two firms have developed leading technologies and products in exchange, transmission, 3G and LTE wireless, and software-defined radio (SDR), and both have realized sustained growth (Figure 1). A major difference between Huawei and ZTE and other local firms is that Huawei and ZTE have been pursuing a more

comprehensive approach to catching up; they are effective in developing not only strong technological innovation capabilities but also complementary capabilities, such as marketing and professional management. As a result, Huawei and ZTE have been more effective in overcoming the challenges of the latecomer disadvantage and leveraging global markets to build scale.

### Technological Innovation

A strong technological innovation capability is the basis for the success of Huawei, ZTE, and Datang in catching up to MNEs. The logic of the approach is clear. MNEs usually enter emerging markets based on their technological superiority. Particularly in technology-driven markets like telecommunications equipment, local firms typically do not have strong proprietary core technologies when they start the catching-up process. Therefore, developing strong innovation capabilities and superior core technologies is a precondition for local firms to compete with MNEs in the market. As Ren Zhengfei, founder and CEO of Huawei, pointed out in the early 1990s, “Although the telecom equipment market today is hot, most local firms will die in one to two years. They do not have proprietary technology. It’s critical for us to develop our own technology in order to survive” (quoted in my interview, Huawei senior vice president, June 5, 2002). In contrast, Eastcom relies on technology transfer and a strong manufacturing capability, reflecting the belief of Shi Jixing, CEO of Eastcom from 1988 until his

retirement in 2003, that transferring technology from MNEs is a more effective choice for local firms to catch up than developing core technologies internally (Shi 1998, 58, 64–66).

A comparison of Huawei and Eastcom illustrates the effect of these different beliefs on each company (Table 1). Huawei has invested in innovation throughout its existence. In early 1993, about four years after the founding of the company, Huawei separated its R&D function from the manufacturing department and, in early 1995, established the Central Research Department (CRD), which oversees all corporate R&D activities (Zhang 2009). And Huawei has continued to invest heavily in R&D, at a rate of about 10 percent of sales revenue between 2000 and 2009, a level similar to that of MNEs in the industry but much higher than R&D spending at other local firms (Figure 2). Eastcom, by contrast, dissolved its corporate R&D department in 1991, when the company was able to transfer key technology from Motorola. Scientists and engineers from the corporate R&D department offer technical services for manufacturing products transferred from MNEs, universities, and outside research institutes; the company does not pursue its own R&D program (Shi 1998, 256). Although Huawei is also very active in utilizing outside R&D resources, the difference is obvious: for Eastcom, outside R&D resources are regarded as a substitute for internal innovation capability development, while for Huawei, they are a complement.

Huawei also has a very effective strategy of doing focused R&D, sticking to what company documents call “the principle of intensity of the pressure.” Under this guiding principle, Huawei applies as much of its resources as possible to the development of one product or technology at a time, hoping that a high level of investment intensity will lead to breakthroughs in the targeted area. The

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rationale is that as a smaller, younger firm, the company is more likely to be successful by concentrating its limited development resources in carefully selected, narrowly defined areas (Interview, Huawei senior vice president and director of CEO’s office, June 5, 2002). In order to stick to this central principle, Huawei has passed up a lot of opportunities. In fact, the Huawei Basic Law, the company’s guiding philosophical treatise, enforces that focus, making it a rule that the company will not invest in business areas outside telecom equipment, even those in near-adjacent areas, such as telecom service (Huang 1998).

Different technology strategies lead to different results. Huawei has developed a continuous flow of new products in digital switch, transmission, intelligent network, router,

*Table 1.—The role of technological innovation capabilities in a firm’s ability to catch up*

Firm	Technology Strategy	Specific Practices	Results
Huawei	Developing strong technological innovation capability	<ol style="list-style-type: none"> <li>1. Invest in innovation early in the life of the company</li> <li>2. Maintain dedicated corporate R&amp;D department</li> <li>3. Invest heavily in R&amp;D (about 10% of revenue)</li> <li>4. Conduct focused R&amp;D by sticking to the “principle of intensity of the pressure”</li> </ol>	<ol style="list-style-type: none"> <li>1. Continuous flow of new technologies and products; holder of highest number of invention patents in China in 2008</li> <li>2. Steady and rapid growth; revenue increased from 1.5 billion RMB Yuan in 1995 to 141 billion in 2009</li> </ol>
Eastcom	Developing strong manufacturing capability based on technology transfer	<ol style="list-style-type: none"> <li>1. Dissolve corporate R&amp;D department</li> <li>2. Treat outside R&amp;D as substitute for internal R&amp;D</li> </ol>	<ol style="list-style-type: none"> <li>1. Perceived by industry as technology and market follower</li> <li>2. Revenues of 3.3 billion RMB Yuan in 1995, 3.8 billion in 2009, with large fluctuations in intervening years</li> </ol>

Sources: Company annual reports and interviews

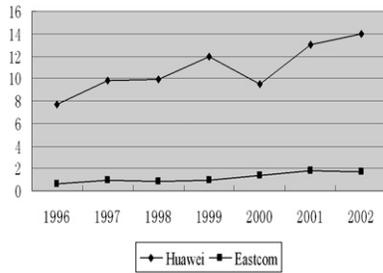


Figure 2.—R&D investment at Huawei and Eastcom (% of sales revenue)  
Sources: Company annual reports and interviews

and wireless telecommunication technologies. Huawei is also one of the few companies in the world able to supply next-generation exchange systems. The result is a steady upward growth trend. Eastcom, on the other hand, has continued to rely on technology transfer and OEM manufacturing, and its growth has not been as steady or as sustainable (Figure 1).

### Overcoming the Latecomer Disadvantage

Compared with well-established MNEs, local telecom equipment firms are often seen as latecomers to the market, and they face particular challenges based on their perceived lack of legitimacy or a lack of stable links to customers and other stakeholders (Carpenter and Nakamoto 1989; Stinchcombe 1965). Telecom service providers are more willing to buy from MNEs whose names they know and trust, even if local firms are able to offer advanced technologies and products.

Firms such as Huawei, ZTE, and Datang have developed four strategies to overcome the latecomer disadvantage (Table 2). The first is to offer products at least as advanced as those offered by MNEs, if not more so. ZTE won the China Unicom bid not only by coming in at a lower cost, but also by offering more-advanced products than competing MNEs could. This contract provided a great opportunity for ZTE to develop a close relationship with China Unicom and become a strategic partner (Interview, ZTE vice president and senior engineers, Oct. 23, 2006). ZTE has followed up that success by becoming one of the technology leaders in the industry and the market leader for software-defined radio (SDR) base stations, in part by providing base stations that can accommodate dual networks and reduce the total cost of ownership by 30 percent (Interview, ZTE vice president, Feb. 24, 2009). To some extent, Datang's story is similar. Since its development of TD-SCDMA and the formal commercialization of this technology in 2009, Datang is showing steady and rapid growth, with 2009 revenues of more than 10 billion RMB Yuan (Figure 1).

The second strategy these firms have used to overcome the latecomer disadvantage is to develop better customer relationships. In managing Huawei's customer relationships, Ren Zhengfei requires that the company follow what he calls a "comprehensive" approach (Interview, Huawei senior vice president and director of CEO's office, June 5, 2002). While other firms usually focus customer-relationship management efforts on managers, and especially high-level managers, of customer firms, Huawei seeks to develop close working relationships with employees at all levels of customer firms, believing that ordinary employees can also play critical roles in building strong relationships between companies.

Table 2.—Strategies to overcome the latecomer disadvantage

Strategies	Typical examples
Offer products as advanced as—or more advanced than—those offered by MNEs	<b>ZTE:</b> (1) CDMA products for China Unicom in 2001; (2) World leader in SDR <b>Datang:</b> (1) Leader in TD-SCDMA and TD-LTE; (2) Rapid growth after commercialization of TD-SCDMA.
Develop stronger customer relationships	<b>Huawei:</b> Developing "comprehensive" customer relationships and offering more complete services
Form strategic alliances and joint ventures with customers and MNE competitors	<b>Huawei:</b> Joint ventures with local Post and Telecoms Administrations (PTAs) in the 1990s led to exponential growth in provincial sales <b>Datang:</b> Collaboration with Siemens on the development of TD-SCDMA from 1998 to 2002 gave Datang critical knowledge in the management of technology development.
Invest in professional management	<b>Huawei:</b> Conscious, systematic transformation from an entrepreneur-driven firm to professional management, with plans for top-management development and succession

Sources: Company annual reports and interviews

Developing close customer relationships also means offering better service than other firms do to supplement quality products and low prices. Here, again, Huawei has excelled. For example, in the spring of 2000, when part of Heilongjiang Province's telecom network was broken, Huawei's engineers arrived on the scene within a day, even before it was clear where the problem lay. Although they traced the failure to another firm's products, Huawei's engineers remained to help solve the problem. The customers were so happy that they invited Huawei's engineers to dinner (Cheng and Liu 2004, 69–70).

By contrast, while Datang and Great Dragon have developed excellent technological capabilities, their limited capability in developing close customer relationships has made it difficult for these companies to overcome the latecomer disadvantage (Interview, Great Dragon senior vice presidents and manager for marketing, June 4, 2002; Interview, Datang senior vice presidents, vice presidents, and senior engineers, Nov. 25, 2005; Mar. 24, 2006; May 17, 2010). Although Datang is the technology leader in TD-SCDMA and the quality of the TD-SCDMA network it helped to build in Gansu Province ranks fourth among about 30 provincial TD-SCDMA networks, China Mobile decided in 2010 to replace products from Datang with those from ZTE and Huawei in cities such as Guangzhou and Shanghai. Similarly, Great Dragon was once regarded as the technology leader among local firms because of its development of the HJD04 large-scale digital switch. However, the firm failed to develop strong service capabilities, partially because it was used to relying on government relationships to secure orders from service providers. As a result, some service providers began to replace Great Dragon's products with those from Huawei and ZTE in 1998 (Zhang 2009, 64).

The third strategy local firms have used to overcome the latecomer disadvantage is to form strategic alliances and joint ventures with customers and even competitors to expand market share and develop technologies. In the late 1990s, Huawei had developed advanced products but faced difficulty in promoting the products in the market; to overcome this challenge, the company formed joint ventures with local Post and Telecom Administrations (PTAs), which provided telecom services at the provincial level and managed state-owned firms within their areas of responsibility. At that time, PTAs were both telecom service providers and government agencies directly managing state-owned telecom equipment manufacturing firms. Both Huawei and the PTAs could benefit from these joint ventures: the state-owned firms could improve their performance by producing and selling Huawei's more-advanced products, and Huawei could sell more products to the PTAs directly through the joint ventures and indirectly because of this newly developed relationship with the PTAs. For Huawei, the relationship produced exponential sales growth at the provincial level. For example,

**Developing strong professional management capabilities is critical for companies to win the confidence—and hence the business—of telecom service providers.**

in 1996, Huawei's revenue in Sichuan Province was about RMB 40 million Yuan; in 1997, the first year of the joint venture between Huawei and the local PTA, revenues in the province grew to RMB 500 million Yuan (Li 2006).

Datang is another example. In 1997, recognizing the Chinese company's leadership in several important technology areas, Siemens offered to collaborate with Datang in the development of TD-SCDMA, and co-developed the TD-SCDMA system for mobile (TSM). Although the collaboration ended four years later because of differences in the two companies' strategies (Siemens decided to focus on TSM, and Datang decided to focus on Time Division Duplex Low Chip Rate, that is, TDD-LCR), Datang learned a lot from Siemens, including the methodology for conducting integrated product development. In addition, the fact that Siemens was eager to collaborate with Datang bolstered the company's reputation and indicated to potential customers that TD-SCDMA was an important and advanced technology (Interview, general secretary of TD-Alliance and Datang former senior vice president, May 16, 2010).

Finally, local firms have engaged in a fourth strategy to overcome the latecomer disadvantage: developing strong

professional management capabilities. This is critical for companies to win the confidence—and hence the business—of telecom service providers. Huawei has addressed this challenge with its Huawei Basic Law, developed in the mid to late 1990s to guide the company’s transformation from a small, entrepreneur-driven firm to a professionally managed company. The Huawei Basic Law provides a comprehensive framework for Huawei’s employees, especially managers, to think about complex management issues as the firm moves forward in its transformation. A specific element of developing strong professional management capabilities at Huawei and ZTE is about preventing the misuse of *guanxi* (personal connections) for personal benefits, a behavior very common in many Chinese firms. Huawei requires that regional directors for sales are not native to the regions they supervise; this means that directors are less likely to have personal relationships that could be exploited in unethical ways within their geographical area of responsibility (Interview, Huawei senior vice president, June 5, 2002).

Compared with Huawei and ZTE, Great Dragon and Datang have been slower and less effective in developing professional management capabilities. Great Dragon failed to realize the importance and the difficulty of developing professional management. For example, Great Dragon’s largest shareholder and second largest shareholder, PTIC and NDSC, had very different understandings about how to set up an effective corporate governance structure for the company. Accordingly, Great Dragon relied heavily on the key technology developers to manage the company in the early days of the firm; when it found that this practice was not effective, Great Dragon hired a CEO without any knowledge or experience of the telecom equipment industry. This contributed to Great Dragon’s restrictive practices (such as limited exploration in new technologies and customer relationship development and maintenance) and eventual failure in the late 1990s (Shen 1999; Interview, Great Dragon senior vice presidents and manager for marketing, June 4, 2002).

In the case of Datang, professional management development was delayed mainly by two factors. First, there are many difficulties in changing the culture of the former Post and Telecommunications Institute of MPT, which regarded research and development as the only priority, to a new culture that balances research and development, marketing and sales, manufacturing, etc. Second, Datang had to focus on the development of new technologies and products for the TD-SCDMA system before this system’s official commercialization in 2009, so it had little resources and time to build capabilities other than technological innovation capabilities (Interview, Datang senior vice presidents, vice presidents, and senior engineers, Nov. 25, 2005; Mar. 24, 2006; May 17, 2010).

## Leveraging Global Markets

The early advance of MNEs into the Chinese telecom equipment market has made globalization a matter of survival for local firms. The Chinese government has adopted a policy of opening the Chinese telecom equipment market to international competition since the mid-1980s; through the early 1990s, MNEs dominated advanced telecom equipment markets. Throughout this period, MNEs increasingly treated the Chinese market as a strategic market, and competition intensified. The more-successful local firms Huawei and ZTE recognized this reality early and acted quickly.

When they successfully developed their first large-scale switches in the mid-1990s, Huawei and ZTE stepped into this highly charged market. In this climate, domestic firms could not hope to compete and survive with a solely domestic market. If Huawei—and other domestic telecom equipment companies—could not make marked progress in globalization within three to five years, they would face huge pressures when the domestic market reached maturity (Interview, Huawei senior vice president and director of CEO’s office, June 5, 2002). As a result, Chinese telecom equipment firms were forced to start their globalization processes when they were very young. ZTE, founded in 1985, became the first local firm to enter the international market in 1995 (Editing Committee 2008, 263–264; Mi and Yin 2005, 59). Huawei, founded in 1988, also began its globalization process in the mid 1990s (Cheng and Liu 2004, 177–189). Both ZTE and Huawei started their globalization process through exporting digital switches, and both firms chose to start in less-sophisticated markets in Asia (for example, Pakistan and India) and Africa (such as South Africa and Egypt) and move later to more-sophisticated markets in Europe and the United States.

Since taking these first steps, Huawei and ZTE have both been very successful in globalization; international markets account for an increasing share of sales for both companies (Figure 3). This success stems from key elements of their

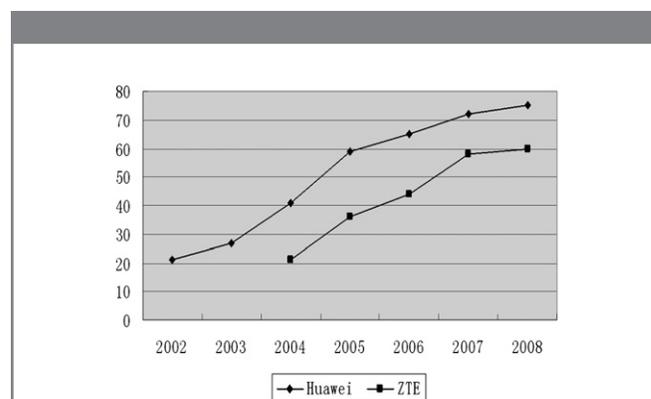


Figure 3.—Sales from international markets: Huawei and ZTE (% of total sales)

Sources: Company annual reports and interviews

# MNEs must develop strategies to maintain their technology leadership.

strategy. For example, both companies have shown a willingness to accept short-term losses in the interest of long-term gains. Globalization is a very expensive process; those expenses can constrain the implementation of other strategies in the short term, while revenues can be slow in developing. Huawei began to allocate resources to developing the Russian market in 1996; it took six years for the company to begin to benefit from this effort (Cheng and Liu 2004, 209–210). ZTE started to develop the African market in early 1999. Although each country's market was small and orders from these countries fluctuated widely, ZTE decided to develop the African market into a strategic market. Revenue from the African market has grown to account for about one-third of ZTE's international sales (Mi and Yin 2005, 62–63).

Finally, for both companies, a deep appreciation of their own competencies and competitive advantages offers direction for the globalization effort. Both ZTE and Huawei believe that they have obvious advantages over MNEs in their advanced technologies and low costs (Yin 2009). These advantages, they believe, will make international telecom service providers more willing to buy from them over better-known MNEs. This appreciation of their own competencies and competitive advantages gives high confidence to both ZTE and Huawei to develop their international business, although this globalization process is associated with high expenses, even short-term losses, and entry barriers. For example, when ZTE was approved by the government in 1999 as a qualified supplier of GSM products, the GSM market in China had been dominated by MNEs, and ZTE had little hope to sell its GSM products in China. However, ZTE believed that it could sell its GSM products in the international markets, and actively pursued these markets. ZTE's GSM products began to expand rapidly in 2003 (Mi and Yin 2005, 70–72).

## Conclusion

Using the strategy of innovation-based differentiation combined with low cost and excellent service, leading Chinese telecom equipment firms are quickly catching up with MNEs in the market. This has important implications for both domestic emerging-market firms and MNEs doing business (or seeking to do business) in emerging markets.

For local firms, the most important implication might be that focusing on transferring technology to compete on low-cost manufacturing alone is no longer an effective strategy. In this era of globalization, developing innovation capabilities as strong as those of the MNEs is the basis for competing successfully. The findings of this paper also support the notion that achieving a constant rate of continuous innovation is more important for a firm's growth than starting from a high level of capability

development (Porter 1990). In fact, when ZTE and Huawei were established in the 1980s, Eastcom was already an established firm with a well-recognized technological capability. Until 1997, Eastcom was bigger than ZTE and Huawei in terms of sales revenue. However, Eastcom chose to rely on buying technology rather than on improving its own capability to develop technology, and so lost ground to the more-innovative firms.

The implications for MNEs are twofold. First, MNEs must develop strategies to maintain their technology leadership. Advanced technology is an important source of competitive advantage for most MNEs, and one of the most difficult obstacles for local firms to overcome. However, this study shows that local firms can achieve breakthroughs in developing advanced technology.

Second, MNEs need to develop strategies to address the challenges arising from local firms' attention to innovation. According to Porter (1998), it's difficult for a firm to pursue both a low-cost strategy and a differentiation strategy simultaneously. But this study shows that once local firms have developed core technologies, they may well be able to combine a low-cost strategy and a differentiation strategy to create competitive advantage. This could present huge challenges for MNEs, exemplified by the rapid expansion of firms such as Huawei and ZTE, not only in their home markets but also in the international market.

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