

---

# The strategies of Chinese and Indian software multinationals: implications for internationalization theory

---

Jorge Niosi and F. Ted Tschang

---

China and India are emerging as major entrants into the international software industry. Both are rapidly learning through outsourcing with multinational enterprises (MNEs) from advanced nations, yet their paths to this dynamic sector are very different. Chinese software firms have focused on their domestic market by working with foreign MNEs, while they move cautiously abroad. Indian firms, which are already large, continue to expand overseas as well as to climb the value chain. Different approaches to MNEs provide useful perspectives. At the same time, the innovation systems approach is necessary to explain the foundations of the industry. The article provides hypotheses and tests them. It concludes that learning internationalization processes are different in Chinese and Indian MNEs, and provides explanations for the different patterns.

## 1. Introduction

The software industry is experiencing a major delocalization trend, from developed to developing countries (LDCs). In this trend, multinational enterprises (MNEs) from both developed and developing countries are playing a major role. In the 1980s and 1990s, India took the lead in fostering this industry, thanks to its large pool of skilled low cost labor. Ireland and Israel followed suit. Since 2000, China and other LDCs have been entering this fast-growing sector, but questions remain as to how these countries can compete with India, or whether they even have to. In this article, we have chosen to study and compare two significant LDCs that present very different software industries—one emerged, India, and one emerging, China. We examine both the differences and similarities of the growth and internationalization strategies of these two cases, to better inform theory on how developing country MNEs internationalize, and ultimately, compete. The rest of this section summarizes the literature on the global software industry, its relevance to developing country industrialization, and the place of India and China in this sector. The second section recalls some contributions to the theory of the MNE, and derives hypotheses from

these perspectives as well as from the existing literature on software industries in India and China. In the third section, the article provides a discussion of India and China's MNE software sectors based on a combination of interviews and secondary data. We conclude with a discussion of our evidence *vis-à-vis* theoretical hypotheses.

### 1.1 *The evolution of the computer software industry*

The computer software and services sector (CSS) emerged within the computer manufacturing industry, from which it progressively detached itself. The emergence of the present-day industry occurred in the United States through different stages.<sup>1</sup> During the period around 1980–1994, the CSS grew by 20% a year to become one of the largest world industries. The global packaged software industry was estimated to be worth around US\$ 250 billion in 2007.<sup>2</sup> The USA still dominates 50% of this industry. For example, Microsoft leads the operating system (OS) and office niches, while Oracle and SAP compete to dominate the enterprise segments under pressure from the world's largest, IBM and Microsoft. Even as new niches form, consolidation is ongoing, with companies specialized in particular niches entering different segments occupied by other firms. Table 1 gives an idea of the size of the industry.

### 1.2 *The globalization of software production*

The outsourcing phenomenon started in the beginning of the software “maturation phase;” outsourcing was first applied to software services, followed by software products themselves.<sup>3</sup> International offshoring is integrating independent

---

<sup>1</sup>In the first era (1950–1959) independent service firms appeared to provide programs that IBM and other hardware vendors did not already sell embedded in their mainframes (Campbell-Kelly, 2004). Software has evolved with the advent of various computing platforms, from the mainframe to the minicomputer, then the personal computer, the networked environment, and most recently, the era of the Internet and Intranet. Today, the computer software industry is usually presented as being composed of some 27 niches. In terms of employment or sales, the most important activities are software publishing, systems design, systems integration, custom computer programming, and data processing.

<sup>2</sup>North American and Western European companies tend to obtain a larger percentage of sales from applications (“products”) but they also provide services (hosting, systems integration, custom software, data entry). Developing country firms produce more “services” than “products” as the needs for services like customization, maintenance, and the like require substantial amounts of technically skilled manpower.

<sup>3</sup>There are certain stylized facts about the software industry. First, there are lower barriers to entry, and in combination with the increasing returns and network externalities of software goods, can lead small firms to become leaders over very short periods of time. At the same time, while technological change appears to be shortening product development cycles, the ever more complex nature of software programs coupled with the ability to rationalize (i.e., partition and produce software efficiently wherever best suited) has promoted the growth of outsourcing.

**Table 1** Global IT expenditures, 2006–2007

	2006	2007	Growth (%)
IT services	467	496	6.3
BPO	421	462	9.7
Packaged software	230	249	8.3
Hardware	452	478	5.8
Total	1570	1685	7.3

(Amounts in US\$ billions)

Source: IDC, NASSCOM, according to TCS, 2007-8 *Annual Report*, p. 55.

companies of developing countries such as India and China into global value chains. Outsourcing is becoming more frequent as software becomes more complex, and cost becomes an increasing factor in production. Outsourcing is also facilitated by the increasing modularization of software, and by the spread of knowledge in software development processes. The outsourcing trend first created a need for substantial amounts of human capital in the outsourcing provider countries. As first India, then other developing countries entered these markets, scaling up both firm sizes as well as project sizes became a critical goal.<sup>4</sup> This resulted in the first Indian multinationals—mega-firms that rival some of the largest US software service firms in size.

Software has also been a vanguard for the internationalization of service outsourcing, especially IT-enabled services such as business process outsourcing, R&D services and so on. The case of India serves as a benchmark for all others, as India was a first mover, and still has the largest and most developed software industry amongst developing countries. However, whereas the Indian industry largely grew on the basis of exports, the Chinese software industry initially started with products and services for the domestic market. Since the early 2000s, as the potential for outsourcing asserted itself, new Chinese entrants appeared, some initially servicing multinational needs in the Chinese domestic market, while others entered regional markets, primarily Japan. Thus, the two cases provide a contrast not only in terms of initial starting points for internationalization, but also in terms of their recent strategies.

<sup>4</sup>However, there are clearer signals now that the countries most successful at developing outsourcing sectors have actually benefited from age-old public policies and, at the same time, fewer investments are needed in this sector (i.e., fixed costs are lower). However, public support for higher education and human capital continues to be important in this sector as with prior ones.

In order to grasp the internationalization of LDC firms, we have to understand a few factors: (i) the *entry mode* of the firms—greenfield<sup>5</sup> or acquisition; (ii) the *market-orientation*—export or domestic; and (iii) the *nature of growth*—in capabilities and other dimensions. At the same time, we need to understand the LDC setting, i.e., its resource base and position in the international value chain. We first summarize the major features of internationalization for our two cases:

- While some Chinese outsourcing firms have focused on the domestic market serving foreign multinational clients, and others on the foreign market, both types serve foreign MNE needs. In this sense, both Chinese and Indian firms are “outsourcing-oriented” as well as internationalized.
- India’s industry was a “leader” in international outsourcing, and China a less mature follower. This has necessitated Chinese firms to search for less prospected markets, and markets where they are, by language, more culturally suited for servicing.
- We can generalize by saying that the industries of both countries have found more easily accessed and less contested markets. Thus, market orientation (domestic or foreign) is a function of the relative competitiveness of the firms, as well as the opportunities present.
- “Greenfield” subsidiaries have been the dominant entry mode for firms of both countries, largely because of their limited financial resources and low starting capabilities; however, both the leading Indian and Chinese software multinationals have recently engaged in acquisitions, for both market- and asset-seeking reasons.

We will begin with a review of the literature on internationalization, and what is known of developing country software industries. We will follow with our methodological approach in Section 3, the two country industry cases in Sections 4 and 5 respectively, and a discussion of their implications for our hypotheses in Section 6.

## 2. Theories of internationalization and software outsourcing

Multinational enterprises have been the subject of a multifarious literature. In this section, we draw on selected major perspectives to construct hypotheses about the occurrence of outsourcing in the software services sector, with an eye to using these hypotheses to guide the interpretation of our data.

### 2.1 *Product life cycles and the relocation of industry to emerging economies*

In the PLC perspective, new industries are born in the richest countries, most often under the aegis of an innovative company (Vernon, 1966). The first countries to

<sup>5</sup>A form of foreign direct investment where a parent company starts a new venture in a foreign country by constructing new operational facilities from the ground up.

develop industries generally produce for their own domestic markets, and then export. This is true for the by now advanced economies. In a final stage of this phase, a trend towards dominant designs, process standardization and cost reduction starts to assert itself. In a later phase, a shake-up occurs and the industry moves to developing countries. Third-world multinationals emerge (Wells, 1983) which nurture ownership advantages such as “appropriate technology,” i.e., software better suited to poorer markets, and organizational advantages such as better capability to hire and train workers from LDCs. Lall (1983) points out that the “ownership advantages” of developing countries, such as lower cost inputs, can matter greatly. This is typically the issue in outsourcing, with the more recent cases being the Asian latecomer countries in electronics, as well as India’s software industry. The literature on Indian software outsourcing often cites the huge opportunities that the country’s lower wages presented, while non-resident Indians facilitated contacts with potential clients in the intended markets (Kapur and Ramamurthi, 2001; Kapur and McHale, 2005). With these advantages, firms that started in the domestic market tended to have greater success in the international market.

## 2.2 Resources and initial opportunities of Chinese and Indian software firms

LDC new firms are generally more resource-constrained, given their country’s latecomer status and lower revenues, and have lower capability (Lall, 1983). Their motivations for internationalizing can be divided into market- and asset-seeking (Dunning, 1998). A reduced domestic market and low labor costs, making LDC firms competitive abroad, are the central elements of the market-seeking explanation. Software outsourcing firms with ownership and labor advantages will seek initial opportunities in markets where their limited resources and labor costs can be efficiently and favorably employed in competition to address potential clients’ needs.

Additionally, the most important factor dictating entry mode is the early resource condition of the outsourcing firm, and the knowledge base or capability required for it to operate. Indian software outsourcing firms started up and expanded early with limited resources, and so have had to offer work for payment, and to grow through retained earnings. Furthermore, software service firms do not have strategic intellectual property. These past experiences and the existing evidence from India’s software industry suggest that at least the largest software firms have tended to grow through self-financing (Athreye, 2005a: 28). This suggests the following hypothesis:

*Hypothesis 1: Software outsourcing firms with limited assets and intellectual property will tend to grow via greenfield through investments or retained earnings from services, rather than via acquisitions.*

### 2.3 *The internationalization of software firm markets: cultural issues*

Several theories predict that the market orientation of a firm is based on cultural similarity. New firms start in their home (domestic) markets, and often choose culturally similar locations for their exports and foreign direct investments (FDI) in order to communicate with customers at a lower cost, and manage investments better (Johanson and Vahlne, 1977). In the value chain, the communications aspect is presumably even more important since the outsourcing firm has to relate to the client on a continuous “provider” basis, and not simply through a market transaction. When this is coupled with the “weak” financial resource base assumption, we arrive at the following hypothesis:

*Hypothesis 2: As software outsourcing firms with a limited financial resource base internationalize, they will enter markets where cultural differences, primarily language dissimilarities, are mitigated, or where markets are less contested by multinational incumbents.*

### 2.4 *Foreign direct investments and location choice of LDC MNEs: the synthetic approach*

Dunning’s ownership, location and internationalization (OLI) approach suggests that location-specific factors including natural resources, cheap labor, market size, as well as “institutional” factors (e.g., intellectual property regulation, R&D incentives) may present different advantages to different industries (Dunning, 1988, 1998). If these observations apply to developing country MNEs, we would expect the following hypotheses on market-seeking FDI:

*Hypothesis 3: Software outsourcing FDI from the developing countries will follow existing patterns of export to the largest and more affluent markets for those developing countries. Thus, both Indian and Chinese MNEs will invest in North America and Western Europe, and Chinese firms will also invest in Japan.*

At the same time, it is possible that these firms will enter other developing countries should they require additional manpower, or if their current capabilities have an advantage over their target markets. The preferred mode of entry would depend on whether the resources are similar to existing ones, and whether acclimatization is based on training:

*Hypothesis 4: Software outsourcing firms will invest in other developing countries, in order to access new labor pools when their home labor supply becomes scarce or costly, as well as to exploit their organizational and technological advantages in similar markets.*

### 2.5 *The evolutionary approach to MNEs and the search for knowledge assets*

Asset-seeking is the second major reason that motivates MNEs to internationalize (Dunning, 1998). The rationale for acquiring knowledge assets is perhaps even more critical for sectors depending largely on R&D, such as software. Kogut and Zander's (1993, 2003) theory of the knowledge-based MNE argues that companies differ in the quality and quantity of the stocks of knowledge they possess, and will thus follow different strategies based on a range of competencies, strategies and structures.<sup>6</sup> For Kogut and Zander, MNEs produce knowledge and search for new and complementary knowledge, both in their domestic and international markets. Buckley *et al.* (2007) found that Chinese firms moved away from market-seeking motives to natural resource-seeking ones over time. Asset-seeking is related to firms' continuing competitiveness as they grow, that is, how firms improve their capability. We know that software firms seek to upgrade their capabilities at all times (Athreye, 2005b), but at the same time, this means that they also have incomplete knowledge assets, some of which they may not be able to build up easily internally. This suggests the following hypothesis:

*Hypothesis 5: Software outsourcing firms will obtain strategic knowledge assets by acquisition. This could be done in either their home market or other countries, depending on how the assets are also tied to market-seeking strategies.*

It is worth noting that the literature also accepts a second source of knowledge improvement: foreign multinational enterprises may also provide demonstration effects and learning opportunities to LDC firms (Meyer, 2004); this suggests that software outsourcing firms' capability can grow through their foreign clients. A third source is the firms themselves. They are also known to engage in the self-development of capability once they have reached a mature stage, as was the case with the major Indian software firms in the early 2000s (Athreye, 2005b).

## 3. Research Approach

We will now briefly describe our data and the approach used to structure the data so as to test the hypotheses. We utilize a combination of primary and secondary data in order to bring out an understanding of the developmental processes and paths based on the experiences of individual firms. Our analysis is based on interviews conducted at various sites in India and China between 2001 and 2007, on secondary data, and

<sup>6</sup>Their work is itself based on the work of Winter (1986/2006) and Nelson (1991). Kogut and Zander also built on the dynamic capabilities approach, which emerged from the landmark work by Nelson and Winter and was eventually formalized by Teece and colleagues (1994, 1997). In their view, "knowledge and learning are at the root of understanding how competitive advantage is gained and sustained" (Foss and Pedersen, 2004: 342). Also, a high proportion of knowledge is tacit, embodied in human experience, and circulates within the MNE through its personnel.

on the literature.<sup>7</sup> In particular, our Chinese case is based on interviews with eight of the Chinese software outsourcing firms considered to be rapidly growing or occupying niches, as well as officials from three government agencies. Most of the firms interviewed represent a new breed of private firms, other than those already in the industry supplying lower level products or services, and many started doing localization and testing for larger MNEs trying to enter China.<sup>8</sup>

## 4. The Indian software sector

### 4.1 *The Indian software industry*

The Indian software sector has been extensively analysed, and it is well known that many Indian companies started their development as subcontractors or “providers” to MNEs based in developed countries (Arora *et al.*, 2001; Arora and Athreye, 2002; Athreye, 2005a; Joseph, 2006). While software exports from India started in the 1980s, the real take-off occurred in the 1990s: from \$105 million in 1989, exports attained \$6.2 billion in 2000, and around \$32 billion in 2007, growing by over 30% a year. The industry’s target is \$60 billion in software exports by 2010. In 2007, software services represent over 22% of total Indian exports (\$140 billion) and are its main export item. India has become by far the largest software exporter among LDCs, and trails behind only the USA and Ireland in the world. Most exporting firms are Indian-owned and controlled corporations; their size and export revenues are shown in Table 2.<sup>9</sup>

### 4.2 *The Rise of India: capabilities meet opportunity early on*

The growth of software industries in developing countries has been associated with the availability of highly skilled but low-cost labor, the technical capabilities of indigenous firms, and market opportunity (Arora and Gambardella, 2005). One of the commonly cited factors in India’s growth has been its comparative advantage in low-cost English-speaking programmers and engineers (Athreye, 2005a). The opportunity was set for India by the increasing software outsourcing requirements of

<sup>7</sup>Approximately 27 firms were interviewed in India, and well over 30 firms have been interviewed in China, including eight in the latter that were outsourcing-specific. All the interviews were conducted between 2001 and 2007.

<sup>8</sup>The firms interviewed were: Isoftstone, BeyondSoft, WorkSoft, ChongRan, United Innovation, Symbio, Hexin, Objectiva, and Ufida. ChongRan (or CS&S) is a more diversified, formerly government-owned firm which was interviewed earlier, and which is included for comparison purposes. The three firms that this article focuses on, Beyondsoft, Worksoft and Isoftstone, rank among the top 13 outsourcing providers.

<sup>9</sup>Throughout this section, we rely on a combination of secondary information, such as annual reports and news sources, as well as interviews that one of the authors has had with firms in the industry (approximately 15 interviews with Indian software firms conducted in 2001, together with follow-up conversations with employees of selected firms since then).



**Table 2** The top IT software and service exporters (excluding ITES-BPO) from India, 2004–2005

Rank	Company	Exports (US\$M)	Employees 2007	Total Sales 2007 (US\$)	Country of control
1	Tata Consultancy Services	1,644	110,000	4.3 billion	India
2	Infosys Technologies	1,502	88,601	3.1 billion	India
3	Wipro Technologies	1,198	79,832	3.47 billion	India
4	Satyam Computer Systems	745	49,200	2.1 billion	India
5	HCL Technologies	588	42,000	1.4 billion	India
6	Patni Computer Systems	342	14,000	560 million	India
7	I-flex Solutions	245	10,900	NA	USA (Oracle)
8	Mahindra British Telecom	202	NA	NA	India-UK JV
9	Polaris Software Labs	154	8500	225 million	India
10	Perot Systems TSI (India)	145	6000	NA	USA
11	L&T Infotech	ND	7000	250 million	India
12	Hexaware Technologies	129	7068	253 million	India
13	Larsen & Toubro Infotech	123	7000	NA	India
14	MASTEK	121	4000	227 m (2008)	India
15	iGate Global Solutions	118		307 million	India
16	Siemens Information Systems	111	3100	NA	Germany
17	Mphasis BFL	103	NA	NA	India-USA JV
18	NIIT Technologies	99	4500	221 million	India
19	Flextronics Software Systems	94	3002	NA	USA
Total		7765			

Source: NASSCOM, as compiled by Balakrishnan (2006), and completed.

developed countries—which resulted from an ever greater need to deal with software complexity and costs. While the scale of the work (and the workforces) both increased gradually throughout the 1980s and 1990s, the defining opportunity was the year 2000 (“Y2K”) problem, which required many US, European and other MNEs to rework older software prior to the arrival of Y2K. Even after the Y2K issue, the outsourcing contracts that firms gained continued to become progressively larger and more complex (Athreye, 2005b), driving further increases in scale and scope, to the point where each major Indian software firm is now organized into as many as a dozen “verticals” or industrial sectors. As far as capability was concerned, although the firms started out small and relatively weak in capability, there was little competition for the low-cost teams of programmers sent to operate out of US clients’ locations, presenting the notion of “low value-added” work with which the industry was earlier synonymous (Arora *et al.*, 2001). These teams learnt through interaction on the job with clients, with training later becoming more formalized. This “onsite”

(at the client's location) work was eventually moved back to India, which, coupled with the increasing scope of work, led directly to the large outsourcing facilities of the present day.

### 4.3 *Market-seeking behavior in developing and other "non-familiar" regions*

4.3.1 Finding new service opportunities: from the USA to other developing regions  
With the reduction of "easy" opportunities in the primary markets of Indian firms, a more recent trend has been their entry into other geographic regions. Wipro has been in Japan for some years, and many Indian majors are establishing themselves in China, with Tata Consultancy Services (TCS) perhaps having the most significant presence. TCS, the largest Indian software firm, has perhaps the most developed multinational strategy in LDCs. TCS has also developed a large Latin American focus (see acquisitions in Table 3).<sup>10</sup> By mid-2007, there were 5000 TCS employees in the region, including 800 in Uruguay and 3600 in Brazil and Chile.<sup>11</sup>

### 4.3.2 Opportunity for product firms: banking on less-contested markets

Whereas the staple of most LDC software firms is service outsourcing, product development is an often-mentioned benchmark—one associated with higher (potential) returns and risk than service outsourcing work. The own brand product strategy has the potential not only for the highest profit margins of all, but is also the most risky (Athreye, 2005a). Given the higher margins that service work obtains for multinational clients of developed regions, Indian software outsourcing firms have historically been reluctant to get heavily into software products.

The I-Flex case, however, clearly shows how product strategy can work.<sup>12</sup> I-Flex was founded in 1991 as a joint venture with Citicorp, with its earlier incarnation

<sup>10</sup> *The Hindu*, June 20, 2006.

<sup>11</sup> Late in 2007, TCS was creating a centre in Guadalajara, Mexico, that will hire out 500 professionals in the short term to deliver a \$400 million contract to the Social Security System of Mexico. In all, by early 2008, TCS had over 100,000 employees in 47 countries with revenues of \$4.3 billion in the fiscal year of 2007 (Table 3).

<sup>12</sup> Because of the low probability of success in own brand products, many Indian firms are moving into product development in a more measured way, often via the development of products as a service, or the "co-development of products" (i.e., working on behalf of a client). Such activities do not carry the risk of making one's own brand product for the international marketplace. Examples of development for other product vendors include Tata Consultancy Services' development of a popular product for Microsoft, called Quadrem, an electronic marketplace, Brainvisa in e-learning, Subex in fraud telecommunications software, and Hexaware in human resources software. The upgrading of technology capability in order to perform this advanced work is accomplished through different channels, not the least being by the acquisition of foreign firms (and their capability and presence in markets). Another area is the domestic market for products. NASSCOM recently observed that the Indian market for IT hardware and software could be as large as US\$15.9 billion, having grown by 29% in 2006.

**Table 3** Some recent acquisitions and greenfield investments of the top 3 Indian firms

Outsourcing Provider	Acquired company name	Year	Location	Purpose (F, MP or ND)
Tata (TCS)	Citigroup Global Services	2008	India	ND: Add new capabilities in banking
	GT Participações	2007	Brazil	MP
	TCS Mexico	2007	Mexico	(Greenfield) MP & abundant low-cost labor
	Tata Solution Centre	2006	Ecuador	MP
	PT TCS Consultancy	2006	Indonesia	(Greenfield) market penetration
	TKS Teknosoft	2006	Switzerland & France	F/ND/MP: Add financial product to portfolio; access Europe
	Total Communications	2006	Australia	MP
	Comicon	2005	Chile	MP/ND: in banking
	Diligenta	2005	UK	ND: Enter life insurance BPO market
	FNS	2004	Australia	F: Add new banking product: BANK
	TCS Iberoamerica	2002	Uruguay	Greenfield MP: delivery centre
Wipro	Unza Holdings	2008	Singapore	MP in SE Asia
	Infocrossing	2008	USA	F: To be leader in IT infrastructure management
	OKI Techno Centre	2008	Singapore	ND: semiconductor design
	Hydrauto Group	2008	Finland & Sweden	MP in Asia and Europe
	Enabler	2006	Portugal	ND/MP: Target global retail sector
	Nervewire	2003	USA	F: Enhance capabilities in financial sector
	GE Medical System & Health Care Infor.	2002	USA and Europe	ND/MP: be a global player in life sciences products
	Ericsson R&D Labs	2002	India	ND: Enter telecom R&D
Infosys	Koninklijke Philips	2008	Poland & Thailand	ND: Acquire expertise in finance and administration areas
	Infosys Technologies	2007	Mexico	Greenfield MP: broad language skills
	Citicorp Int. Finance (Progeon)	2004	India	Greenfield MP: Capture Citicorp outsourcing business
	Infosys Consulting	2004	USA	Greenfield MP: expand presence in USA
	Infosys China	2003	China	Greenfield MP: expand operations in Shanghai
	Expert Information Services Pty	2003	Australia	MP: in Australia; F: acquire management skills and market

(F = functional, MP = market penetration; ND = new domain).

being that of an internal subsidiary providing services to Citicorp. From the beginning, I-Flex's leadership focused on products, and earmarked financial software as the only sector of focus. Competition in financial products, especially at the "back end," including tracking of financial transactions, was less competitive than that of other sectors. I-Flex initially branched into other emerging markets such as Africa and South-East Asia, where competitors were weakly represented, and where its lower cost software would be attractive. The company initially started with a comprehensive banking product called Microbanker, but eventually worked on a state-of-the-art replacement called Flexcube that embodied major improvements, namely a modular architecture to which new features could be added in an extensible manner. I-Flex worked with banking clients in countries such as Thailand, and also developed a strong group of financial sector professionals to further infuse domain knowledge into the product. With the release of Flexcube in 1997, I-Flex eventually won over more clients in developed markets, eventually reaching 280 customers by the early 2000s, and was deemed so successful that in 2006, Oracle acquired it primarily to serve as an entry to higher value work in the financial sector. Despite the success of I-Flex, no other Indian firm has been able to follow its path. In general, success in products rests on technological superiority and costly marketing and distribution networks. Indeed, many Indian firms combine a form of product strategy with services in order to reduce the risk of own brand products.

#### 4.4. *Capability building: from organic growth to acquisition*

Since the early 2000s, Indian firms have been moving up the value chain, in part driven by the natural needs of their clients (Arora *et al.*, 2001), and in part by the Indian firms' desire to upgrade themselves. Large firms like Infosys also face problems when trying to move into the higher value end of the software value chain, in part because clients are unwilling to relinquish the highest ends of the work to their contractors, and because of their lack of such higher level skills.<sup>13</sup> To confront such problems of "upgrading," established software service giants as well as pure product firms have adopted a notable shift in strategy, including the use of acquisitions to complement their previously dominant strategy of organic growth. The largest companies, including TCS, Infosys, and Wipro have been actively acquiring smaller companies, as have companies such as Mindtree in the second tier and even product firms like I-Flex.<sup>14</sup> To see how the industry has come to this point, it is worth considering the choices that firms face in building new competencies

<sup>13</sup>Infosys annual reports, various years. Systems integration is one of the most complex tasks, one in which US firms like EDS, Accenture, and IBM have a commanding market share. Indian firms, in contrast, have found it more difficult to move into this sphere of work.

<sup>14</sup>For instance, in 2006, I-Flex acquired Mantas, a US-based software company, for about US\$122 million. Historically, the greenfield growth mode was most dominant in Infosys—one of the most conservative users of "war chests" in the industry. Recently however, following the pattern initially

over time. After the initial phase of technological learning from clients, such firms have faced the choice of either growing capability organically, or obtaining it via acquisition. In this manner, Indian software service companies have targeted firms in developed markets, typically buying foreign companies with specific expertise.

As our data for Indian and Chinese firms indicate, acquisition serves three purposes: (i) new domains, or the growth of a new internal division based on another new industry, i.e., a “vertical;” (ii) functional: to gain access to new functional or technological expertise; and (iii) market penetration: to create a “beachhead” in another country for delivery of services and products on site to that market. Table 3 shows a list of acquisitions for the top three Indian firms classified with this typology where possible. It appears that Wipro has been particularly aggressive in acquisitions, and TCS in foreign market expansion. Since many of their acquisition targets are in developed country markets, these are also intended to serve as “bases” to help the Indian MNEs to operate in those markets. Their acquisition ability is enabled by the higher market capitalization of Indian companies relative to their targets.

## 5. The Chinese software sector

In contrast to India, Chinese software firms initially followed a domestic path but this strategy has not precluded moves to outsourcing as either export or internal market clients. Also, the “follower” status and lower resource levels of Chinese compared to Indian firms meant that they have had to enter into markets that were weakly contested.

### 5.1. *From products and early services to outsourcing*

In the early stage of the industry up to 2001, many Chinese software firms attempted to work on a product model sometimes involving a basic application for a few customers, or a systems integration model. By the end of this period, the systems integrators were already reaching the limits of their rudimentary capability, whereas the better product firms were thriving in the domestic market.<sup>15</sup> Despite this success, most Chinese firms making products for the domestic market have not diversified into regional or international markets. The road for product companies has also been generally hard because of a variety of reasons, including a lack of customer IT maturity, fragmented markets, and intense competition at the low end from low-cost

---

set by Wipro and since then also adopted by other firms, Infosys has used acquisitions to acquire competencies.

<sup>15</sup>By working in their domestic market, Chinese firms have had some successes with products, including in enterprise management software (e.g., Kingdee and UFIDA), language translation and office productivity software (e.g., Kingsoft), middleware (e.g., Tongtech), and Linux operating systems (e.g., Red Flag software).

domestic imitators and at the high end from financially strong foreign MNEs with advanced technology (Tschang and Xue, 2005).<sup>16</sup> The largest systems integrators also faced problems in that they generally performed lower value-added work, including installation of hardware and packaged software made by other companies, and networking.<sup>17</sup>

#### 5.1.1 The emergence of outsourcing in China

During the late 1990s and early 2000s, some Chinese firms started to see the potential of foreign outsourcing, but the capabilities required to work at the average Indian level were beyond many of them, and still are.<sup>18</sup> There had been small amounts of software-exporting activity, US\$600 million in 2004, growing year on year, reaching US\$1.43 billion in 2006, and forecasted to increase to US\$4.7 billion by 2009, or a compounded annual growth rate of 51%.<sup>19</sup> The challenge of growing this market was initially an issue of seeking opportunities that barely existed. One way was to focus on the Japanese outsourcing market, and a second was to target China's own internal market. Outsourcing in the form of exports of software services was already underway in China by 2001, but in the beginning, firms were mainly focused on the Japanese market. In 2006, China's software outsourcing markets included Japan (61%), the USA (21.8%), Europe (4.7%), and others (12.5%). The Japanese market accounted for US\$872 million.<sup>20</sup>

The Chinese market grew fourfold between 2003 and 2007, as shown in Table 4, thus justifying the domestic market orientation of most Chinese firms. Table 5 illustrates the fact that China's largest firms are oriented towards Japanese or US clients. However, the largest of these firms are dwarfed by the largest Indian firms, and most are even smaller than the smallest of the Indian firms in Table 2.

<sup>16</sup>Piracy is one of the problems that afflict product firms. One well-known product company that we interviewed noted that their well-known product was so heavily pirated that it became a money loser, and it was only the government stepping in to purchase their software in procurement contracts which helped to save this line of business for them.

<sup>17</sup>One of the largest systems integrators interviewed earlier admitted that profits were quite low, and in fact, there have also been recent reports of other systems integrators suffering from low margins (Tschang and Xue, 2005). According to one interviewee, they may also have difficulty in trying to upgrade operations along the value chain.

<sup>18</sup>According to an official, the margins from outsourcing were in the 30% range for the more successful Chinese firms, mirroring margins from India, as opposed to being in the order of 10% or less—as product and systems integration companies have experienced. The outsourcers have ostensibly avoided trying to make products or to undertake systems integration work.

<sup>19</sup>Statistics are from the International Data Corporation (<http://www.idc.com/>). These numbers are generally beyond the 30% growth rates that Indian firms were averaging in the 1990s.

<sup>20</sup>Source: <http://www.ccid.com/>. In another report, the Japanese market accounted for 59% of China's outsourcing revenue, compared to the US market's 23%. Data from Analysys (<http://www.analysys.com/>).

**Table 4** Size of China's software outsourcing services

Year	2002	2003	2004	2005	2006	2007
Market size (100 million US\$)	3.25	4.70	6.33	9.20	14.30	20 (est.)

Source: CCID Consulting, 2007

(<http://www.ccidconsulting.com/upload/12592.gif>; accessed Jan 12, 2009).

### 5.2. *Entering the Japanese market*

The size of the Japanese market, and its attraction for Chinese firms that want to sell services offshore, illustrates a similarity to the USA–India situation in its early days. Chinese firms were initially called on to do lower value work for Japanese clients. Many Chinese firms seek to imitate the success of Neusoft, a firm that achieved the strongest export performance by servicing the Japanese market. Other firms have come up in the ranks. Japanese systems integrators are their main clients—these occupy the same market niches in Japan as do US systems integrators like Accenture and EDS for the US market. One of the issues that Chinese firms have reported in dealing with Japanese clients is the greater degree of control and specificity that is required by these clients. More recently, a number of software firms have also focused on BPO, in particular to the Japanese and Korean markets.

Most of the outsourcing firms that have succeeded in the Japanese market started independently of other service and product firms, suggesting that the necessary competencies were completely different. Furthermore, not all the few earlier firms that tried to move into software outsourcing have been successful, again suggesting that prior competencies might hold one back. This pattern is similar to the early experiences of Indian service firms that tried to move from services into products.

### 5.3. *The Chinese domestic market: servicing western MNEs*

In recent years, another new set of outsourcing providers has emerged in China. This new breed of firms works with foreign, primarily Western, multinationals that service the Chinese domestic market. These foreign MNEs have been strong in the higher end product and service software sector in China; these include firms such as Microsoft, Oracle, and BEA, and software services and systems integration companies like IBM and Accenture. Many foreign, typically US MNEs suffer from a location disadvantage in sourcing labor and accessing clients when trying to service the Chinese market. Interpersonal relationships or “guanxi” are as vital to conducting business in the Chinese software sector as in other sectors (Saxenian, 2005). The difficulty of entering the Chinese market may also be due to differences in

**Table 5** Top 20 software services outsourcing firms in China (2007)

Ranking	English name	Employee	Capability level	Representative Customers	Markets
1	Neusoft Group	12,000**	CMM5, CMMI5	Nokia, IBM, SAP, NEC	USA, Japan
2	Insigma Technology	4000	CMM3***	Microsoft, Hitachi, NEC, Tokyo Stock Exchange, Nomura Securities	USA, Japan
3	hiSoft Technology International	>2300	CMM5	IBM, Oracle, Bea, Autodesk, HP, Microsoft, Toshiba, Mitsubishi	USA, Japan
4	Dalian Hi-Think Computer Technology Co.	2359	CMM5	GE, NEC Group, Hitachi, NTT DATA, Nihon Sys, Ltd. Mitsubishi, Sony	Japan, USA, Europe
5	Chinasoft International	4400	CMM3	Microsoft, IFC	USA, Japan
6	Camelot Information System (China)	>1500	CMMI3	IBM, SAP, Accenture, Bearingpoint, HP	USA, Japan
7	Beyondsoft	800	CMMI 3	Autodesk, Cannon, HP, Kyocera, Microsoft, Oracle, CA, Fuji Xerox, IBM, McAfee, SAP, Siemens, Sony Ericsson,	USA, Japan Asia Pacific
8	Worksoft Creative Software Technology	1000	CMMI 2	IBM, Microsoft, Hewlett-Packard, Oracle, GE, Sony, Panasonic, PeopleSoft, TIBCO, Siemens, Roche	USA, Europe, Japan
9	NEC Advanced Software Technology (Beijing) Co	850	CMMI5	NEC	Japan
10	HANNA (Shanghai) Strategies	800	—	—	—
11	Shanghai Chuwa Software Co.,	1300	CMMI 3	NRI, Mitsubishi, Fujitsu	Japan



12	Shanghai Wicresoft Co.,	1000	CMM3	–	Japan, USA
13	iSoftStone Information Service Corp.	3500	CMMI5	Motorola, Symbio, Sony Ericsson, GlaxoSmithkline	USA, Japan, Europe, Korea
14	Trans Cosmos Information Creative (China) Co.	620	CMMI3	–	Japan
15	Fujian Fujitsu Communication Software Co.	257	CMMI 5	Fujitsu, CISCO, ORACLE, IBM, HP, MICROSOFT	Japan
16	DGT	1000	CMM3	GE, Microsoft	USA
17	iVision Shanghai Co.	162	–	Mitsubishi, SAP, IBM, IT Frontier, Microsoft	Japan
18	Dilington	200	CMM3	Mitsubishi	Japan
19	Nanjing Fujitsu Nanda Software Technology Co.	215	CMMI5	Fujitsu	Japan
20	Intasect Inc	180	–	–	Japan

*Sources:* China outsourcing website; company websites and annual reports.

Other lists of top 20 companies do not include some of the companies in this list, nor do some sizeable companies in other lists show up here. Financial figures are not available for many companies.

\*\*Total number of employees, including outsourcing. The outsourcing division alone reports 4000 or more employees.

\*\*\*Subsidiaries within this holding company hold varying CMM levels between 2 and 3.

standards, administrative rules and programmes across regions and cities.<sup>21</sup> In this environment, MNEs have a greater need to “localize” products and content.

However, many Chinese companies did not have the capability to do higher end services like systems consulting and design, although it was easier for them to develop lower level work like localization, customization and systems integration. This set of circumstances has enabled a convenient marriage between outsourcing foreign software MNEs and supplier domestic firms.

### 5.3.1 The new Chinese outsourcing firms

As noted earlier, the recent Chinese outsourcing pattern has involved firms closely connected to foreign markets, or to MNEs operating in China.<sup>22</sup> While Chinese firms had a limited capability early on, they have circumvented such limitations by working on lower value-added services.<sup>23</sup> A typical case is BeyondSoft, which started localizing and testing products for MNEs entering the Chinese market, including all Microsoft products in China, and HP products for Asia. Gradually, it has worked its way up into higher-level work, including managing offshore development centres for clients, learning organizational strategies from Indian companies and Western clients alike. Over time, the company has managed to develop capabilities in application development and maintenance, and to service more global work of MNEs.<sup>24</sup> Like other outsourcing companies in Beijing, BeyondSoft realized the limitations of a local labor pool for technical talent, and by the mid-2000s had started to open new centres in the so-called “tier 2” cities like Dalian, Wuhan, and Tianjin.

Other firms also reported similar stories of entry and scaling up when interviewed. Like Beyondsoft, Worksoft came into outsourcing through localization and testing,

<sup>21</sup>There are also at least three markets—corporate, government, and private. However, the governmental market is strongly bound by policy and regulations, and many software and systems contracts in the past supported domestic firms. Furthermore, at least in the past, it has been difficult to sell services to some Chinese corporate customers.

<sup>22</sup>The origins of the recent rapidly growing outsourcing domestic firms that service MNEs in the domestic economy are largely private, and hardly any appear to have been government-owned or to have involved government investments.

<sup>23</sup>Since then, many Chinese software firms had until a couple of years ago been slowly climbing the organizational “process maturity” curve, with the Software Engineering Institute’s (SEI) capability maturity model (CMM) level 3 or ISO 9000 certification being common to many of them. As of 2007, only about seven firms had reached CMM level 5—the highest certification—and not all of them were of significant size or reputation (relative to the rest of the Chinese industry). This contrasted with Indian firms, where many (over 50 as recently as a few years ago) had achieved CMM level 5.

<sup>24</sup>At one point, they were trying different strategies, such as opening up dedicated offshore development centers for MNE clients, as well as exploring joint ventures with Indian outsourcing providers.

but Worksoft has focused far more than other firms on offshore development centres, and has a larger number of US clients.<sup>25</sup> They have been one of the most aggressive in seeking US funding, first from the US venture capital firm Sequoia in 2006, then listing on the New York Stock Exchange in 2007.

Like the Indian firms, Chinese firms are also building capability through interaction with MNEs, and in recognition of India's prowess, they increasingly seek to learn from the Indian experience.

#### *5.4. The strategy of rapid scale-up and diversification*

Since the early 2000s, Chinese outsourcing firms have sought to scale up rapidly, initially by hiring and training fresh graduates, but more recently, by engaging in targeted acquisitions in order to compete for larger contracts from MNEs. There was a strong sense that Chinese firms could not compete with Indian firms in terms of scale and capability. Unlike some Indian firms, most of the Chinese firms' clients appear to be the independent software vendors (ISVs) themselves—these can demonstrate a greater tendency to keep the highest value work to themselves than end user clients would. Chinese firms may have had a difficult time “crossing the chasm” between carrying out application development for ISVs and working on services for the ISVs' clients. In contrast, many clients of the Indian software firms are actually end users of vendor software, where software is not part of the end users' core business, and therefore, may be more amenable to outsourcing. While starting out with servicing the domestic market, some Chinese outsourcing firms are now beginning to do work for the same foreign MNEs on a worldwide basis. While this work still tends to be consigned to a lower value added, it proves that at least in software, starting from a domestic market does not limit a firm from eventually servicing the same clients on international projects.

The speed with which the outsourcing industry grows under a globally competitive environment requires a rapid expansion strategy for scaling up human resources for individual firms. Many Chinese outsourcing firms are concerned with their smaller scale, when compared to Indian equivalents. Most of these firms were growing at rates as high as 50% per year by the mid-2000s, and that was mostly for servicing foreign MNEs in the domestic market. Despite this, as of 2006, only five firms had over 2000 employees, with the largest, Neusoft, having 4000 staff members. The situation had changed by 2008, with Beyondsoft, Worksoft and Isoftstone having 4000 employees or more. In contrast, the largest Indian firms like Infosys, TCS, and Wipro are at least ten times larger in size. While there appears to be sufficient human capital to service the Chinese industry's needs, firms have a difficult time when they

<sup>25</sup> Another secondary strategy is to focus on niche markets, which some of the smaller firms have done. Examples include Objectiva (a software developer for the document-processing industry), which was eventually acquired by one of its clients, and Symbio which operates at the higher value end of the market.

consider potential employees for proficiency in English or other foreign languages, process capability, and other skills. Firms have approached this scaling up in two ways. The first has been to open up development centres in so-called second tier cities, hiring university graduates at lower wages than in Beijing or other high-wage centres. Secondly, many Chinese outsourcing firms are adopting an acquisitions strategy and are acquiring firms earlier than Indian firms did: Chinese companies have acquired other firms when they were well below the 10,000 employee mark, which is the stage that most Indian firms started their acquisitions.

As shown in Table 6, all three firms that we profiled earlier recently became more aggressive in their acquisitions. Other outsourcing firms, such as Neusoft, Chinasoft, and Longpro, are also creating subsidiaries abroad in order to be close to their outsourcing clients, or acquiring firms to scale up faster. We have classified acquisitions into the three categories used for the Indian case: functional, market-penetrating and new domain-oriented. All three firms are targeting a variety

**Table 6** Acquisitions by selected Chinese outsourcing providers

Outsourcing Provider	Acquisitions			
	Name	Date	Located	Purpose
Worksoft	JV (unnamed)	2008	China	ND: finance
	Wireless Info Tech	2008	USA	MP/ND: onshore development capabilities for wireless
	Pro-soft	2006	China	ND: telecoms
	Surekam	2005	—	F: application service provision
	Envisys	2005	USA	F: consulting for customer relationship management, business intelligence software, systems integration development
Beyondsoft	Chongqing Xunmei Electronics	2007	China	ND: banking
	Unis Biz Consulting	2007	China	F: IT consulting
	Eastern Software Systems (ESS)	2006	India	F: ERP solutions
ISoftStone	Shanghai Jiefeng	2008	China	F: enterprise application development services
	Akona Consulting	2008	USA	F/MP: IT and business consulting, especially US clients
	Wuxi Hua Yang Software Co., Ltd	2007	China	MP in service of Japanese clients

of these three aims with their acquisitions, that is, a wide range of strategic assets and interests are under consideration, along with the general desire to grow bigger, not only by organic growth, but by acquisition, and to be “market-seeking.”

Thus, Beyondsoft recognized the need to scale up as well as to develop new capabilities, and new lines of business by acquisitions. In 2006, they acquired an ERP solutions provider in India, and in 2007, a Chinese IT consultancy and banking domain solutions provider. The stated intent of acquiring the Indian firm was to obtain Indian expertise in developing systems as well as in software development processes—two areas in which they considered themselves weaker.

At the same time, while the diversity of purposes exhibited by the acquisitions suggests the intention to complement incomplete portfolios of capabilities, there are indications from particular acquisitions of a specific strategy. For instance, while Beyondsoft is reinforcing its local base of developers as well as seeking to learn from Indian capabilities, Worksoft is seeking to penetrate a new market by establishing “beachheads” in the USA, and Isoftstone is diversifying geographically. It is worth noting that many of these outsourcing firms staff their management with Chinese, or overseas Chinese, employees who have international experience and are fluent in English. This has been augmented in recent years by the return of a number of Chinese with valuable experience from Silicon Valley. Finally, in recognition of the growth potential of outsourcing, both national and regional government policies have sought to aid firms’ efforts to internationalize, and to scale up their work forces. One of the most important problems that US-active Chinese firms have to confront is the need to have stronger language skills and appropriate cultural backgrounds to engage with Western clients.

#### 5.4.1 Product firms moving to sell abroad

While the model for internationalization has been proved by product companies in other sectors, such as Haier for white goods, and Lenovo for laptops, in software, some Chinese product software firms are also moving abroad. These already include lead product makers in the domestic market, such as China National Software & Service Company, Kingdee and Ufida. These have started creating subsidiaries to serve customers of their enterprise management software in parts of South-East Asia.

## 6. Discussion and implications for theory

We will now return to the five main hypotheses.

### 6.1 Initial start-up and entry mode: support for hypotheses 1 and 2

Indian firms have grown by retained earnings (hypothesis 1), and have tended to enter new markets with “greenfield,” albeit often mostly sales, offices.

However, recently they have been acquiring firms with the purpose of incorporating new knowledge as well as a variety of products.

Hypothesis 2 is about expansion in culturally similar environments. The hypothesis is strongly supported. By focusing on the USA, Indian firms are mainly targeting “culturally similar” markets, i.e., markets where the English language is dominant, and the largest and most lucrative markets (hypothesis 3). To some degree, these larger, developed markets are also the most mature and ready to outsource services. Chinese firms did the same with the Japanese market.

The third hypothesis concerns outsourcing to affluent countries that were early entrants in the PLC. This hypothesis is also supported. Indian firms are outsourcing providers to North America and Western Europe, and Chinese firms to Japanese systems integrators. Our hypothesis tends to integrate the issue of outsourcing in the product and industry life-cycle approach.

Hypothesis 4 concerns the behavior of third world multinationals *vis-à-vis* other developing countries. As predicted by Wells Jr. (1983), both Indian and Chinese MNEs are now looking for new markets in other LDCs for their scanty products. In addition, Indian firms are looking for cheap labor in other Asian and Latin American countries.

Hypotheses 3 and 4 are about how firms internationalize to markets in terms of FDI. As pointed out in hypothesis 1, Indian firms invest in “offices” or “beachheads” in North America and Western Europe, where they export the majority of their services. Chinese firms do not seem to be entering Japan or the USA in the same way. Thus, hypothesis 3 is only validated for India, possibly because of the protected nature of the Japanese market—with Japanese systems integrators controlling access. As far as hypothesis 4 is concerned, selected large Indian firms are also developing greenfield investments and acquiring subsidiaries in other developing countries to exploit their capabilities as software outsourcing and development centres, e.g., TCS is opening up larger facilities in Latin America and China for services.<sup>26</sup> This suggests that Indian firms are finding that investment also involves acquiring or building up subsidiaries in these regions. Again, this is likely to be due to the particularities of each market, which reflects not only cultural, but also regional and even local business practices. For India, the issue of continuing internationalization appears to involve entry into developing markets such as China and Latin America, supporting hypothesis 4. In contrast, Chinese firms have been more reluctant to enter new LDC markets, possibly because of their continuing need to first compete in their primary markets.

<sup>26</sup>In fact, some activities border on either confirming or unconfirming the hypothesis. For instance, while India's I-Flex has about 400 employees in its Singapore offices servicing the region (according to the authors' research), it is not clear whether Singapore should be considered as a “developing” region as far as financial software product development is concerned, or as an advanced market where advanced skills are available to be invested in acquisition.

Finally, in relation to hypothesis 5, Indian firms more clearly, but also some of the largest Chinese firms, are increasing their strategic knowledge assets abroad. We have identified the search for strategic assets in our data. Again, according to our “stages model,” this search occurs at middle and late stages of maturity, which the largest Chinese and Indian firms are reaching. Constraints on strategic assets in the cases of both China and India, and more basic resource constraints in the process of rapid growth in the case of China, are handled through acquisitions. The other strategy of growing resources—hiring and training—is permanently ongoing. Being followers to the international marketplace, Chinese firms feel the competition more keenly when they venture out of China, and are thus under pressure to acquire strategic assets at earlier stages of their development. That acquisition is important to both India and China suggests that resources cannot be easily or rapidly upgraded. In general, it might be said that as Chinese firms scale up and enter into “international” competition, often to work for the same MNE clients as before, these Chinese outsourcing firms also face the general difficulty of upgrading to “high value” work, an obstacle which Indian firms faced.

## 7. Conclusions

While Chinese and Indian software industries were previously known to be following two different paths, domestic versus export sales (Tschang and Xue, 2005), we have identified a new outsourcing trend in the Chinese industry’s story. We have also sought to reformulate—and integrate—existing theory to explain the differences between the Chinese and Indian cases. Parts of the two countries’ industries are converging on one another as they continue to diversify and increase value-added activities. It might be noted that further convergence seems to be occurring, as Indian firms have recently also been looking at their domestic market.

We find general confirmation for the PLC-ILC as well as the OLI approaches. Cultural factors also explain some contours of internationalization of LDC firms and asset exploitation versus asset acquisition is also useful and receives support. However, our story is more complex because we have managed to integrate outsourcing processes in the internationalization of third-world multinationals.

Our study also suggests that even as we test for general high-level theories at a country level, it is important to bear in mind the complexity of the individual firm’s experience. While a loose, staged process can be said to be at work, there is no universal path among LDCs to nurture an outsourcing industry. The competitive landscape is always dynamic and LDC firms are always situated in idiosyncratic contexts as a result of the firms’ time of entry, existing competition, and opportunities available. This requires strategizing across these factors in order to achieve the firms’ goals. Given this evidence from the Indian and Chinese software industries, we may also conclude that the PLC-OLI theory draws a useful but sketchy

picture of the sector's evolution. Analysing the substrate of a sector at a deeper level of institutional detail provides nuances for both propositions and prescriptions alike.<sup>27</sup>

Finally, the largest firms in both countries are, in spite of their differences, engaged in a persistent pattern of moving up within the international value chain towards higher value-added segments. This is a challenging strategy, and requires them to shift from greenfield investments to acquisitions. That acquisitions are required for multiple, interrelated reasons further suggests that the process of internationalizing is complex and path-dependent.

### Addresses for correspondence

Jorgi Niosi, Department of Management and Technology, School of Management Science, University of Québec at Montréal. e-mail: niosi.jorge@uqam.ca

F. Ted Tschang, Lee Kong Chian School of Business, Singapore Management University. e-mail: tedt@smu.edu.sg

### References

- Arora, A. and S. Athreye (2002), 'The software industry and India's Economic Development,' *Information Economics and Policy*, **14**(2), 253–273.
- Arora, A., V. S. Arunachalam, J. Asundi and R. Fernandes (2001), 'The Indian software services industry,' *Research Policy*, **30**(8), 1267–1287.
- Arora, A. and A. Gambardella (eds) (2005), *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland and Israel*. Oxford University Press: New York.
- Athreye, S. (2005a), 'The Indian software industry,' in A. Arora and A. Gambardella (eds), *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland and Israel*. Oxford University Press: New York.
- Athreye, S. (2005b), 'The Indian software industry and its evolving service capabilities,' *Industrial and Corporate Change*, **14**(3), 393–418.
- Balakrishnan, P. (2006), 'Benign neglect or strategic intent? Contested lineage of the Indian software industry,' *Economic and Political Weekly*, 3865–3872.

<sup>27</sup>This delocalization of the CSS industry is not a purely economic process as depicted by the PLC-OLI model. Its institutional dimensions are key. For both China and India, higher education has been a priority for decades. The public support of the industry through export promotion, technology parks, and government procurement is evident in both countries. The innovation system perspective may shed further light on the importance of institutions. In addition, the processes through which technological capabilities are acquired are neither lineal nor identical from one country to the other, as the cases of Chinese and Indian software firms tend to show.



- Buckley, P. J., L. J. Clegg, A. R. Cross, X. Liu, H. Voss and P. Zheng (2007), 'The determinants of Chinese outward foreign direct investment,' *Journal of International Business Studies*, **38**, 499–518.
- Campbell-Kelly, M. (2004), *From Airline Reservations to Sonic the Hedgehog: A History of the Software Industry*. MIT Press: Boston.
- Dunning, J. (1988), 'The eclectic paradigm of international production: a restatement and some possible extensions,' *Journal of International Business Studies*, **19**(1), 1–31.
- Dunning, J. (1998), 'Location and the multinational enterprise: a neglected factor?' *Journal of International Business Studies*, **29**(1), 45–66.
- Foss, N. and T. Pedersen (2004), 'Organizing knowledge processes in the multinational enterprise: an introduction,' *Journal of International Business Studies*, **35**, 340–349.
- Johanson, J. and J. E. Vahlne (1977), 'The internationalization process of the firm – a model of knowledge development and increasing foreign market commitment,' *Journal of International Business Studies*, **8**(1), 23–32.
- Joseph, K. (2006), *Information Technology, Innovation System and Trade Regime in Developing Countries: India and the ASEAN*. Palgrave Macmillan: Houndmills.
- Kapur, D. and J. McHale (2005), 'Sojourns and software: internationally mobile human capital and high-tech industry development in India, Ireland, and Israel,' in A. Arora and A. Gambardella (eds), *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland, and Israel*. Oxford University Press: New York.
- Kapur, D. and R. Ramamurthi (2001), 'India's emerging competitive advantage in services,' *Academy of Management Executive*, **15**(2), 20–31.
- Kogut, B. and U. Zander (1993), 'Knowledge of the firm and the evolutionary theory of the multinational enterprise,' *Journal of International Business Studies*, **24**(4), 625–646.
- Kogut, B. and U. Zander (2003), 'A memoir and reflection: knowledge and an evolutionary theory of the multinational firm 10 years later,' *Journal of International Business Studies*, **34**, 505–515.
- Lall, S. (1983), *The New Multinationals: The Spread of Third World Enterprises*. Wiley: Chichester.
- Meyer, J. E. (2004), 'Perspectives on multinational enterprises in emerging economies,' *Journal of International Business Studies*, **35**, 259–276.
- Nelson, R. R. (1991), 'Why do firms differ and how does it matter?,' *Strategic Management Journal*, **12**, 61–74.
- Saxenian, A. (2005), 'Government and guanxi: the Chinese software industry in transition,' in S. Commander (ed.), *The Software Industry in Emerging Markets: Origins and Dynamics*. Edward Elgar: Cheltenham.
- Teece, D. and G. Pisano (1994), 'The dynamic capabilities of firms: an introduction,' *Industrial and Corporate Change*, **3**(3), 537–556.
- Teece, D., G. Pisano and A. Shuen (1997), 'Dynamic capabilities and strategic management,' *Strategic Management Journal*, **18**(7), 509–533.

- Tschang, F. T. and L. Xue (2005), 'The Chinese software industry,' in A. Arora and A. Gambardella (eds), *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland, and Israel*. Oxford University Press: New York.
- Vernon, R. (1966), 'International investment and international trade in the product life cycle,' *The Quarterly Journal of Economics*, **80**(2), 190–207.
- Wells, L. T. Jr. (1983), *Third World Multinationals*. MIT Press: Cambridge.
- Winter, S. G. (1986/2006), 'A neo-schumpeterian theory of the firm,' *Industrial and Corporate Change*, **15**(1), 125–141.