Companies are increasingly asking which of their value chain activities are best performed within their own company and which may be outsourced. In addition, they are also considering which pieces of their value chain may be better performed abroad. These interrelated decisions concerning outsourcing and offshoring have not only changed entire industries, they have also transformed the lives of people across the world. Hundreds of millions of jobs in emerging nations have been the direct result of outsourcing and offshoring decisions. At the same time, many people in the developed world have lost their jobs because a company has been able to find a cheaper alternative. Featuring contributions from scholars in eleven different countries, this book is the first to examine the theory and practice of outsourcing and offshoring simultaneously. It includes studies of a variety of different industries, including pharmaceuticals, automobiles, medical records, appliances, human resource management, and telecommunications.

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Global Outsourcing and Offshoring

An Integrated Approach to Theory and Corporate Strategy

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Preface:
The reconfiguration of the world economy

A heavily mustachioed man, with a passing resemblance to the comic character Asterix, regularly enjoys gourmet meals at Brussels restaurants, paid for by the European taxpayer. He draws a salary and allowance of at least €11,867 per month (not counting the salaries of his staff, travel per diem, fringe benefits and other overheads). His total expense to the taxpayer could easily total €500,000 per annum.

José Bové is a Member of the European Parliament (MEP) representing the southwest of France and a leading anti-globalization activist. Reporters and pundits seek his opinion. Think tanks, universities, and even companies invite him to express his opinion on a range of subjects from multinational investment, to agriculture, to outsourcing. When his name is mentioned to French people, their faces light up with instant recognition, and secret approval – even from those who overtly oppose his views. There is something about José Bové that resonates with the French soul.

Mr. Bové is also a thrice-convicted felon. Not so long ago, he periodically vandalized and demolished McDonalds restaurants in France, burnt genetically modified crops in Brazil and France, entered Yassir Arafat’s Fatah headquarters while it was under siege by Israeli forces, and has periodically been tear-gassed at anti-globalization protests in various world cities. Although he is the scion of academic and intellectual parents, Mr. Bové today parades as a sheep farmer from the village of Millau (population 22,000). But he is hardly there, preferring instead to give a speech in Kathmandu to Via Campesina (an international movement of small farmers) or to sail in the South Pacific on the Greenpeace ship, the Rainbow Warrior.

When asked, French executives will give carefully worded and circumspect opinions about Mr. Bové. Their heads tell them that the views of protesters like José Bové are antithetical to business, to efficiency, and to the surge in worldwide prosperity spurred by multinational investment and trade in the last five decades. But their hearts are
ambivalent, or secretly sympathetic. They know that globalization also dulls the taste of dishes derived from agribusiness food stocks, relocates jobs to China, threatens their cuisine and culture, forces some French companies into bankruptcy, and tinged the simple pleasures of life – such as lingering over a Café Noisette – with anxiety and guilt in the name of productivity and global competition.

This book is about efficiency, and about anxiety. By the division of labor and reallocation of jobs to lower-wage nations, companies reduce their costs, fatten shareholders’ profits, but, importantly, also reduce the price their final product is sold for in the marketplace. Consumers in the rich nations, and worldwide, benefit. Hundreds of millions of jobs in China, India, Brazil, Korea, and similar emerging nations have been the direct result of “Offshoring” (relocating jobs to a foreign country) and “Outsourcing” (giving jobs that were formerly conducted by company employees to external contract providers).\(^1\)

These offshore workers, in turn, become more affluent and more avid customers of American, European, and Japanese goods and services. It is no exaggeration to say that, in the last century, billions have been raised from poverty to a middle-class status – in part as a result of the global reallocation of economic activity. In the millennia to come, all the wars, terrorist incidents, and politics of the twentieth century will recede to become small footnotes or blips in history. But the one salient event that will be remembered and noted will be the transformation of humankind from poverty to affluence, from protectionism to liberalized economic policies, from tribalism to a global identity, and from ignorance to productivity.

It is a transformation still in the making. Moreover, there are no guarantees of an inexorably upward trend. History is replete with temporary U-turns. Two thousand years ago there was significant trade between Europe, China, and India. Technology had reached levels not seen again until the eighteenth century. But the glories of Imperial Rome, Chang An, and Pataliputra were followed by lapsed centuries of anarchy and “dark ages.” However, this time, there is a difference and greater reason for hope. This time, through information technology, communication, democracy, and unprecedented levels of education worldwide, we have managed to achieve a collective global consciousness as citizens of a shrunken planet. There is a willingness to take collective global remedial action, on a scale that was unthinkable even two decades ago.
For example, this book contains the contributions of academics from over a dozen nations, some of whom met only briefly in April 2008 at Bocconi University in Milan at a conference on *Offshoring and Outsourcing: The Organizational and Geographical Relocation of High Value Company Functions*. The four organizers of the conference (and editors of this volume) only met once prior to the conference and conducted all their preparations by email. Subsequently, all the work and communications between volume editors, Cambridge University Press, and contributors has been done electronically. Cambridge University Press, in turn, will likely outsource part of the production of this book to India.

One focus of the conference, and much of this volume, is on “high-value” company functions. Even now, the bulk of Outsourcing and Offshoring entails rather mundane functions such as call centers, data entry, accounting services, and copy-editing of books and journals. However, there is the beginning of a trend where even the more strategic, “core,” or high-value portions of a firm’s value chain – such as R&D – are being relocated to foreign nations and external providers. This is disturbing to some strategic thinkers who assert that every firm distinguishes itself by its core knowledge or other inimitable assets which are the foundation of a company’s competitiveness. Relocating these core assets would leave the company more vulnerable to technology leakage, piracy of intellectual property, and a heightened danger of global supply chain disruptions.

The question then reduces to what portions of a company’s operations may safely and efficiently be outsourced or geographically relocated. And which portions of the value chain had better be retained in company headquarters and in the home nation? This entails slicing or breaking down each of the company’s operations (R&D, Production, Marketing, Service), as well as staff functions (such as Accounting, Finance, Human Resource Management, Information Technology, etc.) and asking where each may best be performed. This is a central question in research and the practice of International Business:

What is the optimal allocation, or spread, of a company’s operations and functions over

- Space (nations or geography)
- Time, and
- Organization type (in-company versus external providers).
The book is divided into four sections. The first develops conceptual frameworks and theories. It looks at the strategic drivers, as well as the limiting factors, for offshoring and outsourcing. It traces trends in emerging and advanced nations that have fostered an acceleration of these trends in the last decade. The second section of the book specifically treats the relocation of R&D and innovative activity – what is still generally considered the “core competence” of a firm or the crown jewels of its continued internal vitality. The third section examines organization behavior and politics in virtual teamwork, when personnel and groups are geographically and chronologically separated. The final section of the book has several examples and case studies on particular industries including telecommunications or appliances, as well as specialized areas such as medical transcription and human resource management.

We owe SDA Bocconi School of Management and Professor Vikas Kumar thanks for organizing and funding the conference which was the genesis for this volume. The editors wish to particularly acknowledge and are thankful for the considerable organizing skills and academic acumen of Ms. Pooja Thakur (doctoral candidate at Rutgers University) whose own dissertation is on the Outsourcing and Offshoring of Pharmaceutical Company R&D. Ms. Thakur brought a thorough understanding of the subject to the conference and preparation of this volume – besides fielding several hundred emails from participants and authors with dispatch and cheer.

This book is a microcosmic representation of humankind’s future. Its fruition and contents, although geographically and organizationally separated, were nevertheless unified by an idea, and brought together by the evanescent dance of photons on intercontinental fiber-optic networks.

Note

1 Definitions: “Outsourcing” is an organizational restructuring: a company can “outsource” a function to a contract provider (either in its home country, or abroad). By contrast, “Offshoring” is simply the geographical relocation of a job to another nation (under the aegis of the same company’s foreign subsidiary, or to a foreign contract provider). Chapter 1 provides more details on the distinction between the two.
PART I

Conceptual frameworks and theories
Introduction

The activities of any enterprise can be broken down into a large number of discrete steps along its value chain, from research and design, to production, marketing and distribution, to customer service. Even these are but broad categories which can be micro-dissected into their component pieces. For instance, the “research” function can include creative design, requiring high technical skills and intelligent market feedback into the design process. But research also entails several mundane activities such as field testing, patent applications, and data compilation.

This chapter deals with three broad trends affecting the reconfiguration of company functions, for which we propose an integrated approach for theory and strategy:

(a) The increasingly finer micro-dissection of company functions all along the value chain. This enables a finer-grained evaluation of which of the micro-activities are best performed within the company, and which may be outsourced – in short, the organizational relocation of functions which previously may have been performed in-house.

(b) Geographical relocation and the choice of foreign country and partner.

(c) The greater outsourcing and offshoring of activities that used to be considered “core,” proprietary, or strategically crucial, such as Research and Development vital to the continued competitiveness of the firm.
The chapter addresses a crucial global strategy question, “What is the optimal global and organizational configuration for each micro-activity or function for a company?”

Although the driving forces of outsourcing and offshoring have recently escalated, the roots of geographical and organizational restructuring of economic activity can be traced back into prehistory. Along the central spine of Italy, in the Abruzzo province, are a series of caves carved into mountainsides amidst picturesque deep valleys and gorges. One such cave is the Grotta Sant’Angelo which used to be visited by pilgrims hoping to have their sins purged, ever since the year 490 CE when the Archangel Michael appeared to Saint Lawrence Maiorano and proclaimed absolution for all who visited such grottos thereafter. The tourists, hikers, or penitents who climb up the hillside into the cave are oblivious to its much longer history. Excavations by the University of Michigan into the floor of the cave reveal an entire workshop for making flint tools, as early as 25,000 years ago. Early hominids as well as *homo sapiens sapiens* made flint tools, such as spear heads for hunting, or scrapers for skinning and de-boning. Initially, these were made by each hunter or family for their own uses. However, the raw material, flint, is not ubiquitous. Quarries can be many miles apart. Flint knapping is a skilled art requiring much experience in the worker. Otherwise there is considerable wastage, and the end product is misshapen or useless. In the best of hands, tool-making is a significantly weight-reducing process. As human history progressed, later in the Chalcolithic era, it made economic sense to concentrate production preferably near the raw material sources in skilled workshops, under an organized hierarchy, and then distribute the finished product over the entire region by trading arrangements. This chapter is a story of separation and disaggregation that began over 25,000 years ago – separation between producer and consumer, organizational separation between specialized producers over a fragmented value chain that could be hundreds, and later thousands, of miles apart. Ochre of various colors (brown from Roussillon, France, and yellow from Cyprus) was used to paint dwellings, bodies, and murals such as the famous Lascaux cave paintings. The ores were transported across a continent to specialist workshops which would add proprietary adhesives and grind the mixtures to desired consistencies, before selling them to customers for their rituals, tribal markings, cosmetic
embellishments, or art. The benefits of specialization, economies of scale and learning, technological innovation, weight-reduction criteria for the location of production, and inter-regional trade all have their seeds in human prehistory.

Today, this organizational and geographical fragmentation has progressed to an unparalleled extent – global in scope and scale. An automobile made by a major producer has more than twelve thousand parts. Components are typically sourced from hundreds of major suppliers in a dozen or more nations worldwide, in addition to making key parts in the car company’s own factories. In theory, for each of the twelve thousand parts, the firm may decide to make it internally, or outsource. If the decision is to make it within the company, the question is where, and in which nation. If the decision is to outsource the production of that component, then the question arises as to choice of supplier and country.

The maximum number of combinations amount to 12,000 parts, times 193 nations, times 2 (for the “make” vs. “buy” decision) – which comes to 4,632,000 configurations. For the minimum number, at the other end of the organizational spectrum, the answer is 1.0 – all production being in-house, under one organization, in one country. In practice, of course, the answer is neither 1.0 nor 4,632,000, but some optimum solution in between these two extremes. A typical automobile major has direct relationships with at most a few hundred suppliers and development partners, located in fewer than twenty nations.²

What constitutes the optimal configuration for a firm? What is the optimum degree of outsourcing (versus internal production)? What are the best geographical or country locations for adding value along the value chain? The answer depends on how finely the firm wishes to slice its product or service. Clearly, dissecting an automobile into all its more than twelve thousand individual parts is too detailed, and too fine grained. Outsourcing all of them would be impossibly complex and inefficient, even in an information technology (IT)-enabled world. On the other hand, since a century ago when Ford produced everything from its own steel to the finished automobile, no producer has been that vertically integrated. The fact is that no company is able to produce every piece of the product itself. They all rely on outsourcing to some extent. The question amounts to what the optimal level of outsourcing should be.
The answer also depends on the sector. IBM, which is today better understood as an IT services consulting company, rather than a hardware producer, claims “90,000 business partners worldwide, including consultants, integrators, software vendors, value-added resellers, and distributors” who act as suppliers, buyers, as well as strategic or tactical allies to IBM (IBM, 2009). The large number is a reflection of the multiplicity of the end-applications of information technology in very diverse business arenas in thousands of industries. It is also a reflection of the fact that no company today – not even a giant like IBM – has the internal knowledge or capability to put together a service “bundle” or solution for all its clients. The totality of the knowledge inputs required to produce or design efficiently, or to meet the diverse needs of customers, has today grown beyond the ken of most companies.

In 2007, out of IBM’s 375,000 employees worldwide, some 125,000 were in the US. The second-biggest contingent was 73,000 employees in its Indian affiliates, with 177,000 in other countries (Associated Press, 2007). It is ironic that IBM’s Indian employees today comprise almost 20 percent of the global total, and that in India alone IBM has alliance and supplier relationships with well over a thousand companies – when one recalls that in 1977, rather than accept the Indian government’s mandate to share some technology and accept local partners, IBM shut down its entire operation in India. Vertically integrated, internally controlled hierarchy was then the operating business model for IBM and most companies.

Besides IBM, companies in 2006 that had more than 15 percent of their global employees in India included Accenture, Oracle, EDS, and Cap Gemini, to name just a few.

The spatial and organizational fragmentation of economic activity

Today, the vertical integration or internalization model of business is in retreat. Most major companies are in the process of fragmenting themselves by examining each piece of their operations and asking how it may be deconstructed (Zaheer and Zaheer, 2001). And if deconstructed, in which nation the fragmented function can best be performed.

Traditionally most companies added value “in-house” and in their “home nation” – Cell A in Figure 1.1. Today, the firm adds value
Global outsourcing and offshoring

<table>
<thead>
<tr>
<th>Home nation</th>
<th>“Offshore”</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td>Value of entirely in-house activities in home nation</td>
</tr>
<tr>
<td>Domestic or foreign</td>
<td>(A)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Value created cooperatively with partners in home nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic or foreign</td>
<td>Jointly with partners (in a cooperative or strategic relationship)</td>
</tr>
<tr>
<td>(B.1)</td>
<td>(D.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outsourcing</th>
<th>Value outsourced domestically in home nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic or foreign</td>
<td>From completely arms-length providers (in a contractual relationship)</td>
</tr>
<tr>
<td>(B.2)</td>
<td>(D.2)</td>
</tr>
</tbody>
</table>

Figure 1.1. The spatial and organizational choices available for each piece of the value chain.

Internally (in the home nation [Cell A] or in fully owned foreign subsidiaries [Cell C]) only to selected portions of its value chain where it determines it has “core competence” (Prahalad and Hamel, 1990) while leaving other selected bits of the value chain (and support services) to external providers or in other nations. The latter, in turn, are linked to the focal firm in a spectrum of organizational relationships, ranging from highly “cooperative” or “relational” to mostly contractual or arms-length over the other four categories B.1, B.2, D.1, and D.2 in Figure 1.1.

- **“Offshoring”:** [Cells (C) + (D.1) + (D.2)] refers to the geographical relocation of activities outside the home nation of the firm under any organizational arrangement, including foreign subsidiaries of the company (Cell C), foreign alliance partners (D.1) or foreign contract providers (D.2).
- **“Outsourcing”:** [Cells (B.2) + (D.2)] refers to value added by contractual external providers, whether in the home nation of the firm (B.2) or foreign nation (D.2).

Incidentally, Cell (D.2) is the only one which constitutes both offshoring as well as outsourcing. By contrast, Cells [(B.1) + (D.1)]
comprise cooperative relationships in one case with strategic partners or cooperative vendors in the home country, and in the latter case in a foreign nation. Cooperative alliance relationships are “half way” in organizational terms, between completely in-house operations and completely contract-based outsourcing where the relationship is arms-length.

The offshoring and outsourcing phenomenon is, in a way, the logical outcome of the strategic focus on “core competence” which implies that a firm should abandon functions it cannot best perform in-house or at home, to external vendors, or partners, or foreign countries.

The scale of this devolution or deconstruction of the firm is enormous. But exact data are unavailable. While we have (imperfect) figures on international trade in goods and services, as well as some estimates of the internal value-added by sector, it is impossible to distinguish, in the aggregate, between, say, the purchase of raw materials or components from the relocation of the job or production based on conscious strategic intent. For example, we know from the World Trade Organization (WTO, 2009) that the sum total of merchandise exports of all countries in 2008 amounted to $16.13 trillion. But we do not know what portion of that total was formerly carried out in the home nation of the firm and subsequently offshored by a conscious decision made by the firm.

We do know that the outsourcing of manufactured goods is far more advanced than in services. Trade in manufactures began millennia ago.3 In comparison with the $16.13 trillion in goods, the total of world trade in services was only $3.7 trillion (WTO, 2009). However, the growth rate of services exports has been much higher in recent years (UNCTAD, 2004), especially in the area of “Commercial Services” exports, where the bulk of the figure likely entails a conscious offshoring decision.

The driving and constraining factors

It is not simply a search for lower costs. The outsourcing and offshoring phenomena cannot occur without the firm (i) first deconstructing itself (breaking down its value chain), then (ii) devising appropriate interfaces between the organizationally and spatially separated functions, and finally (iii) minimizing transaction costs between the outsourced
entities as well as minimizing global governance overheads. This has been spurred by some well-known trends in the last decade, such as

- The precipitous drop in IT costs resulting from the massive investment in international bandwidth and developments in information and communication technology that have made communication over distance not just much cheaper but also much easier (Blinder, 2006).
- Shortage of skilled technical and managerial personnel in the US and in Europe as the population ages (McKinsey Global Institute, 2009).
- Acceleration in the rate of technical change (Teece, 1992) which forces a greater degree of externalization so that companies can keep up with the pace of competition.
- Greater codification of corporate knowledge. Technical or administrative processes which formerly were “tacit” or resident only in the minds of experienced engineers or managers are increasingly been written down in manuals, software, process specifications, and expert systems (Balconi, Pozzali, and Viale, 2007). This (i) makes the outsourced/offshored tasks more visible to the vendor or foreign affiliate personnel, (ii) reduces asymmetric information and bargaining power, (iii) improves quality control and thus reduces the fears of the outsourcing/offshoring principal, (iv) reduces negotiation, monitoring, and control costs, and finally (v) the codified “template,” once created, can be used repeatedly, and in many nations, so as to reduce costs of outsourcing/offshoring through repeated experiences.
- The modularization and distribution of tasks. The division or dissection of complex or creative designs over geographically distributed teams is difficult, especially if considerable interactions are needed between the design teams. However, according to Sanchez and Mahoney (1996), if the tasks can be modularized, together with objective criteria for outputs and the interfaces between the components of the design (or finished product), then distributed teams can function more effectively.

The starting point for offshoring and outsourcing is for companies to deconstruct (i.e., fine-slice, codify, standardize interfaces, and modularize) their many activities. This is often described under the rubrics of knowledge management or lean programmes. In that sense it can be said that “offshoring and outsourcing start at home.” The deconstruction and reorganization of company activities is a precondition
for making corporate activities offshorable and reaping the benefits of offshoring and outsourcing.

In retrospect, it now seems quaint that academic literature of just two decades ago cast doubt on the exportability of services because of their alleged “inseparability,” “heterogeneity,” “intangibility,” and “perishability” (Boddewyn, Halbrich and Perry, 1986; Zeithaml, Parasuraman, and Berry, 1985). But while remaining intangible, services can indeed be separated or deconstructed. Each service component can be rendered homogeneous through codification and standardization. And many services can be stored and transmitted electronically (Karmarkar, 2004). Can one export a haircut, a restaurant meal, or an airplane ride? No, but the reservations system, procurement function, advertising content and booking of advertising space, and other back-office functions can all be offshored or outsourced.

In the ultimate analysis, any business or technical operation that can be (a) codified and (b) digitized is amenable to outsourcing and offshoring. This appears to be a serious threat to advanced nation economies where the majority of jobs are in services (most manufacturing jobs having already been offshored). According to McKinsey Global Institute (2007: 5), “in 2008, we estimate that 160 million jobs, or about 11 percent of the 1.46 billion service jobs worldwide, could in theory be carried out remotely, barring any constraints on supply.” Lest that create unwarranted panic, the same report shows the actual adoption of offshoring in 2008 to be a minuscule percentage of the theoretical maximum. Most importantly, even in the future, the actual extent of offshoring will fall well below its theoretical maximum because of:

(i) the consequent escalation of wages in the foreign location,
(ii) the persistence of tacit knowledge and embedded experience,
(iii) transaction costs that can be avoided with vertical integration (such as negotiations, monitoring, coordination, “hold-up,” and quality control),
(iv) fears of supply chain disruptions,
(v) fears of technology spillovers and consequent competitive threat in the event that the operation is outsourced to external parties, and
(vi) regulatory prohibitions and constraints on offshoring.
For a more extended discussion of the constraints see the section entitled “Inhibiting factors” later in this chapter.

This chapter and book by no means predict the collapse of internalization or vertical integration – but only their partial retreat in the face of the global trends described.

**Will high-value or core functions also be outsourced and offshored?**

It is not simply a search for lower costs. In recent years, companies have also been looking for new ideas, talent, and human capital outside their companies and abroad. We are beginning to see the breakup and relocation of even R&D and innovation activities which were formerly considered “core competencies” (Mol *et al.*, 2004). Outsourcing/offshoring is no longer about cost-cutting but about closer connections, better service to clients, creativity, and innovation: “to open the enterprise up in multiple ways, allowing it to connect more intimately with partners, suppliers and customers and, most importantly, enabling it to engage in multifaceted, collaborative innovation” (Palmisano, 2006).

In part, this is because companies today are even micro-dissecting and disaggregating their R&D into finer sub-segments which are distributed to different nations and external providers. R&D is no longer treated as one sacrosanct and monolithic piece of the value chain. A pharmaceutical company can do the clinical testing (approximately 40 percent of the typical R&D budget) portion abroad, the foreign data are then fed back to a data management firm at home, which in turn outsources the data compilation, tabulation, and analysis to Hyderabad.

Mowery and Macher (2007) describe how innovation in personal computers is disaggregated worldwide. Product planning and design take place in the US or Japan while applied R&D and the design of new platforms occur in Taiwan. Design extension development takes place in China, where the bulk of assembly operations exists. Chinese engineers also design the engineering processes in their factories. Similarly, a company like Motorola while keeping aspects of chip design in the US, now has its mobile handsets designed in China.

However, this may only be the beginning of a larger recent trend for emerging nation companies to creep upward in the value chain. US,
European, and Japanese companies say that it is not simply a search for lower costs of scientists and engineers – they need the talent. Kenney (2007) relates how, although integrated circuit (IC) design in India was only five years old, Wipro and Sasken each already had more than 2,000 Indian employees in outsourced IC design, and – as examples of offshoring via foreign subsidiaries (Cell C in Figure 1.1) – the Indian subsidiaries of Intel, Texas Instruments, Broadcom, and others also undertake IC design in India.

The globalization of research is still a minor, but accelerating, trend. According to UNCTAD (2005) multinational companies (which account for about half of all corporate R&D expenditures), now do more than a quarter of their R&D outside the home nation. By 2005 India had R&D centers belonging to over a hundred multinational firms. The UNCTAD (2005) study of 1,773 R&D projects in 2002–04 showed 61 percent located in Eastern Europe, India, China, and other Asian affiliates.

A major reason is that multinationals need to tap into new knowledge and talented people anywhere on the globe. The wind-turbine industry might serve as an illustrative example. The center of the wind-turbine industry has until recently been in Northern Europe with all the dominant players in the world being present in Denmark, Germany, or the Netherlands with significant R&D. This region has offered a vibrant environment with talented people, a large pool of knowledge, and government support of this new technology. However, as the technology has matured and other markets in Asia and the US have become more interesting, the wind-turbine companies are starting to break up the value chain and re-locate their activities. The world’s largest wind-turbine company, Vestas, which until recently had all its R&D activities located in Denmark has now established significant R&D facilities with a global mandate in India, Singapore, and the US.4

In Figure 1.2 we see a wide spectrum of offshoring and outsourcing activities. Ranging from the left are basic tasks like data entry and transcription. Moving to the right are more complex tasks such as Human Resource management functions, and accounting. At the far right are highly skilled and creative activities such as portfolio analysis (requiring high mathematical knowledge), or engineering and R&D.

According to McKinsey Global Institute (2003) the primary motivations for outsourcing and offshoring shift from left to right in Figure 1.2 – from a search for low cost labor, to a search for talent
Global outsourcing and offshoring

Offshoring opportunities across the organization

- **Back office**
  - Basic data entry
    - Application forms
  - Data conversion
  - Transaction processing
  - Document management

- **Customer contact**
  - Customer relations
    - Call centers (inbound and outbound)
  - On-line customer service
  - Telemarketing
  - Collections

- **Common corporate functions**
  - Shared corporate services
    - Finance/accounting
  - HR
  - Procurement
  - IT
    - Help desk
    - Maintenance
    - Infrastructure
    - Applications development

- **Knowledge services and decision analysis**
  - Research services
    - Customer analysis
  - Portfolio analysis
  - Claims processing
  - Risk management
    - Credit underwriting

- **Research and development**
  - Content development, engineering and design
  - New product design
    - Design specs
    - Pilot/prototypes
  - Testing
  - Production design and optimization

**Figure 1.2.** The motivations for offshoring: lowering cost or the search for talent?


and new ideas. Manning, Massini, and Lewin’s (2008) survey indicates that the search for foreign talent has risen to number two rank, just behind “cost savings,” as a strategic driver for offshoring.

The old adage, that a company must never outsource its core competencies, for fear of their loss to potential competitors, remains true. However, by offshoring R&D and innovation to majority affiliates, the multinational firm retains a considerable degree of secrecy and internal control. Second, by artfully splitting the R&D function into vulnerable versus less vulnerable components, the latter can be outsourced to independent parties without much loss of competitiveness, as we saw in pharmaceutical R&D where basic research continues to be mostly undertaken in advanced nations while clinical testing is much more widespread in emerging nations.

While companies keep their core competencies close to their corporate headquarters, the range of what a firm defines as “core competencies” is becoming slimmer as even some high-value activities like R&D, design etc. are to some extent deconstructed and more standardized parts are teased out. In fact, more and more functions and activities are being deemed outsourcable and offshorable. And this is true not just
for complementary or peripheral activities, but also for some activities that were previously considered as part of the core competence.

**Box 1.1 What is a high-value or core function?**

Core competencies of a firm exist in all portions of the value chain. Research competence is an obvious source of competitive advantage. But so is innovativeness in marketing, or brand equity creation. Below are some characteristics or attributes of “core” functions:

- Strategically vital
- At the heart of firm competitiveness
- Hard to quantify, measure or monitor for “success” vs. “failure”
- Difficult to separate from the rest of the value chain
- Difficult to teach or transfer to external partners
- Entail the highest transactions costs (in terms of knowledge transfer difficulty, absorption, dedicated assets, and opportunism)
- Entail greatest danger if leaked to competitors
- On the other hand, they are the most difficult for competitors to replicate, because they can be
- Idiosyncratic
- Non-standardized
- Tacit
- Embedded
- Complex
- Protected by IP laws
- Most related to human capital and skilled human resources (Sen and Sheil, 2006)
- Entail the greatest uncertainty of outcomes (e.g., R&D)
- The most “profitable” portions of the value chain
- A new aspect of “core competence” now may also be the firm’s ability to coordinate the offshoring/outsourcing function and cooperatively optimize the relationships with multiple network partners. This is especially pertinent in companies like Dell or Nike that have relatively low or zero production value-added internally.

The rest of this chapter examines in detail the strategic drivers for outsourcing and offshoring, as well as the constraining factors. It
describes four decision steps that a company must take in order to plan for the international and organizational reallocation of its activities. Finally, it scrutinizes cooperative or alliance arrangements as an intermediate organizational form between the extremes of internalization of an activity and completely arms-length outsourcing.

Causal factors promoting the outsourcing/offshoring of high-value or core functions

This section enumerates both the “pull” and “push” factors that are rapidly relocating high-value operations such as R&D away from the home nation of the multinational firm. The “pull” factors include not just lower wages and lower cost inputs (e.g., cheaper test subjects for pharmaceutical drug trials) but also the emergence of knowledge clusters such as Bangalore (for IT services) or Taipei (for IC and computer design). Finally, some of the large emerging countries now have large internal markets whose demand and marketing feedback constitute important inputs into the design of products as well as into the overall strategic management of companies. The “push” factors come from changes in several industries located in the US, Europe, and Japan. An inadequate supply of engineering and science graduates, and the loss of internal self confidence in their own innovative capacities (for example in IT hardware and the pharmaceutical industry), are pushing companies to seek talent and ideas further afield. In some cases, technology has become so complex that the diverse sources of knowledge required to design a latest product is too broad for even a giant firm’s internal personnel to handle. A case in point is Boeing, which has moved to a business model that includes extensive outsourcing and offshoring with their latest airplane – the 787 Dreamliner. In some areas, what the firm lacks internally is how to apply or exploit their technical skill to diversifying end-applications or diverse markets that the firm has not encountered before. Hence they build up this competence through the use of foreign talent hired in the company’s foreign subsidiary, or greater collaboration with suppliers.

Reducing wages and costs

Clearly, this remains a dominant consideration in outsourcing and offshoring in most studies (e.g., Flores and Aguilera, 2007; Dossani and
Kenney, 2004). It is paramount in the more standardized and codified business process outsourcing shown on the left side of Figure 1.2, such as document processing, customer relations, insurance and medical claims. It remains a driving factor even in tasks of some complexity such as product development, IT programming, and clinical trials. According to Doshi (2004), a 50 to 60 percent saving in costs can be realized by doing clinical trials in India compared to the US. However, the low labor cost factor diminishes in importance towards the high value right side of Figure 1.2, where the search for talent trumps the wage and salary consideration. Superficially, one would expect a negative correlation between a country’s wage levels and the propensity to relocate jobs there. But this is not necessarily so. Empirical findings in studies such as Contractor and Mudambi (2008) or Bunyaratavej, Hahn, and Doh (2007) show the relationship between the average wage variable and the propensity of a country to export services is not negative, but positive or non-significant. In the long run, wage levels rise with the productivity of workers. In the economics literature this is known as the theory of marginal productivity of wages (Van Biesebroeck, 2003) – or the idea that, in the long run, wages correlate positively with the rise in productivity in an industry or nation.

Practically, we also see this in the wage bubbles and shortage of technical personnel in cities like Bangalore or Mumbai where the demand for IT-qualified personnel temporarily outstripped supply between 2006–07 (McKinsey Global Institute, 2007 and 2009). However, the skilled labor pool in India remains vast. Moreover, outsource service supplier firms have already relocated to Tier 2 cities in India as well as to the Philippines and Latin America. For a considerably long period therefore, the labor cost saving consideration will continue to drive the relocation of economic activity.

**Escalating R&D costs and risks**

The percentage of sales expended on R&D has escalated across all sectors. The pharmaceutical business is a good exemplar. US firms spent a total of $62 billion on R&D in 2008. However, the output of commercially viable new molecules was so low that the expenditure for each new successful drug rose to $1.2 billion. This constitutes too high a risk even for the majors.
Internal creativity limitations

In some sectors, at least, there is considerable questioning as to the ability to maintain an adequate degree of innovation from only internal sources of creativity, e.g., pharmaceuticals (Kleyn, Kitney, and Atun, 2007). Pharmaceutical firms are already hedging the risks of internal development with a plethora of alliances and co-development partners, as well as doing more research abroad in their foreign subsidiaries. In high technology areas, it is the search for external talent, more than wage savings, that drive firms. The same can be seen in wind-turbines and also in the case of Boeing with their outsourcing of key components for the new 787 Dreamliner.

The demand for foreign scientific talent

In their multi-industry survey, Manning, Massini, and Lewin (2008) reported that the search for foreign talent had risen to the number two strategic driver behind “cost savings” as a motivator for offshoring. Since the number of post-graduate degrees awarded in the sciences and engineering to citizens or residents of the US and Europe have been more or less stagnant since the 1990s, there is an emerging shortage of post-graduate degree holders in several technical areas (National Science Foundation, 2009). At the same time, in certain technical fields, the talent pool in emerging nations is increasingly more capable, more up to date and attuned to developments anywhere in the world (Florida, 2005).

This is reflected in the relocation of scientific and research jobs away from the home base of the multinational company and even to emerging nations like China and India. Based on the latest available information5 from the National Science Foundation (2009), the data indicate that in just two years between 2002 and 2004, R&D spending by the foreign majority affiliates of US-based pharmaceutical companies jumped by more than 25 percent. In 2004, the ratio of US drug company R&D spending in their foreign affiliates over R&D expenditures at home in the US rose to 17 percent. This is by no means only a pharmaceutical sector, or high-tech phenomenon. The figure for all US-based multinationals was slightly higher – with R&D expenditures in foreign majority affiliates being 18 percent of R&D spending
by all parent companies in the US home base. In 2002–04, the Indian majority affiliate of all US multinational firms operating there increased their R&D by 217 percent, albeit from a then tiny base.⁶

**The growing supply of foreign scientific talent**

The absolute numbers of science and engineering graduates in emerging nations has been rapidly escalating (Bunyaratavej, Hahn, and Doh, 2007; McKinsey Global Institute, 2007). There are varying estimates of the number of S&E graduates because not all are degree holders, but may only carry a three-year certification or technical diploma. Wadhwa and Gereffi (2005) estimate that, in 2004, China graduated about 350,000 engineers and 290,000 with three-year certifications; India graduated about 112,000 and 103,000 with three-year equivalent diplomas. By comparison, the United States graduated about 140,000 and 85,000 with a lesser qualification. But then the authors themselves say that “these are inappropriate comparisons.” While the quality of scientists and engineers from the top programs in China or India is comparable to the US, in emerging nations there is a rapid drop off in the caliber of training as one goes down the rankings into the second- and third-tier universities.

Having said that, even if we were to take only the top 10 percent of graduates in Brazil, Russia, India, or China (the “BRIC” countries), that would add up to about half the technical talent pool in the US. These are eager, hungry, and creative personnel who, incidentally, can be hired for a quarter of the salary levels of the US.

Beyond engineering and science disciplines, the talent pool in BRIC nations in related areas such as mathematics is even larger. Witness the massive training programs by companies in India which take non-engineering graduates and teach them how to be programmers or business systems experts.

**Knowledge clusters in emerging countries**

A knowledge cluster is a dense network of interlocking companies, suppliers, and university and research centers whose proximity and interactions create an industry capability in innovation and responsiveness
that is not easily replicable elsewhere. As more companies are drawn to a cluster, that adds to the cluster’s attraction as a center of excellence. Tapping into foreign knowledge clusters as a locational motivation is confirmed in several studies such as Alcacer and Chung (2007) or Cantwell and Mudambi (2005) who studied knowledge-seeking subsidiary formation; Patel and Vega (1999); and Sorensen, Rivkin, and Fleming (2006). Knowledge clusters not only attract knowledge-seeking foreign direct investment (FDI) but also mobile expatriate talent. As income levels and economic growth in emerging countries have escalated, we see the beginning of a “reverse brain drain” to places like St. Petersburg, Bangalore, Bombay, and Shanghai. A bio-tech cluster is emerging in Singapore because of generous tax incentives and government support. As more multinational companies are attracted to a knowledge cluster, this reinforces the virtuous cycle of related company agglomeration (Manning, 2008).

As part of its plans to invest over $1 billion in India, in 2008 Cisco opened its “Globalization Center East” in Bangalore with three declared objectives: (i) innovation, (ii) talent development, and (iii) participation in Asia’s growth. General Electric Company already uses India as a global “center of excellence” for several products and technology areas. GE’s Technology Center in Bangalore, with 3,800 researchers (almost all Indians or scientists of Indian origin lured back) is by some measures the company’s single largest R&D grouping (Bhandari, 2009): “The work done here is for aircraft engines, turbines, water treatment plants, diesel locomotives and healthcare instruments . . . In addition, there is a 400-strong team that carries out work on “blue sky” technologies.” According to Bhandari (2009), by 2010 India will have about one-sixth of GE’s technologists worldwide.

Knowledge clusters are also augmented by universities which are symbiotic to the industry for both the supply of fresh talent as well as basic research. According to Un, Cuervo-Cazurra, and Asakawa (2008), when a company engages in research collaboration with an external party, the most fruitful innovations come from alliances with university collaborators. For this reason, the Danish wind-turbine company, Vestas, did not just establish a large R&D center in Chennai, India, but also developed strong links to the local universities, in particular, the Indian Institute of Technology.
Growing importance of foreign markets (and foreign market feedback)

Market feedback, as an essential input into the innovation and development process, has long been accepted as axiomatically true. However, foreign market feedback to augment the design process is a more recent idea, and one not yet universally implemented (Patel and Vega, 1999). In part, this is a reflection of the growing importance of foreign markets (Flores and Aguilera, 2007). While still a small fraction, the percentage of companies that have more than 50 percent of their sales outside their home countries is growing every year. Economic growth rates outside of the traditional company centers in the US, Japan, and Europe are much higher.

According to Farrell (2006), the importance of the local market is one of the five or six top criteria used by companies to choose their offshore locations. The importance of a foreign market can be judged by (i) existing size, (ii) potential size, (iii) as a node or hub in the global supply chain, as well as (iv) a source of cutting-edge ideas.

For basic consumer products (e.g., such as those sold by Unilever or Nestle) the BRIC nations are already large markets. For medical and pharmaceutical products, they are on the cusp of rapid growth. Part of the motivation for relocating clinical trials to China, India, or Brazil is to build goodwill, a local “presence,” and relationships with the government and Food and Drug Administration (FDA or similar regulatory agencies) there. Equally, conducting trials by hiring local doctors, nurses, and hospital administrators who administer the trials, creates a pool of foreign influence agents useful to the companies’ future sales growth. This is an additional advantage on top of the other benefits of clinical trials in emerging countries – the obvious cost savings, the larger test subject pool, the fact that test subjects in developing nations are “drug-naïve,”7 less stringent local FDA requirements, and cheaper and faster data compilation.

As an internal market, Taiwan is small or only medium sized. However, as a design hub for integrated circuits or PCs, as a global supply chain integrator – linking Chinese production centers with western markets or western technology with the mainland Chinese market – Taiwan’s importance far exceeds its size (Mowery and Macher, 2007). A large number of offshoring and outsourcing sites in Taiwan are motivated by its central nodal position.
South Korea’s consumer market for mobile telecommunication, wireless devices, and flat-panel displays is arguably one of the most advanced in the world, with a high degree of competition, and with fussy and demanding customers. Consequently Korea has become a fecund source of innovative ideas. This explains the establishment of new product development centers in Korea by US, European, and Japanese companies, as well as alliances between them and firms such as Samsung.

**Development speed as a response to acceleration in the rate of technical change**

As technical change accelerates and competition intensifies, “companies selling their products around the world need to progress products from development to the market with ever-increasing speed” (Kuemmerle, 1997). For the pharmaceutical industry, being bound by patent expiration dates, every month of delay can sometimes make a discernable difference in profitability. Outsourcing of clinical trials and screening of compounds can often be speedier in contract providers rather than performed inside the company (Getz, 2007; Sen and Shiel, 2006). Faster development and faster market entry as a motivator for offshoring has increased from 27% to 46% in responses from 1,600 companies tracked by Duke University (Manning, Massini, and Lewin, 2008). In high-tech sectors such as aircraft engines, with each sale involving millions, any delay in the promised delivery date to Boeing or Airbus may mean loss of the order to a competitor. By the same token, earlier completion of an R&D project can be a big competitive boost over rivals. General Electric credits its Bangalore R&D center’s computer simulation and computer analytic skills with reducing the testing time for new aircraft engines by as much as 50 percent (Bhandari, 2009).

**Broadening of knowledge inputs needed for R&D or core activities**

For reasons that are as yet imperfectly understood – but probably connected with the increasing complexity of products and diversity of their market applications – even large firms are finding their internal innovative capacity inadequate. Hence they seek a diversity of external
inputs into the design process from external agents and allies (Alcacer and Chung, 2002; Sjölander and Granstrand, 1990) as well as foreign locations (Kuemmerle, 1997) which can complement the firm's own efforts. Chesbrough and Teece (2002) state that “to organize a business for innovation, managers must first determine whether the innovation in question is autonomous (it can be pursued independently) or systemic (it requires complementary innovations).”

The drug discovery process has begun to fundamentally change from chemistry to molecular biology and genetics: from the more or less speculative screening of thousands of chemical compounds to see what therapeutic results they may achieve, to the manipulation of molecules based on some underlying hypotheses or hunches. But as a result, the scope of knowledge inputs has grown beyond the ken of most single firms. Even the giants can no longer garner the requisite knowledge in-house, or in the corporate headquarters nation alone. Hence the proliferation of small specialized biotechs, contract research organizations, and university collaborations worldwide (Cockburn, 2004).

The increase in R&D costs may have a greater than linear relationship to the number of knowledge input sources, because of search, learning, and integration costs – a hypothesis that was implied in Granstrand, Patel, and Pavitt (1997). However, if these diverse knowledge inputs are provided by external partners, then the search costs can be avoided and the learning and integration costs reduced.

**Broadening scope of the end-applications of certain technologies**

Certain technologies turn out to have end uses in areas that are unrelated to a firm’s prior experience. Applied Materials, Inc. is a company whose core competence was defined as making equipment for the computer chip industry. However, closer analysis of the scope of their corporate knowledge revealed that the real expertise of the firm was nanotechnology – the ability to sense, manipulate, and fabricate structures at the molecular level. So defined, Applied Materials had technology useful in solar energy, flat-panel displays, energy-efficient glass, and fuel cells. But these were end-applications where Applied Materials had no industry experience. To bridge a downstream application gap a company has three alternatives: internal growth (which
Global outsourcing and offshoring can be slow, or acquisitions in the diverse fields (often too risky), or the formation of cooperative R&D arrangements and alliances with firms already established in those end applications. This increases the return on R&D, lowers risk, and increases the firm’s performance by positioning it in a broader range of end product offerings (Nichols-Nixon and Woo, 2003).

Deconstruction and routinization or codification of portions of high-value functions

Activities considered to be “core” or of high strategic importance can, nevertheless, be deconstructed into sub-segments that are routine and others that remain tacit, proprietary, and secret. The human resource management function has aspects of critical importance to strategy. But others such as benefits management or record-keeping can be routinized and outsourced (Blinder, 2006). Certain research and intellectual assets are properly treated as highly proprietary and never to be outsourced. But other aspects of the R&D function are mundane, and can be systematized, and codified with the help of IT systems, e.g., patent applications and product design. What used to be considered one monolithic block in the company’s value chain is now amenable to micro-dissection into its component sub-routines.

For example, the pharmaceutical industry is slowly moving towards standard IT-based formats for clinical trial analysis, data collection, and reporting to regulatory authorities (various FDAs), and furthermore, to eventually have this codification “harmonized” and standardized across countries. Also, for example, Cockburn (2004) indicates that modern technologies and automated equipment are speeding the screening of larger numbers of preliminary compounds for possible pharmaceutical use. On the face of it, this trend seems to be an argument for not outsourcing or offshoring – since automation reduces skilled labor content and reduces wage costs borne by pharmaceutical firms in high wage nations. However, the fact is that greater automation in the compound screening process also entails a routinization of the screening process. Once routinized, a process can be outsourced and offshored, thus yielding even further savings to the company.

The remaining two causal factors promoting outsourcing and offshoring summarize familiar economics theory arguments for de-integration.
The quest for flexibility and “leaner” organizations

As the rate of change in industries grows, firms feel greater pressures to become more flexible. In such an environment, vertical integration is held to be cumbersome. Shedding some parts of the firm’s operations is supposed to result in a leaner, but more flexible firm, better able to respond to contingencies in the business environment (Rothaermel, Hitt, and Jobe, 2006).

Auxiliary or support functions, such as occasional or sporadic testing, or analytical tools not always used, if kept in-house entail idle fixed costs which are not fully utilized. By the same token, in times of peak demand, or facing competitive pressure or hurry, internal capacity to perform a particular sub-routine may be completely used up. In such cases, outsourcing as a means of temporarily adding auxiliary capacity is necessary. Capabilities used only occasionally, or subject to sudden demand can profitably be outsourced (Langlois, 2003).

Experience and scale economies in external provider companies (or in offshore company service centers)

When some auxiliary or support functions in the various divisions or departments of a firm are not performed continually, this can result in insufficient learning in a particular niche activity. By contrast, outsourced contract providers – by aggregating demand over all their clients – can achieve economies of scale and experience and achieve deep learning which makes them more proficient and more efficient than companies performing the same functions in-house. This is because specialization results in deeper and more repetitive learning in that specialist function compared to the client firms in that particular niche (Holcomb and Hitt, 2007). The same learning, specialization, and scale advantages can also accrue in offshoring, if the offshore center of the company is given a mandate to perform a certain activity or service for all of the company divisions’ worldwide operations.

Strategic decision-making steps for the optimal allocation of the economic activity of the firm (applies to both outsourcing and offshoring)

Some of the arguments in the foregoing section may appear to apply only to outsourcing to external providers. But they also apply to
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offshoring, if the firm designates a foreign subsidiary as the specialist provider of a certain niche service to the entire global firm. This is in fact part of the strategic rationale for General Electric’s or CISCO’s Indian subsidiaries which are given mandates to perform niche services such as computer simulation and testing of aircraft engines for the entire global company.

After all, whether outsourcing or offshoring, it is the same story, involving a common analytical approach involving four decision steps:

• **STEP 1**: micro-dissecting the firm’s value chains into smaller and smaller pieces;
• **STEP 2**: asking where – over the various divisions or departments of the firm – the same function or activity is being duplicated, and whether this function can be combined across units;
• **STEP 3**: asking where in the world this function can best be performed;
• **STEP 4**: asking which organizational form is best:
  (i) Internal Ownership and Control (at home or in a foreign majority affiliate), or
  (ii) Cooperative Alliance, or
  (iii) Contractual Provider.

Step 3 (geographical location decision) and Step 4 (organizational design) are not necessarily sequential, but simultaneous. In general, the strategic question amounts to this:

In which of the six cells in Figure 1.1, should each activity of the company optimally be placed?

**Inhibiting factors (or why jobs still exist in Europe, the US and Japan)**

There are natural limits to any economic phenomenon. This chapter and book do not ring the death knell of vertical integration or question the continued economic vitality of advanced nation economies and jobs. But there is an undoubted fundamental shift occurring on a global scale. Starting with the separation between producer and consumer in the Chalcolithic era – and the geographical relocation and specialization of economic activity, which resulted in the emergence of international trade more than five thousand years ago – this trend has gathered especial force in recent years with the
liberalization of world trade and investment. In services, particularly, the phenomenon has been spurred only since the mid-1990s when installed bandwidth exploded and communication prices tended closer towards their near-zero marginal cost. Finally, in both services as well as manufacturing, the greater willingness of companies to disaggregate, and “micro-dissect” portions of their value chains, has resulted in an even finer division of labor internationally.

But all economic shifts, whether disaggregation, dis-location, division of labor, or specialization, have their natural limits. The optimal configuration for a company is neither all value being added in Cell (A), in Figure 1.1, nor all activity in Cell (D.2). Instead, the optimal configuration is a spread over many or all of the six cells in Figure 1.1. This section of the chapter details the limitations on outsourcing and offshoring faced by companies.

*Embedded or tacit knowledge cannot be externalized efficiently*

The transfer of tacit knowledge across the boundary between unrelated companies can be difficult, protracted, and costly, compared with internalized routines, learned over many years by company personnel sharing the same payroll and loyalties. Salaries in the Philippines may indeed be lower. But complex tasks cannot be easily codified or effectively taught to developing country personnel (Contractor and Ra, 2002). Even if the knowledge can be transferred, the cost of training the foreign workers may sometimes exceed the present value of the monthly wage savings. Companies should therefore carefully calculate what operations to keep in-house and which to outsource. Azoulay (2004), who studied the decision in pharmaceutical companies to outsource clinical trials, indicates that “knowledge-intensive projects are more likely to be assigned to internal teams, while data-intensive projects are more likely to be outsourced.”

*The costs of vertical integration are “sunk” but benefits persist into the future*

Vertically integrated firms possess advantages and efficiencies developed from their internalized routines, past learning, and resource-based advantages (Barney, 2001). Much of the costs of vertical integration are “sunk” – meaning that they were incurred in previous
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years. However the benefits of the accumulated internal expertise and organizational routines persist into the future.

Delays and “hold-up” risks in global supply chains

Some companies such as Boeing have discovered, to their chagrin, that giving up internal competencies in favor of external providers has been too problematic, expensive, and delayed, so that the outsourced function has been re-internalized, at considerable cost, by acquiring the outsource service provider company (Tadelis, 2007). According to Cargonews Asia (2009), “Boeing will pay about US$580 million for a South Carolina plant in an attempt to resolve supply problems dogging its long-delayed new jet 787 Dreamliner . . . The plant in question belongs to Vought Aircraft Industries and is mostly responsible for the supply of the Dreamliner’s composite sections.” The risks of delay in large capital cost items like aircraft can be severe, since airlines reserve the right to cancel their orders beyond a stated deadline, or can demand penalties from Boeing for delivery delays, under contract provisions.

Finer disaggregation of the supply chain can yield savings. However, one can also hypothesize that firms that outsource increase their overall supply chain risk at a faster rate than the number of external contracts, or the number of geographical relocations.10

Rising labor and other costs at offshore locations

Any relocation entails incremental costs of search, negotiation, set-up, knowledge transfer, and training (Farrell, 2006). But in addition to the initial set-up costs, the “running” costs of a foreign operation, and their future escalation, have also to be estimated. In offshore “hot spots” like Bangalore, Hyderabad, or Shenzhen, skilled labor costs have doubled or even quintupled since the mid-1990s. Until the 2008 recession, stories abounded where a new employee in the IT field in Bangalore would quit his job on the very first day, tempted away by a competing offer from a rival company. Rents have doubled or tripled. Streets are clogged with slow-moving traffic and – at least in India – the infrastructure is loaded beyond its peak carrying capacity in terms of electricity, water supply, pollution, transportation, and schools, etc.

On the other hand, India is investing in infrastructure and to meet the skilled labor shortage, thousands of engineering and science graduates
are being retrained for IT positions. Farrell (2006) estimates that, even if Indian wages were to rise inexorably faster than in advanced nations, after twenty years there would still be a 40 percent gap in a software engineer’s salary. In part this is because of the vast Indian labor pool and also because competition from other nations – including advanced countries such as the US11 – will put a ceiling on the rate of escalation of Indian wages.

Fear of misappropriation and leakage of knowledge to potential competitors

This fear takes two forms. First, there is a concern that outsourcing can increase unintended technology spillovers especially in foreign locations (Dosi et al., 2006). With a higher personnel turnover rate, and lower control in locations such as Bangalore, spillovers to rival firms in the same knowledge cluster can occur when employees are lured away. Intellectual property laws, employment contract enforceability, and the legal environment in general may be weaker than in Europe or North America. Some studies claim that this is a dominant factor in explaining R&D location decisions (Belderbos, 2003). In some cases, the competitive threat comes from the external contract provider firm which, having mastered one (outsourced) portion of the value chain, then expands its own operations to compete with its former clients.

The second fear is that, with extensive outsourcing, a “hollowing out” of a company’s core competence will occur, leaving the firm weak in the long run.

These are, indeed, significant concerns, especially in the high-value portions of the production and distribution chain.

Inefficiencies resulting from spatial separation

Geographical separation between work units, and chronological dislocations necessitate the creation of virtual linkages, which entail additional communication costs and ineffective integration of tasks because of lack of trust, disparate incentive systems, time zone differences, or cultural differences (Earley and Mosakowski, 2000; Hinds and Bailey, 2003).

Problems which can be solved through ongoing face-to-face communication when activities are located next to each other become much
more complicated or intractable when the personnel are separated over large distances. In cases where the interfaces among the separated activities are improperly specified and not sufficiently standardized this will result in miscommunication and inefficiency.

Certification and quality concerns

The world is still far from having uniform or harmonized regulatory standards. Each government prescribes its own rules and procedures. For some industries and regions like the EU, there are moves to reciprocally accept a patent or drug filing made in some other countries, or in the long run seek harmonization of codes across the region or world. But this is only a nascent trend. Each nation still has its own standards, requirements, and procedures.

There is therefore a higher hurdle in terms of regulatory scrutiny or a natural bias against functions performed by (i) contract providers, and/or (ii) foreign providers. (See Hindin, 2004 for pharmaceutical industry filings before the FDA which include clinical test data done by Contract Research Organizations (CROs) and data derived from foreign locales.)

Other transaction cost considerations

Transaction cost theory provides several other cogent caveats to firms making the transition from integrated to outsourced and offshored activities. These include:

- Negotiations/training/set-up costs. (An example would be the avoidable costs and delays in concluding contracts with CROs in the pharmaceutical industry.)
- Contract incompleteness. The inability of a contract, whatever its length, to cover all contingencies is known as “contact incompleteness.” Since business environments can change between signing and execution, and “knowledge goods” or knowledge-based output cannot be described with exactitude, contract incompleteness is even worse when knowledge is tacit and firm-specific. Contracts are also fuzzier, more prone to cultural misunderstandings, and their enforceability less certain in foreign settings.
“Hold-up” costs and fears when as part of the contract (i) large function-specific investments need to be made by one of the contracting parties and in the event of future conflict (ii) those assets have few alternative uses in the nation (Klein, 1996). This fear inhibits either an external outsource provider or the focal firm, depending on which party is making the large dedicated investment.

Monitoring and coordination costs/central overheads. As companies increase the number of their outsourced and offshored functions, greater oversight, monitoring, and coordination are required (Azoulay, 2004). Takeishi (2001) describes these as the increased cost and overheads of “boundary-spanning” efforts. Many firms have had to create new departments to handle all their outsourcing arrangements (Barthelemy, 2001). Some organizations have been overwhelmed by the volume of additional monitoring and coordination tasks – in handling the increased strategic complexity and supply chain risks (Rothaermel, Hitt, and Jobe, 2006). Overhead expenses may grow at a higher than linear rate to the number of outsourcing arrangements.

Data privacy and security

This concern is specific to and crucial in certain areas like medical and financial records. IT professionals claim that this is an easily solvable matter, through encryption or by stripping names and identifying markers from records and splitting the operation over several discrete units of the company or over different external providers, so that no single unit has the capability of assembling an entire record. However, this remains a significant concern.

Xenophobia and protectionism in advanced economies

Several foreign call centers, such as Dell’s, have been brought back to the US after American customers complained of poor service and language difficulties. In general, xenophobia and a rising sense of protectionism could put a damper on the offshoring and outsourcing trend in some areas, such as customer service.

However, this also illustrates another constraint. The labor pool in China, India, Brazil, and the Philippines may appear vast. However, it is stratified. Only the top tier in those labor markets exhibits
world-class skills, and there is a significant drop-off in capability going down into the second and third tiers of the labor pools. Indeed, the processing efficiency of customer service in Philippine or Indian call centers has declined in the last five years. The cream of the foreign labor pools has been lured away by other firms, or has gone into more attractive occupations. The second- and third-tier personnel can do the same jobs – but more slowly, less satisfactorily, and with stronger local accents.

**Erosion of competitiveness in external service provider firms**

Barthelemy (2003) indicates that, infrequently, an external service provider may lose its technological edge and then the function may have to be reincorporated into the client firm, or another external contract provider sought. When selecting an external provider, an initial assessment of their technology trajectory and absorptive capacity are desirable.

At the same time, supplier and buyer firms can benefit and augment each other’s technological competencies through greater ongoing cooperation in an alliance arrangement.

**Cooperation: neither in-house nor contractually distant**

The search for the optimum (organizational and spatial) configuration of a firm these days necessarily includes arrangements that are neither completely in-company, nor arms-length with distant contractors. Instead, cooperative relationships between two firms that remain distinct – or corporate “alliances” – are often preferred. In Figure 1.1, these comprise Cells (B.1) and (D.1).

According to surveys of some of the world’s largest enterprises, over one-fifth of their revenues comes from alliances, or for many other firms some 30 percent of their R&D expenditures is shared with co-development partners (Kale and Singh, 2009). Globally, the nominal number of alliance arrangements must run into the millions. IBM and CISCO alone each claim over 100,000 “partnerships.” The character of most of the listed arrangements may not be much more than contractual, or temporary, or in some cases is merely a listing with no ongoing joint activity. Nevertheless, it would be correct to estimate that a significant fraction of the 100,000 partnerships of IBM or
CISCO entail real ongoing relationships. These relationships between the managements of the allies involve cooperative behaviors that go well beyond what their formal agreement states. Moreover, several of their alliances include major joint commitments and investments amounting to many millions of dollars.

The strategic objectives of alliances

Alliance arrangements encompass a multiplicity of purposes, such as joint R&D, the transfer of technology from one firm to another, cooperative supply chain links, or the joint development of a market (Contractor and Lorange, 2002). These involve diverse strategic objectives such as:

Cost reduction

Examples include new systems developed by CISCO, or one of its partners which are more efficient than the existing version. The new configuration is then licensed from one ally to the other. However, the transfer of technology and its implementation cost in another country requires future collaboration of an unknown extent. Hence the cost of the technology transfer borne by each partner cannot be exactly specified in the agreement. However, with an ongoing relationship, based on trust and forbearance, the sacrifice made by a partner, in one deal, is remembered and they may be compensated with a sweeter arrangement in the future.

Risk reduction

Alliances between biotech and big pharmaceutical firms are predicated on the big company’s limited internal knowledge in new areas like genetics, and the small partner’s deep specialized knowledge, nimbleness, creativity, speed, and freedom from the big company’s restrictive organizational culture. The large pharmaceutical firm’s deeper pockets share part of the risk of developing a new molecular entity, and it is also better at the (nowadays international) clinical testing and certification process, and the increasingly expensive marketing phase. This is an example of risk-sharing based on complementary contributions by the two partners.
However, in joint exploration in the natural resources area, or in R&D for new technologies jointly undertaken by IBM and a partner, the talent and money contributed by each member of the coalition is not complementary, but similar. In such a case, the alliance is simply a risk-pooling or risk-sharing device.

In the same vein, when industry giants like Microsoft or Novartis take small equity stakes in a hundred start-up companies, or pay in advance to acquire unknown future rights to technology that may or may not emerge from their start-up partners, this is akin to buying one hundred lottery tickets (with a small investment in each) rather than spending the entire R&D budget on say two large R&D projects. This is another risk reduction device and a “real-options” approach to participating in possible future technology developments.

Revenu enhancing or market accessing alliances

Alliances where one ally contributes intellectual assets or a technology, while the other contributes access to a market, are very common internationally. The classic example is the successful Abbott-Takeda 50/50 joint venture (JV) for the American market. Takeda’s contribution was the drug, while Abbott’s expertise was US certification and marketing under the *Prevacid* brand name.

Many cross-licensing agreements in the pharmaceutical industry involve not merely the exchange of patents, but really the exchange of territorial rights to different countries. New computer applications or software are licensed because the developer does not wish to carry the risks or costs of a foreign market development. They would rather leave that end of the value chain (in that region) to a local partner who has better understanding of the regional culture, regulatory practices, and distribution.

In the 1980s, 7-Eleven, a chain of convenience stores, was highly integrated, even owning the cows which supplied the milk on their shelves. Today, most of their procurement is outsourced, but under very cooperative relationships where the allies share proprietary knowledge (Gottfredson, Puryear and Phillips, 2005). 7-Eleven’s core competence is today described as gathering and analyzing data from its hundreds of thousands of consumers worldwide, and selectively sharing this with their suppliers. 7-Eleven even goes so far as to recommend changes in recipes and packaging design. Major suppliers co-invest in
market research, store displays, and kiosks, and even install dedicated machinery in their factories for special 7-Eleven orders – risks they would not take were it not for a trusting alliance relationship built up with the company.

The learning objective

In many alliances, the dominant strategic objective is learning. Since 2005, when new legislation in India again allowed product patents for drugs, the pharmaceutical industry view of India has made an almost 180 degree turn. India is now considered a very desirable growth market. Foreign companies are rapidly forming subsidiaries and alliances with Indian partners for all portions of the value chain, from marketing in India, to clinical testing and certification, and even joint R&D. In the latter two areas, a dominant objective is mutual learning. The Indian partner wishes to learn the technology or research procedures, while the foreign partner wishes to learn about the Indian market, institutions, and regulation.

Strong alliance relationships with a CRO may remain contractual, in legal form. But when mutual trust develops, the two become allies for the long term (Sen and Shiel, 2006) and are increasingly willing to risk larger investments into R&D projects, which benefit each other from mutual learning over the long run (Dyer and Singh, 1998).

An Indian company may begin as a contract partner to do clinical trials for a US firm in India (Cell [D.2] in Figure 1.1). Initially, the US company is not familiar with the Indian medical establishment or government. But later, as they learn, and as the relationship with the Indian partner deepens, the American company may buy a partial equity stake in the Indian company (which moves them into Cell [D.1] in Figure 1.1) or acquire the latter outright and convert it into an Indian subsidiary (Cell [C]).

Joint R&D

The “lean manufacturing” concept that began in Japan superficially appears to have cost reduction as its main objective. Indeed, the engineers of say Toyota and its suppliers will do intensive joint R&D with the idea of shaving pennies off the cost of a component. But an equally
important unheralded objective is to get the supplier base to share the costs and risks (and rewards) of joint R&D. An arms-length supplier will not do R&D that benefits the large firm. They have no assurance of being able to share in the fruits or rewards of a successful new component design. However, if the relationship is cooperative, deeply interactive, and based on trust, a supplier has the incentive to risk investing in joint R&D because they know their sacrifices and investment will be remembered, even if one particular R&D project does not yield much. In an adversarial, arms-length, competitive environment, with multiple suppliers bidding for the same component order, the transaction costs of dealing with arms-length parties are too high. Compared to a contractual strategy landscape, in the Japanese “keiretsu” system, the number of suppliers the focal firm deals with is reduced. The fewer chosen suppliers are then invited to form deeper cooperative relationships with the assembler who often will take a small equity stake in the partner. (This is more to signify trust and membership in a corporate “family,” rather than the small equity stake having any real voting power.) Consequently, the relationships with the chosen fewer suppliers are more intensely interactive. There is greater mutual disclosure of proprietary knowledge. In an alliance context there is far more joint R&D than in an arms-length environment.

CROs and big pharmaceutical firms that have developed trust over the years then have an incentive in investing in co-specialized assets. For example, they jointly develop a common IT platform and management processes whereby their interaction and communications are more standardized and less costly. Neither ally would undertake the cost and risk of a relationship-specific R&D investment without some assurance of an ongoing alliance link between them.

Diversifying the product and market portfolio

Earlier we discussed the example of Applied Materials, Inc., a company in the business of selling equipment for the fabrication of computer chips. But the real expertise of this company may be described as nanotechnology (the ability to sense and manipulate matter at the molecular level). Nanotechnology has applications in many other fields totally unrelated to the company’s prior experience, such as flat screen displays, and solar cells. Forming alliances with companies in those unrelated areas gives Applied Materials a presence (and a future
revenue stream) in product and market areas in which they could not have hoped to enter by themselves. Takeda, despite having a significant Japanese presence, did not feel sanguine enough about their own abilities to get rapid FDA approval and market share in the US. That is why they invited Abbott to form a 50/50 joint venture alliance for what turned out to be a very mutually profitable blockbuster drug – *Prevacid*.

### Which is more important – alliance structure or process?

An alliance will typically have a legal agreement that specifies its structure, such as royalty or milestone payments, unit price or quantities in supply chain agreements, rights to buy the partner’s shares, or in the case of an equity joint venture, the shareholding of the two partners that jointly create and run the (third) joint venture company. But in most situations, the industry and the environment change rapidly enough, so that no agreement, however lengthy, can cover all the eventualities. This is described by the term “contract incompleteness” or the inability to foresee and specify all future possibilities (Williamson, 1975). And this is one reason why healthy alliances go beyond contract specifications to a cooperative relationship between the two or more firms – based on mutual trust, forbearance, openness, friendly exchange of personnel, and willingness to share risks, costs, and rewards. A legal structure is desirable. Many would call it a necessity. But successful alliance executives know that the language of their legal agreement is only a beginning and that the arrangement will often need to be renegotiated as conditions change.

### The drawbacks of entangling alliances

Unlike purely contractual and distant outsourcing links (Cells [B.2] and [D.2] in Figure 1.1), alliances (Cells [B.1] and [D.1]) typically entail higher investments, longer-term commitments, and deeper relationships. But there is also a higher mutual vulnerability. When alliances terminate there may sometimes also be higher costs than in arms-length contracts.

First, relationship building takes time and considerable effort. For many firms, this requires patience and cultivating new relationship-building skills which they may not have possessed or needed in the past (Holcomb and Hitt, 2007). In addition, to keep the relationships...
Global outsourcing and offshoring

developing entails an ongoing management overhead cost (Tadelis, 2007). Large organizations like Novartis, with more than 500 alliance partners at any given time, need huge departments with lawyers, engineers and other highly paid personnel to negotiate, transfer knowledge and intellectual property, monitor the arrangements, and act as interface between the hundreds of allies and the focal company.

This is a large and complex task. “Contract incompleteness” means that one alliance partner often seeks a renegotiation as industry conditions change. By all accounts, the Abbott-Takeda Joint Venture was a success for both parties. However, in the latter half of their alliance relationship, Abbott had a disagreement with Takeda (and even sued them in 2005 to force a change) alleging that the transfer price (per kilogram) at which Takeda sold the “active pharmaceutical ingredient” (API) to the 50/50 joint venture was too high. Clearly, the higher the unit price of the API, or key raw material, the higher are Takeda’s profits. The profit mark-up on the API is 100 percent earned by Takeda, in Japan, without incurring US taxes. By contrast, any profits made by the joint venture company had to be shared 50/50 with Abbott (and that, too, after paying US corporate income taxes). Alliances often have such inherent (or “built-in”) conflicts of interests. The two companies, whilst entangled in an alliance, nevertheless remain separate entities.

The termination rate of alliances may, or may not, be different from single-management companies. Data are unavailable. Moreover, termination itself does not signify failure. Many alliances in high-tech areas are wound up at the behest of both alliance partners – with mutual consent. This occurs when the patent runs out, or when the technology has progressed on to the next generation. The strategic purpose of many alliances is intrinsically, and intentionally, medium term. However, it is true that when alliances terminate, the division of assets is messier than when a single company terminates an operation. The overall distribution of benefits that accrued to each ally is rarely commensurate with the costs and risks borne by each. Over the entire Abbott-Takeda alliance cycle, the benefit/cost ratio for both companies was greater than 1. However, the ratio was not the same for both firms. In retrospect, while both were better off forming the alliance (compared to the go-it-alone or internalization alternative), the net value captured by one partner was greater than the net value captured by the other.
Alliances are now a permanent feature of business

Alliances, as we know them today, were virtually non-existent or very few at the start of the twentieth century. Their proliferation in the last twenty years is a reflection of the fact that, for certain strategic objectives, neither complete internalization nor arms-length contracts are optimal. Instead, an intermediate organizational form – namely alliances – provides the best choice in many circumstances. Today, there is hardly a major company that does not have several cooperative or alliance-based relationships as part of its overall operations. No passing fad, alliances are now a minor but permanent part of the strategy landscape. Today, a mix of in-company operations, contracted outsourcing as well as a network of several cooperative alliance arrangements constitutes the “portfolio” of any significantly sized company – one that searches for, links to, and extracts cooperative value from multiple relationships (Chesbrough, 2007).

Concluding remarks: the evolution of economic organization from the Paleolithic to the globalization era

Humans have progressed from individual self sufficiency to group cooperation, from do-it-yourself production to units that specialize in one or few items made at larger scale. Ours is a story of separation between consumer and producer – as well as a separation, by specialization, between one type of producer and another. Even within a factory or workshop, workers and operations became separated by skill level and task, because each worker, through repetition, progresses down his/her own experience and specialized skill curve. By the Chalcolithic era, in the fourth millennium BCE in Palestine, factories had become so specialized that one workshop would produce only drills or micro-borers. Another produced only tabular scrapers, another only sickles, and another only ivory figurines, and so on (Levy, 2003). From there, the output was distributed all over the Eastern Mediterranean. Today, only because our maps have strange lines called “country boundaries” do we label this as “international trade.”

The seeds of all of these economic trends were planted in the Middle or Late Paleolithic era. But it was not until the waning decades of the twentieth century that these trends gathered exponential force.
Today, the ever finer disaggregation or slicing of the value chain, the relocation of each slice to remote regions, and the international division of labor by specialization have reached unparalleled proportions and a planetary scope.

In a sense, this is the logical corollary of “lean manufacturing” programs which have spread around the world. The Industrial Engineer, armed with a stopwatch, does “time-and-motion” studies of a worker’s movements, analyzes each worker’s turn of hand, or swivel of heel, and determines how the worker’s movements can be pared down to a minimum in time, and maximum in output. The Industrial Engineer optimizes the division of labor along an assembly line, optimally dividing the operation into discrete tasks and sets the speed of the assembly line in such a way that no individual worker has slack time. He or she also seeks to replace a human with an automated machine, if technologically and economically feasible. So too, the Industrial Economist seeks to divide the value chain into discrete and fine bits, to determine the optimal allocation of each slice or component over space (country), time, and organizational type (firm hierarchy, or cooperative alliance or contract).

Figure 1.1 described the six generic combinations of geography and organization type over which each firm’s value chain may be allocated. The chapter then outlined a decision procedure consisting of four strategic decisions: Step 1: Micro-dissecting the firm’s value chains into as many small pieces as economically divisible. Step 2: Asking if the same function or activity is being duplicated, and whether this function can be combined across different units of the company. Step 3: Asking where in the world this function can best be performed. Step 4: And for each location (where the specialized function is to be performed) asking which organizational form is best, whether (i) Internal Ownership and Control or (ii) Cooperative Alliance, or (iii) Contractual Outsource Provider. In the broadest sense, this chapter poses the question:

In which of the six cells in Figure 1.1, should each activity of the company optimally be placed?

The explosive increase in the geographic relocation and reorganization of economic activity in the last two decades is a reflection of (i) necessity (the intensification of competition faced by companies because of globalization and liberalization of trade and investment
regimes); and (ii) the means to do so (i.e., the precipitous drop in transport, data transmission, and tariff costs – so that output can be relocated much farther afield from its consumer than ever before). At the same time, we have quietly undergone a revolution in management ideas and organization. From an era when Ford made everything including its own steel to the finished automobiles, from IBM preferring to withdraw from India rather than accept local partners, we are now in an era where managers are willing, even eager – in the name of efficiency – to share control with a plethora of suppliers and partners in a spectrum of arrangements, from arms-length outsourcing to the familial alliance. The chapter described the benefits and drawbacks of each organizational type, and identified the driving factors, as well as the factors inhibiting the offshore relocation of economic activity. Managers are also willing today to consider what would have been unthinkable to some even ten years ago – the outsourcing and offshoring of “core competence.” Even these core or high-value portions of the value chain, such as R&D, can now be disaggregated, or micro-dissected into operations that need to be highly proprietary (for fear that the firm’s knowledge may leak to competitors) versus those functions that are mundane or can be routinized and outsourced, with no danger to the company.

We have come a long way since the ancestral Paleolithic workshop in Grotta Sant’Angelo. The denizens of that flint-knapping and tool-making cave have vanished into prehistory. Perhaps the genesis of that economic activity was not even a conscious act. Since the finished spearhead may be only one-fifth, or less, in weight compared to the stone raw material (i.e., it was a weight losing production process) the incentive for locating the workshop near the quarry is fairly obvious. Today, location decisions are based on planetary scale intelligence (in both its meanings, the availability of information or data, as well as meta-analytical skills in industrial economics and global management).

Notes

1 The University of Michigan Museum of Anthropology (2009) uses the term “workshop” but stops short of describing it as having any organization because of lack of physical evidence.
2 For each assembly plant, Sutton (2004) identifies a minimum of 24 separable major systems or sub-assemblies that constitute a modern
automobile, and classifies them into three groups: “Normally Made In-House,” “Often Outsourced” and “Normally Outsourced.” The outsource suppliers, in turn, procure from yet other external vendors, and so on.

3 Merchandise trade over vast distances was established long ago. Pliny the Elder complained to the Roman Senate about Rome’s enormous trade deficit of 100 million sesterces per year, caused in major part by imports from Asia. He blamed Roman women’s fondness for Indian textiles and Chinese silks. Roman coins are periodically dug up from Indian soil. Indian-style temples all over Southeast Asia attest to the commercial expansion by Indian traders and empires in the first millennium CE. However, another definitional and data problem arises from the fact that the nation-state, with fixed jurisdictional boundaries as a political entity, is only a few hundred years old.


5 There is a considerable lag in reporting. Moreover, these are data only for the foreign affiliates of US-based multinationals. One can surmise that similar growth exists in contract research performed by third parties – Cell [D.2] in Figure 1.1.

6 These data are only for the US, and only for the majority affiliates of US multinationals. They do not cover foreign multinationals, or the substantial growth in foreign contract research done by arms-length parties for which aggregate global data are poor, or non-existent.

7 The term “drug-naïve” refers to the generally lowered consumption of drugs in developing nations, with the benefit that a drug under trial is less likely to interact with a drug already in the test subject’s body, thereby confusing the results.

8 In some cases, though by no means all, automation also results in being able to use operators with lower skills and discretion who simply follow routine procedures and instructions.

9 Specialization of production in workshops began much earlier, probably no later than the dawn of agriculture around 10,000 BCE. However, scholarly circumspection does not allow many archeologists to admit this because the physical evidence is scant thus far, the surface of the planet barely having been scratched.

10 There is as yet no evidence, but this hypothesis could constitute a significant future research study.

11 The bottom 20 percent of wage earners in the US have seen their real income decline or stay stagnant over the past fifteen years. It is difficult to say what portion of this decline can be attributed to domestic automation and service sector productivity measures on the one hand, and competition from offshore locations on the other. The point remains,
however, that some operations in US states such as South Dakota, Utah, or the South where wages are below the US average, remain marginally competitive with several offshore locations.

12 From 1970, when socialist tendencies in India were at their peak, until 2005, India did not allow product patents for drugs, but only “process patents,” a policy that spawned a healthy Indian generics industry with as many as 22,000 (mostly small) generics producers who were alleged to have gleefully copied patents filed in Europe, the US, and Japan. This resulted in medicines being available to the Indian customer at tiny fractions of the price of the patented equivalent. However, it made India a pariah nation, as far as the industry majors were concerned.

13 Kale and Singh (2009) quote statistics from two surveys. But there is no comparable control group of single-management firms, so that a proper assessment cannot be made.

14 The alliance was terminated and settled to mutual satisfaction in 2008–09.

15 One of the authors of this chapter, Farok Contractor, wishes to confess that he began his career as an Industrial Engineer in the Max Factor Co. factory in Gardena, California. As part of the redesign of assembly lines, he did time-and-motion studies to see how the assembly operation could be speeded up, or workers replaced by automated equipment. He was immensely popular on the factory floor.

References


Globalization of R&D
Offshoring innovative activity to emerging economies

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Introduction

Recent years have seen a major debate in academia, the media, and policy circles on the impact of the phenomenon of offshoring on the US economy. The relatively sluggish job creation numbers have been blamed on offshoring, among other factors. Varying estimates of job migration and potential future job losses have been developed, and supporters have lined up on both sides of the issue, debating the pros and cons of offshoring for the US economy (for an early account of the impact of offshoring on jobs, see Bardhan and Kroll [2003]).

Broadly speaking, there are two schools of thought regarding the magnitude and potential impact of offshoring. The votaries of a major and continuing job loss note that the confluence of the five factors that gave rise to the phenomenon – (1) globalization, (2) free markets, (3) information and communications technology, (4) wage differentials, and (5) the large numbers of college students graduating annually in developing countries – show no signs of abating. They also claim there are no signs of any new, emerging sectors or occupations that will take up the slack, as the US software sector did during the 1990s when manufacturing jobs continued to decline. The case for minor impact is based on the fact that the magnitude of job loss attributable to offshoring has been minor so far. Supporters of this view claim that the US economy is robust and dynamic enough to replace the jobs lost, and that China, India, and other countries have severe constraints in terms of how many more offshoring related jobs those economies could create, absorb, and sustain. Moreover, they claim, a significant share of the jobs being lost to offshoring currently are low-paying, service sector jobs, such as in call centers, and the key long-run challenge facing the US economy is the creation of high value-added, high-paying jobs.
Both camps are largely in agreement on the importance of continued innovation as the primary way to create high-paying new jobs in the country. The innovative dynamism of the US economy, the creation of new goods, new services, new value, and the temporary global monopoly that comes with them as well as the spillover effects that these innovations have on productivity in other sectors of the economy, have played a large part in the creation of high-paying jobs. It is one of the key lessons from the economic history of the United States going back to the era of rapid industrialization in the late nineteenth century. This has been true from the time of the automobile revolution to the world of the Internet. This realization has prompted entrepreneurs, economists, venture capital firms and policy makers to look for the coming of the NBT (next big thing) – the next major technological breakthrough that will create new high-paying jobs in the US. While the pessimists fret that there is no “Next Big Thing” on the immediate horizon, the optimists are firm in their belief that continued innovation and creation of entire new sectors of the economy will more than compensate for the ongoing white collar job losses, as was the case during the wave of manufacturing offshoring during the early 1990s in the aftermath of the recession. The industrialized countries, as well as developing countries, would benefit from this win-win scenario.

The evidence that R&D itself is being offshored is therefore met with particular concern, and in this context worries have been expressed in western economies about (a) the growth of innovation clusters and evolving critical masses of engineers and scientists in parts of India, China, Russia, and other countries, and (b) the movement of offshoring activity further up the value chain, encompassing research, design and development operations in manufacturing and services.

What are the economic and business management implications of R&D offshoring? Is a significant amount of R&D activity being off-shored? And if the volumes are sizeable, does that imply that future innovations would originate in other countries and also that the economic benefits would disproportionately accrue to other nations? These are some of the questions discussed here. The chapter is organized in the following manner: the next section describes the evolution of R&D carried out by firms in the US, starting with in-house R&D operations, and the reasons that have led to the offshoring of R&D activity, as well as the global conditions that have facilitated this phenomenon. This is followed by an examination of the macroeconomic
state of R&D in the US, including R&D expenditures, R&D employment, patent generation, and their impact on the economy.² Next, we describe the results of our ongoing firm survey that deals with questions dealing with characteristics of firms which resort to offshoring of R&D. We then look at the analysis of the management challenges faced by R&D affiliates in emerging economies and the organizational evolution of global corporate R&D. Finally, we give our concluding remarks and analyze the implications for US innovation, the economy, and job creation.

Global corporate R&D

From the domestic proprietary model to offshoring

Mowery (1990) points out that the nature of the innovation process led to the early development of industrial research as an in-house or intra-firm activity. Corporate research and development departments and organizations first started appearing in the late nineteenth, early twentieth century in the United States. The in-house R&D unit was an organizational innovation that institutionalized invention-related activity, separating it from production-related processes, and connecting inventions to the marketplace under the auspices of a single firm. Through specialization, economies of scale and scope, and by internalizing the invention process, firms were able to make inventive activity more efficient and to ensure high returns. Increasingly savvy consumers, burgeoning competition, as well as rapid globalization, initially in the period up to WWI and then later, after WWII, placed heavy demands on firms to continuously introduce new products and services. The dynamic requirements of R&D and its commercialization therefore were such that the large teams of scientists and engineers needed were more effectively housed within the organizational structure of the firm.

The model of the proprietary, internal, domestically based industrial laboratory is, however, changing for a number of reasons, foremost among them being the increasingly global nature of sales of large firms. As firms expanded into hitherto untapped markets around the world, they experienced the need to design their products in consonance with local tastes, leading to the strategy to “design and research to market,” in addition to the earlier policy of “produce to market.”
rapid expansion into new markets with different product cultures is now putting a severe strain on the R&D resources and capabilities of individual firms. Moreover, the complex organization and increasingly interdisciplinary nature of most research projects calls for simultaneous services of researchers from many diverse disciplines, such as statistics, computer science, genetics, nanotechnology, and so forth. It is not always feasible to hire all these specialists on a permanent basis, when the need for their services is sporadic, and depends on specific projects. The experience accumulated in the offshoring of manufacturing and service activity has served to open the door to exploring the offshoring of R&D. Other factors behind R&D globalization include the need for a shorter R&D cycle from conception to implementation, the need to ramp up efficiency and effectiveness levels of R&D activity, and the need to access R&D talent in different scientific-cultural climes leading to different technical solutions. The widely heard theme in business literature today about returning to the core competence of firms has been interpreted by some firms in the context of R&D activity as well. Since the offshoring/outsourcing option as a lumpy cost-cutting procedure is exercised particularly during times of distress and downturns (see Bardhan and Howe, 2001), the combination of an economic downturn, problematic returns to R&D and increasing competition can create fertile grounds for the “push factors” needed for divesting R&D operations by firms in the US.

Changing global environment, availability of skilled labor and R&D offshoring

The political, technological, and economic changes that have taken place in the last two decades have given rise to the preconditions necessary for offshoring in general and R&D offshoring in particular. Serendipitously, the liberalization of state controls and opening up of Russia, China, and India to trade and investment flows has occurred at a time when the technological wherewithal for offshoring, in the form of the Internet, was being put in place. The arms race during the Cold War, and the belief in science and technology as a primary tool of economic development led the former Soviet state to invest heavily in the creation of specialized research institutes and centers. These research establishments were usually geographically concentrated, thus forming major scientific agglomerations in certain urban areas employing large
numbers of scientists and engineers. The end of the Cold War and the disintegration of the USSR displaced many highly trained scientists, engineers, and technicians from their work in the scientific-research and military-industrial establishment, who now constitute a significant pool of global R&D labor (see Bardhan and Kroll, 2006).

The skilled labor potential of China and India is also becoming well known. Playing to Indian strengths in engineering and a wide range of basic science research, there is an ongoing transfer of R&D activity to India, particularly in the areas of software, biotech and pharmaceuticals, engineering design and development, and animation and simulation, as well as basic research activity in the physical sciences. High-tech clusters are appearing rapidly, in and around the major and even secondary metropolitan areas of India. While the premier institutions of higher education in engineering and sciences in India are justly famous, there is a growing second tier of institutes that actually produce a larger number of graduates, and in the long run may have a greater impact. The large network of public sector scientific institutes and laboratories, some of them affiliated to the defense establishment, has been instrumental in creating a solid base of science and technology in the country.

In the case of China, the institutional umbrella of a science and technology park is one innovation model being tested. A network of laboratories, research institutes, universities, and firms, the Zhongguancun-Haidian Science Park, based in Beijing, is touted as China’s answer to Silicon Valley. The establishments here include fifty-six universities, including two of China’s leading institutions of higher learning, Beijing University and Tsinghua University, as well as 232 research institutes of various kinds led by the Chinese Academy of Sciences. A fifth of the firms located at Haidian are wholly foreign-owned or joint ventures, and constitute a veritable “who’s who” of the US high-tech industry. The official website claims that nearly 90 percent of the firms are involved in research, development, production, and marketing in cutting-edge fields, such as new materials, electronics, and energy. Around 38 percent are state-affiliated in some form or other. Walsh (2003) points out that while the absolute number of R&D centers or facilities in the PRC is not known; recent Chinese news articles put the number at anywhere between 120 and nearly 400 foreign-owned or jointly owned R&D centers spread throughout the PRC.
**Pace of offshoring of R&D**

Offshoring of R&D activity in sectors ranging from pharmaceuticals and biotechnology to computer hardware and software is on the rise, particularly from the US. Intel, for example, has labs carrying out advanced microprocessor design work in Novosibirsk and St. Petersburg in Russia, after having bought Elbrus, a leading Russian computer technology research center and boosting its Russian research staff to over 1,500. Intel also has a high-tech development center in Bangalore, India, working on digital signal processing, device drivers, and process and chipset design, and a major facility in Beijing, the Intel China Research Center for the development of next-generation networking and wireless platform solutions. According to the Indian National Association of Software and Service Companies (Nasscom), the total market size of this so-called knowledge process outsourcing (KPO) business in India was around $1.5 billion in 2006, and is expected to increase substantially. Original equipment manufacturers to whom value-added resellers would offshore component manufacturing, are giving way to original design manufacturers in the Asia-Pacific region. The latter design, engineer, and manufacture products from the ground up with little input from their clients, whose major role often is to contribute the brand name.

**A macro‐look at the present state of R&D in the US**

We now look at some macroeconomic indicators, including R&D expenditures, patent generation, and productivity growth, which portray the economy‐wide context of R&D offshoring. In terms of gross spending on R&D, US expenditures have been quite robust. Figure 2.1 shows the gross expenditures on R&D for selected countries as a share of the economy. Japan is at the top of the list of most R&D intensive economies, with the US a close second. The figure also points to China’s rapid rise, with the country having doubled its R&D expenditures as a proportion of its GDP over the last decade. There has been corresponding robust growth in both employment and in wages of R&D occupations. Figure 2.2 shows our estimates of the R&D employment as a share of total employment in the US. During the post-2000 period, the average weighted nominal wage for these thirty-seven R&D occupations has increased by around 17 percent, marginally
Figure 2.1. Gross expenditures on R&D as a percentage of GDP. Source: OECD.

Figure 2.2. R&D employment share in total employment in the US. Source: Estimates by authors from BLS occupational data.

higher than the nominal 15 percent increase for all occupations as a whole.

The “nominal output” of the R&D sector, as measured by its patent production, has also been healthy. OECD developed triadic patent family registrations (received by entities and individuals based in the
US, Japan, and the European Union) show the US share has been relatively steady, amounting to about a third of all patent registrations.

The economic impact of a nation’s R&D establishment and its inventive capacity are ultimately measured not by patents, which are after all an intermediate step on the way to economic appropriation, but by productivity growth, which determines the standard of living, as well as by measures of global market share of new goods and technologies, and creation of new, high-paying jobs. In brief, technology helps us do something better or it helps us do something new. In order to get a sense of the economic impact of R&D and innovative activity we need to look both at (a) variables that directly reflect technological prowess inherent in doing something better, such as productivity growth, as well as those (b) where “newness,” a greater variety of goods, higher quality, etc., can be proxied by some “revealed” variables, such as exports and global market share of high-tech goods. While lagging behind European countries in the post-war decades, US productivity growth has picked up significantly in the post-1995 period and averages over 2.5 percent per year during the last decade. Over the quarter century 1980–2005, the US global market share in key technologies such as pharmaceuticals has remained steady in the 30 percent range; in aerospace it has declined somewhat but is still about 50 percent; in communications equipment it declined in the 1990s but has again increased to around 35 percent; and in computing and office machinery it has declined from 40 percent in the mid-1980s to 24 percent due to offshoring and the “China effect.”

A summary reading of productivity growth and global high-tech shares may therefore suggest that all is well with the state of R&D, but other factors point to a more complex picture. How effective is all this R&D spending? How much bang is the economy getting for the R&D buck? It is not entirely clear that the economy is reaping benefits commensurate with the huge amount of spending associated with R&D. The number of patents granted by the US Patent and Trademark Office over the period 1985 onward has been growing at approximately twice the rate of the economy. As pointed out by Randall Stross in The New York Times (July 31, 2005), the changed intellectual property environment has led software firms, for example, to file more patents than they did in the earlier copyright era. Firms these days apparently target the number of patents that they wish to file relative to their R&D spending. One can also gain a sense of the
problematic returns from R&D by looking at Figure 2.3, which plots the incremental GDP due to productivity growth (deducting that part of additional GDP which is due to increase in employed labor force) against annual R&D spending. A superficial reading of the graph might suggest that the overall annual addition to the GDP is less than the amount spent on R&D. Of course, a number of cautionary factors need to be considered, such as the need to take into account a significantly longer time series, and to include lagged and multiplier effects.

There is a vast body of literature in economics on the connection between innovation and productivity, which addresses questions regarding the impact of information technology, R&D, and technological progress on productivity growth (see Baily and Gordon, 1988; David, 1990; Lipsey, 2002; Nordhaus, 2004). Comin (2004) suggests that the contribution of R&D to productivity growth in the US is in the range of three- to five-tenths of one percentage point. Apart from the fact that it is difficult for firms to appropriate much of the returns to innovative activity (see Nordhaus, 2004, on Schumpeterian profits from innovation), it is also true that many of the benefits of innovation are not reflected in macroeconomic data. The emergence of new goods and particularly the non-economic benefits of the Internet,
such as increased convenience and comfort, are often not reflected in standard economic measures. Ultimately, the subject matter of innovation, technology, and their economic impact flounders in the confusion surrounding definitions, measurement issues, data issues, and indeed even issues of a conceptual nature when it comes to categorization of new goods and so forth. There does seem to be an agreement among many observers that for the US, as indeed for many advanced countries, this particular time in economic history is fraught with somewhat decreasing effectiveness of R&D spending, at least in terms of the latter’s impact on standard measurements of economic well-being. The diminishing effectiveness of R&D spending at the national level seems to be getting reflected in decisions by individual firms to outsource, as well as offshore part of their R&D activity in order to make it more cost-effective.

There are some other issues specifically related to the kinds of technologies at the forefront today. The difficulty of appropriating innovation profits on a consistent basis due to increased competition and the nature of some of the innovations has led to greater cost-cutting pressures. Add to this the increasing share of services, both in GDP and in R&D expenditures, and the operation of Baumol’s disease, which condemns service sectors to slower productivity growth, and one can see the compulsions to offshore and cost-cut. Most of the increase in R&D spending in services has taken place in the information technology related services, and the professional, scientific, and technical services sector, both of which are at the forefront of the R&D offshoring wave. R&D offshoring is also given a boost in an environment of intense global competition, where R&D expenditures and patenting also have a strategic role to play (see Hall, 2004). The compulsions of spending on competing me-too products, with marginal, indeed even insignificant new attributes in a kind of arms race of creeping innovation have forced firms to look for ways and means to restructure their R&D operations.

**Ongoing Silicon Valley firm survey**

The authors carried out the first stage of a survey of high-tech firms, initially during the summer and fall of 2004, in order to get some tentative answers to the questions posed earlier and to understand better the characteristics of R&D offshoring. The continuing survey has involved
Figure 2.4. Size distribution of firms (by number of employees).
Source: Survey by authors.

answering a web-based questionnaire. Initial requests were sent to a sample of 488 California-headquartered firms involved in the following broad business and industrial sectors: computer hardware and software, including semiconductors, telecommunications, instrumentation and electronics, and research and testing services. Forty-eight firms responded to our survey and filled out the online questionnaires. Figure 2.4 shows that a majority of the firms in our sample were small and medium-sized firms with fewer than 500 employees. A number of follow-up interviews were also carried out with business executives at some of the firms in our sample, as well as with executives at out-of-sample firms during winter 2005 and with in-sample firms in 2007.

**Domestic outsourcing**

Twenty-six of the forty-eight firms in our sample resorted to domestic outsourcing of different kinds of activity. Most of this was
manufacturing, and fourteen of those twenty-six firms indicate that they outsource to other locations within California itself or in the nearby states of Arizona, Oregon, and Nevada, whereas the rest had outsourcing arrangements in other states within the US. While domestic outsourcing is not the focus of our chapter, it needs to be stated that it is the largest and most common form of outsourcing resorted to by the firms in our sample, and interviews indicate that perhaps the possibilities for domestic outsourcing have not been exhausted yet. However, while earlier there was an element of sequencing involved, i.e., firms often first resorted to domestic outsourcing, and then adopted offshoring as cost pressures mounted, more recently, in many cases firms have directly resorted to a foreign presence, leapfrogging and bypassing the domestic option.

**Offshoring**

Nineteen firms resorted to foreign outsourcing, i.e., importing intermediate goods or services from independent suppliers, while thirteen firms imported from their own offshore units, affiliates, and subsidiaries (we refer to the latter phenomenon as affiliated or intra-firm offshoring and the former as unaffiliated offshoring). Ten firms had participated in both affiliated and unaffiliated offshoring. For the sample as a whole, seven firms resorted to all three: domestic outsourcing, affiliated offshoring, and unaffiliated offshoring simultaneously (summarized in Figure 2.5).

**Innovative capacity**

Our sample of firms underscores the innovative and dynamic nature of the high-tech sector. An innovative firm was defined by us as one having more than half of its sales from products and services that were less than three years old. As Figure 2.6 shows, close to half (45 percent) of the firms surveyed were “innovative” firms by this measure. While the novelty of a product or a service might be marginal and the definition fuzzy, we believe that self-assessment of the importance placed by firms on their innovative dynamism is a valuable judgment criterion. Interviews revealed that executives at high-tech firms consider their capacity to innovate to be one of the core attributes of competitiveness
Figure 2.5. Forms of outsourcing and offshoring.  
*Source*: Survey by authors.

Figure 2.6. Innovative dynamism.  
*Note*: Firms with percent of current sale from products and services less than three years old.  
*Source*: Survey by authors.
and an integral part of overall business strategy. Some indicated that the impulse to innovate at the product and process level was even more important than the imperative to cut costs.

**Nature of activities outsourced and offshored, including R&D**

Figure 2.7 gives the distribution of the nature of activities outsourced/offshored to various locations, within each category of outsourcing/offshoring. The general progression of offshoring from manufacturing and back-office services now also includes R&D activity, albeit broadly defined as any developmental, research, and design activity involving the products and services of the company; it is important to note that our question did not qualify the phrase “Research and Development” in any manner. While manufacturing is the most common form of activity outsourced/offshored overall, there is a significant amount of R&D offshoring as well. Two-thirds of the offshoring resorted to by firms in our sample is to developing countries, primarily China and India, followed by OECD countries and then the transition economies of Eastern Europe. This pattern does not change even when we look at offshoring of R&D activity alone, whether to arms-length contractors or to subsidiaries. The relatively low incidence of
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Offshoring of back-office activity is perhaps due to the nature of our sample. Back-office activity of the kind that has generated publicity in the recent past, such as call centers, payroll, and data and record management offices are a lumpy cost segment, to be offshored in one fell swoop. It is possible that for many firms, at least at the present stage, the cost advantages of offshoring back-office activity might not be as significant or worth the bother as for offshoring software and other technical work, which create larger immediate gains. Back-office offshoring has been more common for large service-oriented firms, while large set-up costs continue to deter the smaller firms.

It is interesting to note that R&D is the most significant segment in the intra-firm offshoring category, i.e., to foreign affiliates. Apparently, when it comes to carrying out R&D abroad it is important to safeguard proprietary business procedures and intellectual property rights under the aegis of your own firm. Firms attempt to match their organizational strategy and structure to the kind of innovative activity being pursued. As pointed out by Chesbrough and Teece (2002), “to organize a business for innovation, managers must first determine whether the innovation in question is autonomous (it can be pursued independently) or systemic (it requires complementary innovations),” and also determine whether the capabilities needed for innovation can be easily outsourced or created in-house. Interviews suggest that within the universe of offshoring, the more routine developmental activity was subcontracted to arms-length parties while more sensitive aspects were dealt with by the firm’s subsidiary. Also, firms preferred to carry out in-house research on “drastic” innovations, embodying a qualitative break from attributes of previous products or processes, while offshoring the search for routine, marginal improvements and individual innovative elements of a product. Reflecting this, we find that (see below) the more innovative firms do not offshore their R&D.

Reasons for offshoring

The primary reasons given by firms for not offshoring are concerns and sensitivity about intellectual property rights and security (32 percent), lack of knowledge and exposure to the potential targeted host countries (26 percent), and, interestingly enough, high costs (26 percent), particularly for smaller firms. The latter seems to suggest that the issue of lumpy, upfront, fixed costs mentioned earlier deters at
least some firms from offshoring, particularly given the relative inexperience and paucity of specialized intermediary and consulting firms, and the extent of due diligence required for setting up an appropriate contractual structure with the suppliers.

The reasons for offshoring vary by the nature of activity offshored and the organizational set-up of the supplier. The motivations for affiliated offshoring of R&D include a mix of access to skilled labor, costs, and a focus on core competence, but with a greater weight placed on access to skilled labor than for offshoring of other activity. For unaffiliated offshoring of R&D cost savings were critical, while for domestic outsourcing of R&D all reasons given above are now of more or less equal importance. Generally speaking, costs are of greatest significance for unaffiliated offshoring and least for domestic outsourcing.

Table 2.1 Mean size of firm, by attribute

<table>
<thead>
<tr>
<th></th>
<th>Innovative firm</th>
<th>Not innovative firm</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>588</td>
<td>2,486</td>
<td>*</td>
</tr>
<tr>
<td>Offshoring firm</td>
<td></td>
<td>Not offshoring firm</td>
<td></td>
</tr>
<tr>
<td>Number of employees</td>
<td>2,931</td>
<td>487</td>
<td>**</td>
</tr>
<tr>
<td>Firm offshores R&amp;D</td>
<td></td>
<td>Firm does not offshore R&amp;D</td>
<td></td>
</tr>
<tr>
<td>Number of employees</td>
<td>4,243</td>
<td>477</td>
<td>*</td>
</tr>
<tr>
<td>Firm does affiliated offshoring of R&amp;D</td>
<td></td>
<td>Other firms</td>
<td></td>
</tr>
<tr>
<td>Number of employees</td>
<td>7,837</td>
<td>512</td>
<td>**</td>
</tr>
</tbody>
</table>

Note: ** Denotes significance in mean difference at 10%, and * at 5%.
Source: Survey by authors.

Size, innovative dynamism, and offshoring

Is there a relationship between firm size and propensity to offshore? As Table 2.1 shows, the larger firms resort to offshoring more readily,
whether of R&D or any other kind of activity. This is particularly true for those firms that set up their own R&D affiliates abroad, where the size factor is of particular significance (see row 4). At the same time, it is clear from our sample (row 1) that it is the smaller firms that are more innovative. We find that the more innovative firms tend not to use offshoring for their R&D activities, although they are above average in their overall use of offshoring. Follow-up interviews on the topic also suggested that the more innovative firms claimed that having development take place in-house helped in cutting down the lead time between innovative products and helped in quicker implementation of new technology in production and dissemination.

Miscellaneous

Most unaffiliated offshoring was carried out on a long-term contractual basis; 75 percent of these firms adopted long-term agreements with trusted independent suppliers, who had experience and a proven track record in the industry. Of the remainder, most had one-time contractual deals with suppliers, and a few had concluded joint ventures and spun off separate entities. The primary decision-makers and the driving force behind the phenomenon of offshoring remain US-based senior management. The role of specialized, intermediary consulting firms in facilitating the offshoring process is minor, as is the role of firms from offshoring-receiving countries actively promoting offshoring and attracting customers. This is consistent with the notion that it is the “push” factors, embodied primarily in high costs, which were responsible for offshoring; US firms faced with the imperative of cost-cutting had taken the initiative in scouting for potential locations, while the “pull” factors, reflected in the available supply of technically educated, relatively low-wage labor had acted as a facilitating condition.

While concessions, subsidies, and other recipient country policies to attract investment were important, they were not the decisive factor in either the decision to go abroad or the choice of country. They were assessed in an overall cost estimation exercise that included the additional transactions costs that firms would face in an uncertain environment of regulatory flux and infrastructural inadequacy. Since R&D is a sensitive and critical activity, the stance of the recipient country’s policies toward investment of this nature is of particular importance. While a strong intellectual property rights regime was preferred, it
was not seen to be a major stumbling block, perhaps because of the industries in our sample. Studies have shown that intellectual property rights are of greater importance in some industries, such as pharmaceuticals, than in others.

Follow-up in-sample interviews

Follow-up interviews with senior executives from some of the companies in the initial sample were carried out over the summer and fall of 2007, in order to fine-tune the earlier results and check their robustness over the intervening period. Perhaps due to the combative nature of the initial debate on offshoring, we found the firms somewhat more willing to look for opportunities for domestic outsourcing than before, particularly where cost was not the primary factor.

The search for establishing and expanding subsidiary R&D outfits in China and India continues unabated, with R&D projects of ever increasing complexity being offshored, subject to constraints and compulsions mentioned in the next section. If the routine back-office offshoring surge (call centers, payroll, etc.) seems somewhat tempered, it may owe more to the fact that it has become more customized and tailored to the needs of the parent establishments in the US, in addition to being already a somewhat mature market. There is a marked tendency to greater unbundling and disaggregation of tasks; the offshoring business environment has evolved from being driven by the earlier cost-push considerations of the high-cost side, to an attempt to figure out the disengageable elements in the supply chain and the task-universe, both by parent firms, as well as specialized intermediary-consulting companies.

Among those firms from our earlier sample that still do not offshore, the reasons seem to have migrated from “lack of knowledge of target country” to issues relating to management challenges of offshoring, particularly relating to R&D offshoring, and the issue of compatible organizational set-up to deal with them. By 2007, there had been ample dissemination of knowledge about the potential of India, China, and East European countries as bases for offshoring. There is considerable accumulated experience of successes and failures, with a greater appreciation of some of the organizational and logistical pitfalls. The reasons for continuing offshoring have therefore become more subtle and nuanced, with a greater clustering around different factors,
unlike the significantly greater stress on “lower costs” before. Indeed, there is an increasing appreciation of the market potential of these target countries and the linkages to domestic industry there, instead of the sole reliance on abundant, low-cost labor markets.

The view from the other side: management and organization of R&D in emerging economies

Extensive interviews were carried out in the summer and fall of 2007 with personnel at affiliated R&D centers, research institutions, academics at universities and at think tanks, executives of R&D centers of local firms, as well as policy makers in India (Bangalore, Hyderabad) and China (Beijing, Shanghai), to get a sense of the evolution and trajectory of the globalization of R&D, in general, and of offshoring of R&D from the US to India and China, in particular. Insights were also gleaned from three international conferences on globalization of R&D, organized by one of the authors.

(i) **Issue of isolation and lack of feedback**: A common theme involving stand-alone subsidiary R&D centers was the relative absence of linkages to the local economy, local suppliers, and customers, except in cases where the project involved local market penetration. Consumer and other kinds of feedback are therefore a key issue, in spite of excellent communications and organizational ties to the main consumers of the R&D at the headquarters.

(ii) **Blackboard strategy vs. equipment strategy**: For a multinational with subsidiary R&D centers in many different countries, the global distribution and allocation of research projects is subject to many considerations. A key one is the relative strength and drawbacks of the R&D culture of a country vis-à-vis another – i.e., comparative advantage and specialization in research niches. A better understanding of this issue has resulted in India and Russia getting the more “theoretical” projects, and China the more equipment-heavy, laboratory-intensive ones; in a sense this R&D specialization is compatible with strengths in the sectoral economy, where India and Russia have competitive strengths in the software sector and China in manufacturing.

(iii) **Management challenges**: The risky enterprise of globalization wedded to the uncertain activity of R&D compounds the problem
of effective monitoring and management of far-flung R&D centers (Bardhan, 2006). The type of innovative activity to be undertaken, its subsequent marketing strategy, the positioning vis-à-vis input and output markets, the commensurate human resource approach, and firm organizational structure are all affected by this interplay of globalized, offshored, affiliated innovative activity. An innovation diagnostics approach can help clarify the binding constraints on the ability of a firm to appropriate higher returns on its innovative activity. Figure 2.8 gives an example.

(iv) Compatible organization design: A careful study of the binding constraints on the level of returns to innovative activity would then be translated into a responsive and compatible organizational structure. The choice variables in the decision-making process would include – R&D dedicated to business/product lines vs. country demarcation; joint, cross-country projects vs. sole proprietorship; selective task-based outsourcing vs. project-based, and so on.

Conclusion

While the impact of offshoring on labor markets in the US is a matter of some debate, it is widely understood that in an environment of global labor arbitrage, innovation leading to creation of new high-paying jobs is the only sustainable path for continued growth in US
living standards. Innovation would impact living standards not only through continued increases in productivity but through the creation of new goods and hence a temporary global monopoly, favorable terms of trade and significant Schumpeterian profits for local firms, as well as other benefits accruing to consumers. At the same time, offshoring has been steadily creeping up the value chain and has reached the R&D segment within individual firms. Consequently, concerns have been raised about the sustainability of new job creation and of rising productivity and technological innovations in other countries, which could seriously challenge US leadership in high-tech industries and negatively impact wages.

Results of a survey of forty-eight technology firms reveal that it is mostly large firms that resort to offshoring of R&D. R&D activity is carried out abroad primarily under the aegis of affiliated offshoring. While it is small firms (fewer than 500 employees) that are more innovative (after all, in Silicon Valley the medium through which new innovation has been brought to market has been through the creation of new firms), larger firms are older, and as a result may have a larger share of older products in their product mix. There is some preliminary evidence that the more innovative firms carry out their R&D, certainly the most advanced aspects of it, in the US. The cutting edge, “drastic” innovations need incubation and development close to the “cutting” edge or first-adopter market with the greatest potential for appropriation of economic returns on innovation.

While US R&D expenditures, patent generation, and productivity growth have been consistently robust, both data at the national level and firm interviews raise concern regarding the cost-effectiveness of R&D spending. The increasingly global sales of firms are forcing them to “design to market,” and the complex, interdisciplinary requirements of modern research are compelling some of them to outsource and offshore their innovative activity and access global R&D talent.

What issues does this phenomenon raise? To begin with, it should be noted that the offshoring of R&D and innovation is fueled largely by the same considerations as offshoring in general, i.e., costs, spread of education and skills, opening up of markets, technological developments, and so forth, and is equally irreversible. In a nutshell, comparative advantage, or the forces of specialization and trade have reached the market for innovation goods and services. Consequently, it stands
to reason that India, China, and other developing and transitioning
countries are bound to take a larger slice of the scientific pie. More
importantly, however, with the inclusion of the large scientific estab-
lishments of developing economies there is the distinct possibility of
the pie itself growing faster than before. There could be benefits to
geographical diversity in science and technology. Different conditions
and different scientific cultures may spur innovation along unusual
lines and in more appropriate ways than was possible earlier, lead-
ing to a synergy through the development of mutual attraction and
compatibility between globally dispersed innovative regions.

The emerging situation with offshoring of R&D related activity is
going to pose serious challenges to white-collar workers, engineers,
designers, and scientists, and to US firms, as well as to policy makers.
It is possible that the future of R&D offshoring will include continued
innovation and R&D in the US and the creation of high value-added
jobs in Silicon Valley, leading to a win-win situation where the US
develops/markets the “new” goods, and the now “routinized” goods
and services are offshored. On the other hand, there exists the dis-
tinct possibility of major innovations originating abroad. Given this
possible change in the spatial location of innovation, can the US, and
Silicon Valley in particular, continue to dominate the field of economic
appropriation of R&D? Can they maintain their competitive edge in
the infrastructure of innovation, i.e. the institutional and financial
environment, the armies of venture capitalists, lawyers, accountants,
investment bankers, and others, who assist in nurturing new firms, help
them develop and market their products, and guide them to financial
success through initial public offerings and other landmark financial
stages? Can they continue to attract innovative firms from around the
world? From the point of view of a foreign entrepreneur, establishment
of a company in the US confers some other advantages as well, such
as proximity to market, imparting credibility to the start-up firm and
the learning effect from other innovative firms. Therefore, even though
innovations/inventions may take place abroad, it is conceivable that
the location of start-up headquarters and the benefits of initial job
creation and so forth may still occur in Silicon Valley.5 In evaluating
the positive aspects, Jaffee (2008) also points out some of the addi-
tional institutional and policy advantages that the US enjoys at present
in terms of a supportive infrastructure of innovation: these include
an economic culture of promoting and rewarding innovation, with
failure looked upon as an occasion for a fresh start, a predisposition toward invention and risk-taking among a part of the populace, and a technology-supportive immigration policy.

The first important issue therefore is the promotion of R&D and innovation. Experts are in wide agreement about the critical nature of school and higher education, as well as the problematic occupational choices being made by newer entrants to the labor market (see Freeman, 2005). There is scope for government policy in the educational sphere, in terms of getting re-involved in the retraining of workers, and perhaps in a judicious way in the innovation process itself. While few economists would venture to suggest that the government start picking favorites from the set of technologies comprising the next big thing, whether it be biotechnology or nanotechnology, and channel funds to it to the exclusion of others, there is perhaps room for further research and policy analysis of issues relating to promotion of technology agglomerations and R&D incentives. It needs to be recognized that all technologies are not born equal. General purpose technologies, those that have the intrinsic capacity to be used as an input into every sector of the economy, tend to have a revolutionary impact on the structure of the economic system, on jobs, wages, and living standards through the extraordinary potential for spillover effects. The externalities, coordination failures, standardization issues, and potential social returns must be taken into account when policies are formulated, in order to enable technologies to evolve, disseminate, and diffuse quickly and have an economy-wide beneficial impact.

Notes
1 Offshoring refers to the transfer of at least a part of a firm’s production and jobs abroad, with a view to importing the products and services back into the US.
2 The US Office of Management and Budget gives the following definitions for different categories of research:

*Basic Research* as relating to a systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena;

*Applied Research* as study to determine the means by which a recognized and specific need may be met, and
Development as application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes.

Our chapter is guided largely by a broad definition, encompassing all three above.

3 A triadic patent family is a set of patents registered at all of the three largest patents offices, namely the European Patent Office (EPO), the Japanese Patent Office (JPO), and the US Patent and Trademark Office (USPTO).

4 This raises the broader question of what should be considered R&D, how to separate research from development in the context of the many intertwined innovational activities that a firm carries out, and indeed how to separate innovational activity from customized, non-routinized, yet not necessarily completely original work.

5 There is yet another way to look at the issue of innovations abroad. As Walsh (2003) notes, “On balance, although foreign R&D centers are contributing to China’s impressive recent high-tech growth and increasing competitiveness in ICT industries, they are contributing as much or more – under newly consolidated, wholly foreign-owned R&D enterprises – to foreign companies’ high-tech development and production capabilities and, thus, to the US economy.”

References


Introduction

Outsourcing has evolved into a significant organizational practice over the last decade (Hoecht and Trott, 2006). However, as firms expand the practice by outsourcing increasingly key and core functions, new management challenges can be anticipated. The organizational changes that accompany these challenges are likely to be sweeping, suggesting that it is now appropriate to consider the need for a comprehensive behavioral theory of the outsourcing firm.

Both transaction cost economics (TCE) and the resource-based view of the firm (RBV) have been useful perspectives to investigate the determinants and conditions under which firms can best leverage outsourcing (Holcomb and Hitt, 2007; McIvor, 2009). Transaction cost economics provides clear direction as to economic trade-offs and contracting styles that a firm can use to evaluate the consequences of a potential outsourcing decision (Williamson, 2008). Similarly, the resource-based view highlights how unique capabilities of the firm can offer advantage when appropriately matched to environmental conditions (Peteraf, 1993); this has made it an effective measure to determine the extent to which a firm’s competencies can and should be outsourced (Jennings, 2002; McIvor, 2003).

While TCE and RBV offer helpful vehicles for measuring the efficiencies gained through outsourcing, they offer a less helpful look into the organizational changes that occur within the firm as it outsources an increasingly larger percentage of its functionality to external contract providers. For example, transaction cost economics can provide some level of insight into the differences that constitute “ex post misalignments” but only to the extent of the difference rather than the magnitude of resultant costs (Williamson, 1985). TCE is less clear as to the nature of the operational and behavioral changes that the firm will undergo as a smaller but outward-reaching firm (Harland et al.,
2005). By the same token, RBV is less clear as to the manner in which organizations develop their capabilities (Helfat and Peteraf, 2003), and two key tenets of the resource-based view, causal ambiguity and path-dependency, highlight the difficulty firms face in consciously creating and building their capabilities (Lado et al., 2006).

TCE and RBV will continue to represent powerful theories by which to understand and assess outsourcing considerations. However, their inability to fully anticipate ex post behaviors and the concomitant development of new capabilities limit their potential to prescribe operational guidelines for managers. Firms, especially those outsourcing key functions, will have to contend with new forms of organizational complexity and new levels of managerial effort as a result of their outsourcing decisions (Rothaermel et al., 2006). Hence, a clear theory of post-outsourcing behaviors is highly relevant for modern firms.

As today’s firms push for operational cost reductions (Hormozi et al., 2003), conversion of fixed costs to variable costs (Alexander and Young, 1996), and flexibility (Jennings, 2002), they also need to deal with increased organizational cost (Barthelemy, 2001) and business risk (Adler, 2003; Mahnke, 2001). This simultaneous juxtaposition of operational efficiency and organizational complexity represents a contradiction (Cameron, 1986) that managers of outsourcing firms are likely to face. Such contradictions, which are inherent in social organizations (Clegg et al., 2002; Quinn and Cameron, 1988), can therefore be more fully appreciated when viewed through the lens of paradox.

The major contribution of this chapter is to categorize a new set of organizational behaviors that address the following question: “Given that firms expand the scope of their outsourcing activities to increasingly core functions, what fundamental organizational and behavioral changes do managers need to anticipate as a result of outsourcing decisions?” The stimulus for this study is the belief that paradox sheds new light on some of the implications of outsourcing that managers will need to focus on in the future. The authors’ intention is not to replace TCE and RBV’s usefulness to outsourcing considerations, but rather to advance a more behavioral perspective that augments these two important theories.

The organization of this chapter begins with a summary of three critical paradoxes that are created by outsourcing and then uses a
A theory of the outsourcing firm

hypothesical example to depict how a firm’s behaviors differ as it evolves from a fully integrated to a disintegrated state. This is followed by an investigation that maps how organizational factors such as leadership, learning, firm culture, and processes are expected to change during this evolution. Finally, a set of characteristics that determine the firm’s ability to successfully manage its outsourcing evolution are summarized.

Three outsourcing paradoxes

Paradoxes are “dynamic tensions of juxtaposed opposites” (Rosen, 1994: xvii) that contain “contradictory, mutually exclusive elements that are present and operate equally at the same time” (Cameron, 1986: 545). Despite the fact that managers have difficulty dealing with such inconsistencies (Marsh and Macalpine, 1999) paradoxes are considered to be a fundamental aspect of organizational life (Clegg et al., 2002). Paradoxes should not be confused with economic trade-offs, which represent conscious decisions to favor one outcome over another, since paradoxes are often unintended and inevitable. This is why scholars have suggested that paradoxes cannot be solved (e.g., Chen, 2002; Lewis, 2000), leading to the prevailing practitioner thinking that they can only be managed (Rhinesmith, 2001).

Three paradoxical situations of outsourcing are summarized in this section. The first paradox highlights the fact that outsourcing increases operational expediency at the expense of increased managerial complexity; the second underscores the phenomenon that increased efficiencies are accompanied by the need for new and more complex organizational learning; and the third reflects the manner in which operational expediency increases the risk profile of the firm, thereby creating strategic complexity.

Increased expediency leads to increased managerial complexity

The firm’s opportunity to reduce infrastructure has been a recurrent theme in the outsourcing literature, with numerous studies featuring outsourcing as the transfer of activities to third parties (Bailey et al., 2002; McCarthy and Anagnostou, 2004; Quelin and Duhamel, 2003).
In some instances this transfer can have minimal operational impact, such as the decision to outsource benefits administration from an internal human resources group to a third party. In other instances it has the potential to be highly disruptive, such as the case of relocating staff and equipment to an external contract provider (Willcocks and Feeny, 2006).

In many cases, outsourcing firms need to take on new managerial responsibilities that do not already exist in typical firms and which subsequently need to be developed (Takeishi, 2001). The most prominent of these involve managing the boundary-spanning efforts necessary to oversee activities with the outsource contract provider. Boundary-spanning units allow firms to adjust to external contingencies (Thompson, 1967), and the more complex a firm’s environment the greater the variety of boundary roles the organization will employ (Aldrich and Herker, 1977). However, boundary-spanning roles are inherently complex because they operate as both internal liaisons and external gatekeepers (Katz and Tushman, 1983), and very often boundary spanners operate in areas that represent high risk for the firm (Hoecht and Trott, 2006). Individuals in these roles need to demonstrate a unique combination of technical competency and personal attributes that makes them difficult to find and hire (Tushman and Scanlan, 1981a).

A number of outsourcing scholars have recommended formalizing and expanding the boundary-spanning role through the deployment of cross-functional teams to manage the outsourcing relationship (Lonsdale, 1999) or even a special department within the firm to capitalize on outsource management expertise (Barthelemy, 2001). Regardless of the form in which it is implemented, the effort required to coordinate these groups and their related activities increases managerial complexity significantly, potentially to the point where management can become overloaded (Rothaermel et al., 2006). Moreover, the increased boundary-spanning activities represent potential risk areas to firms unprepared or unable to address such processes (Adler, 2003) as well as significant centers of hidden costs (Barthelemy, 2001). Finally, as firms outsource additional and different functions (e.g., manufacturing, research and development, sales) such managerial requirements can be expected to grow in a non-linear fashion. Consequently, firms that progressively outsource functions will achieve expediency benefits, reduced infrastructure, and reduced operational costs, but can be
expected to do so at the expense of more difficult-to-manage boundary-spanning activities that both increase and change their managerial requirements.

**Increased efficiencies lead to increased learning requirements**

Outsourcing enables firms to operate much more efficiently through reduced costs, greater flexibility, and increased scope economies (Ellram et al., 2008). Such benefits have made outsourcing an appealing tactic despite some of the inherent drawbacks, such as managing in a condition of reduced control (Hormozi et al., 2003) or overcoming negative public opinion when jobs are moved out of the community (Kakumanu and Portanova, 2006). More importantly, such cost efficiencies do not always lead to improved productivity or profitability (Jiang et al., 2006). Nevertheless, the search for more streamlined organizations has been an important motivation for firms to disintegrate their operation, making the outcome assessment process an important stage in the outsourcing lifecycle (e.g., Greaver, 1999; Johnson, 1997; Lonsdale and Cox, 1997).

Unfortunately, cost efficiencies are often achieved by outsourcing functions that are heavily process-oriented, such as manufacturing, logistics, data processing, and call centers; those organizations are still required to retain skill-based tasks such as design and engineering (McIvor, 2003). More importantly, firms need to acquire the skills to exist effectively in an outsourced world. Over and above their need for boundary spanners, outsourcing firms need to invest in supply-chain-related inter-organizational competencies (Espino-Rodríguez and Padrón-Robaina, 2006). Among the hidden costs of outsourcing is the requirement to manage the relationship (Tadelis, 2007). However, significant effort is required to develop and internalize collaborative processes and knowledge-sharing routines (Dyer and Singh, 1998), and firms often overlook the need to develop necessary skills to manage external contract providers (Hoecht and Trott, 2006). Although this relational learning requirement has been emphasized in the outsourcing literature (e.g., Spekman et al., 2002) firms do not normally possess such skills (Holcomb and Hitt, 2007) so their learning complexity increases. Therefore, while firms may achieve expediency by outsourcing functions, such efficiencies can be offset by the requirement to learn and internalize new skills related to their relationship
management. Consequently, firms that progressively outsource tend to replace efficiencies gained in one dimension with the effort to learn new processes in other dimensions.

**Increased expediency increases strategic complexity**

Many scholars have noted that outsourcing increases the flexibility of the firm (Jennings, 2002; Quelin and Duhamel, 2003; Rothaermel et al., 2006; Snow et al., 1992; Willcocks and Feeny, 2006). This follows from the argument that firms made leaner though outsourcing will also have the ability to be more nimble and competitively adaptive. Moreover, firms that outsource can tap into lower cost outsourcing contract providers (Espino-Rodríguez and Padrón-Robaina, 2006) or third parties that offer a high level of domain expertise (Holcomb and Hitt, 2007). All of these factors create conditions that can improve the competitive position of the firm.

However, there is significant evidence to suggest that outsourcing also reduces the competitive capabilities of the firm. One cause of this occurs when organizations outsource the wrong functions either because the firm cannot execute them well (Lonsdale and Cox, 1997) or the firm simply wishes to eliminate costs centers (McIvor, 2000). A greater impact on competitive capability occurs when firms outsource functions that represent core competencies, which can occur when firms misjudge how such core requirements will change over time (Mahnke, 2001). Another danger of outsourcing is that firms can lose their absorptive capacity when they outsource (Cohen and Levinthal, 1990). This can prevent firms from recovering in cases where market conditions change (Momme, 2002), or when an outsourcing decision needs to be reversed because the external contract provider loses its leadership position (Barthelemy, 2003) or forward integrates to become a competitor (Cox, 1999). In such situations firms may have lost the know-how necessary to reactivate their old functions (Sadowski et al., 2003). This also poses long-term challenges for the firm because its competitive capabilities, now transferred to external contract providers, are likely to have been “leveled out” across the market (Hoecht and Trott, 2006). As a result, firms that progressively outsource will be more expedient in terms of their existing capabilities and may even temporarily improve their short-term competitiveness due to accessibility to best-in-class contract providers. But, in so doing,
they may undermine their long-term ability to remain adaptive. As this occurs, firms will ultimately be required to replace old behaviors with new ways of developing competitive capability.

**Test in extremum**

The three paradoxes described above suggest that outsourcing firms, particularly those that outsource a large portion of their operation, will face a greater level of managerial effort, need to learn new skills, and contend with increased strategic complexity in order to be competitive. In short, as operational functions are eliminated they will be replaced by the need for new, more difficult behavioral functions. This can be best demonstrated by a brief *in extremum* example showing the various changes a firm can be expected to undergo as it moves from a fully integrated to fully disintegrated state.

A fully integrated firm will (a) have developed a number of internal proficiencies that permit it to absorb and transfer knowledge so that it can adapt to market conditions, and (b) embody a culture and set of organizational routines that facilitate internal communication, collaboration, and decision-making. Because all of its functions are integrated internally, the firm can develop, produce, market, and service its products independently. Only a small subset of its activities, most notably procurement and sales, will operate through external interfaces. All of the organization’s routines will be a product of path-dependent evolution processes that take advantage of a set of coherent objectives and environmental responses to external markets (Barney, 2001; Nelson and Winter, 1982).

Assuming this firm pursues efficiency to the extreme degree, it could elect to outsource all of its functionality until it has reduced its infrastructure to a single titular official (e.g., the CEO). At this stage, the structure of the firm is essentially turned “inside out”; functions that had previously been governed by internally congruent routines are now operationalized as a series of interactions with external parties. Consequently, there is no collective culture to orient communication, collaboration, and decision-making processes. All elements of knowledge transfer, such as the product development cycle that occurs among research and development (R&D), manufacturing, and operations, are now inter-organizational and subject to influence and redirection by the firm’s external contract providers. As a result, the firm
has less ability to create sustainable competitive advantage (Porter, 1996). Though the disintegrated organization may have successfully achieved its objective of operational expediency, it now exists in an environment that is managerially more complex and strategically less agile than before.

The lessons from this example suggest that progressive outsourcing creates two major factors of change for the organization. First, the organization has changed from a largely self-contained entity to a completely boundary-spanning form. Because boundary-spanning has been conceptualized as a function that occurs at the “edges” of the organization through liaison and gatekeeper behaviors (Katz and Tushman, 1983) there is little theoretical precedent for how it operates at the “middle” of the firm. Second, the firm’s competitive capability has now been externalized. Consequently, the firm’s strategic advantage is contingent on its ability to configure available capabilities externally and collaborate more effectively than its competitors.

These two factors point to specific areas that firms will need to manage differently in a largely outsourced world. The next sections of this chapter identify the strategic and managerial areas that will challenge firms as they travel along the path from integration to disintegration.

**Strategic implications of outsourcing**

As was discussed above, even firms that guard their core competencies and retain them internally are not immune to the potential loss of absorptive capacity (Cohen and Levinthal, 1990). This can become an issue when firms determine that they need to rethink their outsourcing decisions (Barthelemy, 2003; Cox, 1999; Momme, 2002), identify a replacement provider (Barthelemy, 2001), or return the function in-house (Tadelis, 2007). Firms facing these situations risk not having the necessary skills to reassess or reestablish the outsourced function. Even in cases where such readjustment is not required, firms may find that the narrowed focus caused by outsourcing tends to lead them toward organizational oversimplification, especially in dynamically changing markets, that can hurt subsequent performance (Miller and Chen, 1996).

Given that the firm risks diminished competitive capability in an outsourced world, it must develop new means of adaptation to an environment where it has less direct control over factors that breed
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advantage. The following sections discuss how these new strategic challenges are manifest in areas of leadership, learning, and risk management.

Leadership

Though scholars have offered important conceptual models for the traditional highly integrated firm (e.g., Katz and Kahn, 1966; Lawrence and Lorsch, 1967; Thompson, 1967), it has been argued here that the disintegrated firm is likely to have different dynamics. An important question, therefore, is what constitutes effective management in the highly outsourced firm. Management’s ability to orchestrate and direct strategic capabilities within the organization has traditionally been subject to its ability to lever internal power bases (Hall, 1999). Even in firms that espouse empowerment, both overt and subliminal power-based cues are often predominant (Argyris, 1998). For example, the typical planning process of the firm assigns vision creation, strategy definition, process definition and role specification to executive ranks, thereby signaling the overriding power center of the organization. And, on an ongoing basis, workers are continually reminded that management controls their efforts by changing priorities, reallocating resources, allowing project failures, and micromanaging (Sheard and Kakabadse, 2002).

As the firm outsources functionality, these power bases become less potent. Because the firm has now entered a contractual relationship with a third party, it has in essence moved into one of two non-hierarchical models: market or hybrid (Williamson, 1985). A market model places the firm in a supply-chain environment since the firm becomes a buyer of the services that external contract providers supply. In this configuration, the firm should expect to see its power relationship changed into one based on traditional channel power models (Cox, 2001). Although the outsourcing firm can retain a level of control in situations where multiple providers are available to bid on its requirements, this only grants it power over the selection process. It is subsequently possible for the firm to see diminished power relative to the provider, such as in cases where the external contract provider uses its learned skills for the benefit of other firms (Takeishi, 2001).

The second of the two non-hierarchical models, the hybrid form, represents a collaborative relationship. Here, the firm faces the risk that
one party will attempt to take advantage of the other. In an outsourced relationship such opportunism can take the form of leaked information (Mahnke, 2001) or the threat that the external contract provider will become a competitor (Cox, 1999; Hoecht and Trott, 2006). Consequently, governance structure and authority factors will differ from those typically experienced by the firm (Barney, 1999), likely evolving into sophisticated governance models (Fawcett et al., 2006) that increase managerial cost and effort.

As the firm progressively outsources, the focus of its leaders is also likely to change. Transaction cost economics has been a useful perspective to assess outsourcing decisions, but over time it is anticipated that the leadership model of the firm may need to become less transactional and more relational in order to remain competitive (Holcomb and Hitt, 2007). In an environment where firms increasingly depend upon a range of commoditized outsourced capabilities that are not likely to offer sufficient differentiation to their firm (Hoecht and Trott, 2006), managing top-line growth and product breakthroughs as well as operational efficiency will be crucial. An expediency-seeking focus is capable of producing the latter, but these will not likely be adequate to produce competitive advantage (Porter, 2001). Instead, leaders who embody a transformational style may be better suited to guide their firms down a path to competitive advantage in an evolving outsourced world (Bass and Avolio, 1994). For example, Burnes and James (1995) found that firms operating in a steady and predictable business environment were best suited by following a transactional leadership style, whereas those operating in a changing and challenging business environment were better suited by using a transformational style because it encouraged the organization to think beyond conventional solutions.

Learning

The strategic potential of the outsourcing firm changes as it approaches disintegration, so the need to acquire knowledge and the nature of how firms do so becomes more important. Even if a firm retains internal control of its core competency, that firm will not be completely immune from its reliance on outsourced capabilities. In looking back at the in extremum example described above, it becomes evident that a highly disintegrated firm will face constraints imposed by its external contract providers. For example, a breakthrough product feature,
developed by an internal R&D group, may still be unusable if the external manufacturer (i.e., external contract provider) is unable to develop the corresponding breakthrough processes required to manufacture it. Managing the interdependencies between outsourced and retained functions therefore represents a significant risk to the firm (Adler, 2003).

The need to assess such interdependencies, as well as the need to integrate and transfer learning across organizational lines, becomes a significant challenge for the disintegrated firm (Easterby-Smith et al., 2008). Organizational learning depends upon shared insights and knowledge that has been built on the cumulative past experience of the firm (Stata, 1989), and it defines the continually evolving nature and needs of organizations (Pahlberg, 2001). Knowledge acquisition and transfer is considered to be a critical component of a firm’s success (Argote and Ingram, 2000; Inkpen and Tsang, 2005), such that the firm’s ability to create, own, protect, and use difficult-to-imitate intellectual assets can provide a competitive advantage (Teece, 2000).

Nevertheless, many organizations simply do not know how to learn (Szulanski, 1996) due to the difficulty in transferring and integrating knowledge (Grant, 1996b). This difficulty is attributable to three conditions: the lack of motivation to transfer knowledge, the tacitness of the knowledge to be transferred, and the ability of the organization to absorb that knowledge. With regard to the first condition, motivation to transfer knowledge is often influenced by the desire to control knowledge, the relationship with the individual to whom the information will be conveyed, and the perceived rewards for sharing that knowledge (Ipe, 2003). Szulanski (1995) found that the motivation and reputation of the sender, as well as the motivation and ability of the recipient, had a high correlation with successful knowledge transfer. The second condition, degree of tacitness, has an impact on the exchangeability of the information; since tacitness relates to ambiguity it impedes the formalization of the learning process (Simonin, 1999). Grant (1996a) argues that knowledge is contained in individuals rather than institutions, such that tacit knowledge transfers within the firm only occur through lengthy contacts among its members. Therefore new knowledge can only enter the firm through the incremental learning of existing members or the incorporation of new members bringing new knowledge. Finally, absorbing knowledge is dependent on the ability to recognize the value of new information in order to assimilate
and apply it (Cohen and Levinthal, 1990). Thus, knowledge transfer within the firm is dependent upon the absorptive capacity of the recipient, the causal ambiguity of the transfer process, and the willingness to engage in the repeated exchanges between participants in the process (Szulanski, 1996).

Mullen and Lyles (1993) suggest that, in the traditional organization, the framework for learning starts with the communication of the firm’s strategies to internal educators and line managers; they then develop the behavioral modes, communicate those through training programs, and finally transfer those back to senior management for incorporation into the firm’s overall support system. Such a model indicates that knowledge transfer is dependent upon structural, cultural, and relational factors within the firm (Inkpen and Tsang, 2005). However, firms that heavily outsource begin to undermine this process in two ways. First, by shrinking the organization they reduce both the number of domain experts required for the learning development process and disrupt the familiarity ties that foster knowledge transfer (Grant, 1996a). Second, these firms now introduce the need to exchange tacit knowledge across its boundaries with its outsourcers, and this will be dependent upon the degree to which firms are connected to their external contract providers (Eriksson and Hohenthal, 2001). While there is a significant opportunity to learn through ties created by inter-organizational relationships (Burt, 1992; Powell et al., 1996), the ability to actually transfer knowledge will be challenged.

As has been noted previously in this chapter, the ability to build and manage relationships with external contract providers is a skill that many firms do not possess (McIvor, 2003). If firms are to be effective at scanning the external environment for new innovation as well as increasing their own ability to innovate they will need to reassess their relationships with their outsource partners. The strategic alliance literature has provided insight on the type of knowledge-exchanging behaviors that outsourcers will need to learn. One dimension of this is the firm’s objective in creating its outsourcing relationships. Grant and Baden-Fuller (2004) suggest that collaborations need to be viewed as knowledge-accessing relationships rather than knowledge-acquisition relationships. Where knowledge-acquisition relationships tend to view knowledge as the finite entity to be transferred between the partners, knowledge-accessing relationships conceptualize learning as the outcome of the relationship. Consequently, knowledge-accessing
collaborations with outsourcers would work to increase rather than partition knowledge. Grant and Baden-Fuller argue that this will lead to greater efficiency in both the application and utilization of the information. Similarly, ties to third parties have been shown to expand a firm’s ability to both exploit existing knowledge and explore new knowledge sources (Vanhaverbeke et al., 2004). Firms looking to leverage their outsourcing relationships will therefore want to assess the networks in which their external contract providers are situated and consciously match their outsourcing requirements to firms which have compatible knowledge bases, organizational outlooks, and operational logic systems (Lane and Lubatkin, 1998).

A second dimension lies in the way in which disintegrated firms will structure their relationships. First of all, executives will need to adopt a more proactive role in fostering a learning culture in their firms (Amitay et al., 2005). Second, they will need to define ways in which the knowledge-accessing process is opened up with their outsourcer. Given that tacit knowledge is learned primarily through observation (Inkpen and Tsang, 2007), it will be essential for managers to create a high level of transparency and receptivity between their firm and their outsourcer contract provider (Larsson et al., 1998). While they will need to balance this transparency with governance models that maximize learning while minimizing related risks (Mohr and Sengupta, 2002), such a leadership approach is highly congruent with the transformational style suggested above.

**Risk mitigation**

In conducting business, a firm is exposed to both internal and external risks, some of which – but not all – are controllable, or partially controllable (Wu et al., 2006). When the firm outsources, it also exposes itself to the internal and external risks of its external contract providers. Furthermore, the very act of outsourcing introduces the firm to additional strategic and operational risks. At a strategic level, the firm may not be astute at identifying its core and thus get too close to outsourcing it (Harland et al., 2005). Similarly, the firm may overlook the possibility that the outsourced function will need to be brought back into the firm at a future date (Harland et al., 2005; Tadelis, 2007).

At an operational level, Harland et al. (2005: 841) identify the “lack of skills and competence to manage outsource relationships” and the
“increased costs in relationship management” as key risks of outsourcing. These tie back to the boundary-spanning activities previously identified. Harland et al. (2005: 841) further identify the ability to “design appropriate service level agreements” with outsourcing partners as another operational risk.

Risk management begins with the analysis of potential risk in the supply chain using techniques such as analytical hierarchy processing (Wu et al., 2006) or other advanced analytical tools (Chopra and Sodhi, 2004; Norrman and Jansson, 2004). At a strategic level, Chopra and Sodhi (2004: 60) suggest that the firm “mitigate risk by building various forms of reserves, including inventory, capacity, redundant suppliers, and responsiveness.” Unfortunately, such actions are likely to offset the benefits anticipated by the outsourcing decision.

Managerial implications of outsourcing

Establishing and managing a network of outsourced providers can be likened to the development of an inter-organizational community of practice (CoP). In a CoP, groups of people interact, often across organizational boundaries (Zboralski and Gemünden, 2006), so as to deepen their knowledge and share their expertise about a set of problems (Wenger et al., 2002). Scarso and Bolisani (2008) identify what they term the four pillars of a CoP in its organizational, cognitive, economic, and technological dimensions. The organizational dimension concerns relationships and roles within the CoP as well as between the CoP and the rest of its environment, while the cognitive dimension deals with the specific knowledge domain that is the focus of the CoP. The economic dimension concerns benefits, costs, and performance, and the technological dimension encompasses the CoP’s enabling technologies. In this chapter, the four dimensions reflect specific areas of managerial process and organizational routines that will evolve as firms progressively outsource. The primary emphasis in the following section of the chapter is to elaborate the organizational and cognitive dimensions caused by outsourcing; because the economic and technological dimensions have received much more extensive analysis in the literature they are discussed only briefly here.

These four managerial dimensions support the strategic implications discussed in the previous section: the need to develop new approaches to relational leadership, organizational learning, and risk management.
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Figure 3.1. Outsourcing model as an inter-firm CoP (adapted from Scarso and Bolisani, 2008).

Figure 3.1 depicts the integration of the strategic and managerial implications of this model.

**Organizational dimension**

Organizational factors pertain to the relationships that arise between the outsourcer and its external contract provider. Three elements are considered in the following section: the way in which the relationship will be set up and governed, how that relationship will be managed by boundary spanning, and how the participants organize themselves into a virtualized entity.

**Governance**

As its outsourced relationships proliferate, the firm can expect the resultant effort associated with governing those relationships to increase also. The central challenge of governance is “how to motivate people to take others’ interests at [sic] heart” (Nooteboom, 2000: 77), and it reflects the agency conflicts that arise when external parties have the ability to take actions that affect the interest of a principal (Jensen and Meckling, 1976). The primary driver of such interparty relationships is the potential for one member to take opportunistic
advantage of the other, a condition created by the inability of firms to completely anticipate the intentions of external parties (Williamson, 1985). In order to protect itself *ex ante* the firm consequently requires the drafting and negotiation of complicated contracts, the commitment of asset-specific investments, and the implementation of monitoring systems to ensure compliance. All of these create significant transaction costs for the firm.

However, transactional instruments are not the sole means of managing relationships with external parties. A significant stream of literature suggests that social exchange (Granovetter, 1985) in the way of trustworthy dealings between the parties can serve to reduce the need for governance in inter-firm relationships (e.g., Gulati, 1995; Muehlberger, 2007; Wang and Wei, 2007; Yu et al., 2006). Such trust can be based on the calculative assessment of the risks of performance (Williamson and Craswell, 1993), past performance (Dodgson, 1993), or merely goodwill intentions (Dodgson, 1993), but generally over time trust has been found to moderate the need for explicit governance vehicles. Regardless of whether relationship factors such as trust ultimately serve to offset or complement transactional mechanisms such as contracts (Poppo and Zenger, 2002), there is general acknowledgment that inter-firm relationships, such as outsourcing, are best governed when attention is paid to both elements.

Similarly, governance considerations for outsourcing firms are subject to both temporal and environmental factors. Mahnke, Özcan, and Overby (2006) have noted that *when* a firm outsources will have a bearing on its governance requirements. For example, those firms that outsource information technology operations early in relation to the rest of their industry are more prone to need complex contracts and monitoring mechanisms than late outsourcers since the transactional risks in relation to technologies will be greater. Geographic factors will likewise be a consideration of the outsourcing firm since international differences will necessitate different governance requirements (Pedersen and Thomsen, 1999). Similarly, time zones, language, culture, and local business norms complicate the ability to anticipate intentions and increase the difficulty with which oversight mechanisms can be implemented (Stratman, 2008). Finally, as firms and their competitors progressively outsource they essentially create a web of external contract-provider networks. The embeddedness which results from such networks creates controls based on reputation (Uzzi, 1997)
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and self-monitoring (de Man, 2004) that, when coupled with a balance of formal and informal mechanisms (Winkler, 2006), serve to reduce the unilateral dependence on contracts and similar transactional mechanisms.

Firms that progressively outsource can therefore be expected to implement formal contractual mechanisms with their contract providers, but their use is likely to be moderated by relationship-building capabilities coupled with the reputation and experience effects. All of these work to clarify the intentions of the outsourcer and external contract provider over time and redefine the need for strict governance. One might anticipate that firms which continue to operate in a traditional agency mind-set will experience increased governance effort over the long term. On the other hand, those firms that develop strong relationship-management skills can be expected to reduce such effort over time, though this will be somewhat offset by the increased effort associated with developing relationship-management skills.

Managing boundary-spanning requirements

As was suggested above, firms that progressively outsource operations will essentially turn themselves “inside-out,” meaning that functions which formerly operated within the firm will now operate externally. If for no other reason than lack of more precise terminology, interaction with these external units has been considered a boundary-spanning function. However, boundary spanning has traditionally been used to describe activities needed to address organization–environment interactions (Jemison, 1984). Such conceptualizations involve procuring or disposing of inputs, linking the organization to the larger community, and preparing the organization for future challenges by scanning the environment for trends (Katz and Kahn, 1966). Definitions of boundary spanning have generally revolved around the tasks of communicating across organizational borders, linking the organization to its environment and often serving as the conduit for teaching this external information to the organization (Fennell and Alexander, 1987; Katz and Tushman, 1983; Thompson, 1967; Tushman and Scanlan, 1981a, 1981b). However, as organizations redeploy increasing portions of formerly internal operations to external contract providers, one must argue that the primary consideration should no longer be communication but rather management. In other words, highly disintegrated
organizations will need to understand how to direct their externalized functions if they are to sustain their competitiveness.

One model of boundary-spanning behavior that outsourcing firms can consider is the relationship management function firms have implemented for their strategic alliances. The functionalization of alliance-relationship management within the firm (Kale et al., 2001) and the development of relationship-specific procedures (Heimeriks and Duysters, 2007) have been shown to positively impact both firm and relationship performance. This is because an alliance-management function ensures the adoption of inter-organizational communication processes needed to coordinate goals, align priorities, reconcile decision-making structure, and develop trust (Kale and Singh, 2007). Such a function is similar to outsourcing boundary-spanning groups recommended by Barthelemy (2001) and Lonsdale (1999). Since the consequences of outsourcing are often unanticipated, especially if the firm has the mind-set that outsourcing streamlines operations and thereby reduces both headcount and effort, the creation of such dedicated functions is often overlooked. Nevertheless, as firms outsource increasing portions of their business, the need for such a formalized boundary-spanning entity to address the organizational complexity being created becomes ever more critical.

Virtualization
As an organization outsources, it takes on a more distributed nature, thereby behaving like a “network of virtual teams” that can be scattered around the globe. Virtual teams are most often characterized by their lack of spatial proximity and dependence on advanced communication (e.g., Bell and Kozlowski, 2002), and they have been defined as “groups of geographically and/or organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task” (Townsend et al., 1998: 17). As does outsourcing, the use of virtual teams enables organizations to become more flexible, responsive, and lean. These teams represent a good analog to the virtualized interactions of outsourcing because they (a) contain functions that can be organizationally and physically located both inside and outside the firm, (b) over time can represent networks that are spread across continents, and (c) are not collocated and therefore are highly reliant on modes of communication other than face-to-face meetings.
A number of critical factors have been associated with the operation of virtual teams, and these can be directly applied to the manner in which firms need to manage their outsourcing relationships. A major factor is the ability to be committed to attaining mutual goals. Shared understanding of goals is essential for effective collaboration in virtually organized groups (Peters and Manz, 2007), and, even though they are essentially contracted, an external provider needs to carefully synchronize its goals, expectations, and actions with the outsourcer in order to provide the most desirable outcome (Hertel et al., 2004). Since incongruent expectations have been shown to lead to weak motivation and low levels of satisfaction among extended virtual teams (Bosch-Sijtsema, 2007), one could extrapolate that both parties in an outsourcing relationship will need to enjoy high levels of satisfaction if they are to continue to remain committed to mutual objectives.

Many scholars have noted the importance of creating a trusting relationship among virtual team members in order to facilitate congruent behaviors. Bergiel, Bergiel, and Balsmeier (2008: 101) note that “trust is the foundation of all successful relationships and, in order for virtual teams to succeed, they need to build and foster their relationship carefully and intentionally.” Rosen, Furst, and Blackburn (2007) assert that without the ability to establish a strong level of trust, virtual teammates will view requests for information as risky and will tend to impede effective interaction. It is important to emphasize that the need for trusting behaviors among virtual teams has been found to be identical to the relational behaviors that have been suggested as critical to outsourcing relationships (e.g., Spekman et al., 2002). The lesson is that outsourcing relationships have many parallels with virtual team relationships, suggesting that there is much that can be learned from that literature. At a minimum, firms will need to develop new skills in the area of cross-boundary interaction and extra-boundary trust-building in order to minimize potentially deleterious tendencies in their outsourcing relationships.

**Cognitive dimension**

This dimension represents the cognitive homogeneity (Scarso and Bolisani, 2008) of the outsourcer–external contract provider relationship and deals with the mechanisms that are employed to coordinate it. The elements considered in this section discuss the impact of
organization and national cultures on outsourcing relationships as well as the communication modes those parties utilize to bridge their unique cultures.

Culture
As the firm takes on the characteristics of an inter-organizational relationship (Klein et al., 2000), it will encounter different work practices and orientations. These elements represent organizational culture and values which ultimately map to national culture (Hofstede, 2001). Outsourcing in general requires organizations to deal with differences in organizational culture, and offshoring will add the necessity of having to deal with differences in national culture. Both situations will have implications for leaders and their style of management (Dorfman and House, 2004).

Despite efforts to anticipate cultural differences, there are a number of challenges associated with overcoming them in virtualized relationships such as outsourcing. Culturally diverse actors naturally gravitate toward different expectations, can have a difficult time understanding the intentions of the outsourcer, and are often hesitant to share ideas and feedback, which can result in certain participants being marginalized (Rosen et al., 2007). Scholars have found that factors such as geographic dispersion and national diversity hinder innovation unless a psychologically safe communication climate is created (Gibson and Gibbs, 2006). These suggest that one of the most important requirements for the outsourcer is conscious leadership to ensure that the cultures and interests of the dispersed actors on both sides of the outsourcing relationship are aligned (Latapie and Tran, 2007).

Communication
A second cognitive challenge involves communicating with the outsourcer contract provider. Effective collaboration within a supply chain is highly dependent on open lines of communication (Dwyer et al., 1987), but the nature of communication changes during the various phases of the relationship (Ambrose et al., 2008). Careful attention must therefore be paid to how outsourcer and external contract provider interact over the life cycle of their relationship (Furst et al., 2004), especially since many firms are conditioned to treat external relationships as adversarial (Mudambi and Helper, 1998) and may be unable to step outside of that mind-set (Spekman et al., 2002).
Again, there is much to be learned from the virtual team literature to anticipate the new communication requirements that outsourcing creates. Because of the virtual nature of the outsourcer–external contract provider relationship, much of its communication will occur in an asynchronous manner through modes such as email and voicemail rather than through synchronous forms such as face-to-face meetings and telephone conversations. Synchronicity of communication has been shown to be a key determinant of effectiveness, with asynchronous forms being found best suited for information conveyance and highly synchronous modes being better for achieving convergence of shared meaning (DeLuca and Valacich, 2006). Given the importance of goal congruence as mentioned above, in order to bolster their outsourcing relationships, firms should be encouraged to err on the side of promoting greater use of interactive, synchronous modes. However, the physically distributed nature of many outsourcing relationships, and the related costs of face-to-face meetings, suggests that firms will gravitate toward asynchronous methods.

Economic dimension

The economic dimension highlights benefits, costs, and performance factors in an outsourcing relationship. It is imperative that in the long term the outsourced operation continues to add value to both parties. Thus, transaction costs and benefits need to be assessed on a continuous basis. A holistic view needs to be adopted as the firm outsources more and more of its operations. While a particular outsourced operation may add value, this may be detrimental to other outsourced operations. Thus, assessment should be in terms of the total supply chain. While the value created by outsourcing may generate acceptable returns to the firm, this may come at a higher level of risk than is acceptable to the stakeholders. Thus, ongoing risk assessment is an additional aspect of the economic dimension. These areas are beyond the scope of a detailed discussion in this chapter.

Technological dimension

This dimension relates to the technologies that will enable and facilitate the outsourcing relationship. Technology has been offered as a means of compensating for the challenges of communicating in more
distributed relationships such as outsourcing. Hewitt (2006) has noted that email may not be as effective as more synchronous modes, but with proper use it can nevertheless convey influence, communicate intent, and reinforce shared objectives and goal alignment. However, other scholars have noted that there are trade-offs, foremost among which are miscommunication (Byron, 2008) and negative effects on overall cohesion and commitment (Driskell et al., 2006). Consequently, managers interested in achieving the highest leverage from their outsourcing relationships will need to consider ways in which they can improve the effectiveness of their firms’ interaction with their outsourcing contract providers. Members of the outsourcing teams will thereby need to be encouraged to adopt high frequency, active communication profiles in order to build the level of trust necessary for good communication.

In addition, technology in the form of information systems needs to be implemented to facilitate the continuous assessment and monitoring of the outsourced operation. These systems should form part of an overarching knowledge-management system.

Conclusions

By extrapolating the effects of progressive outsourcing to its logical extreme, it is possible to conclude that the operational expediency achieved through outsourcing will be paradoxically replaced by new management, learning, and strategic requirements. This relationship is depicted in Figure 3.2. A vertically integrated firm (Time 0) can improve its operational expediency in the short term by outsourcing (Time 1). However, as it continues to progressively outsource increasingly key (and even core) functionality, additional benefits will be joined by new levels of complexity (Time 2). The argument of this chapter is that this process is predictable, though often unintended. The majority of this chapter has endeavored to define the nature and scope of these complexities and provide insight into the organizational and behavioral changes that may be anticipated when outsourcing key and core functions.

The bigger question is how a firm manages itself through this evolution. Several of the salient factors have been suggested in this chapter, though one must assume that firms will exhibit differing abilities to
transition through this process based on their unique proficiencies for organizational change and their abilities to evolve adaptive leadership styles and cultures. Consequently, more adept firms can be expected to achieve greater levels of expediency than their competitors at comparable levels of complexity. This offers opportunity for future empirical studies, as it suggests that a firm’s behavioral profile, as well as its ability to adapt that profile to ongoing challenges, can determine its ability to achieve maximum efficiency with minimal incremental complexity when outsourcing. This also presents significant opportunities for applied studies, as it suggests that management teams that anticipate these changes, discern the right responses, and properly adapt their organizations can effectively leverage both sides of the expediency–complexity paradox.
References


A theory of the outsourcing firm


PART II

The offshoring and outsourcing of R&D and innovative activities
Blurring firm R&D boundaries

Integrating transaction costs and knowledge-based perspectives

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Introduction

Firm boundary decisions have been traditionally studied through the lens of transaction cost theory (TCT) (Masten et al., 1991; Monteverde, 1995; Williamson, 1975, 1985). However, the challenging evidence associated with the worldwide diffusion of new outsourcing practices, such as advanced subcontracting in the automobile industry, has driven researchers to analyze this phenomenon using alternative – although somewhat complementary – paradigms like the knowledge-based view of the firm (KBVF) (Grant, 1997; Kogut and Zander, 1993; Madhok and Tallman, 1998; Malhotra, 2003; Moran and Ghoshal, 1996) or the relational view (RV) (Dyer and Singh, 1998).

Although these paradigms question some of the predictions of TCT, the underlying hypothesis of this paradigm – the minimization of production and transaction costs – remains valid (Barney and Ouchi, 1986). In relation to this, a new trend is drawing the attention of both academics and practitioners: increased outsourcing of high-value and knowledge-based services that have traditionally been conducted internally by the firm, even to emerging countries (Bunyaratavej et al., 2007, 2008; Doh, 2005; Lewin and Peeters, 2006; Kedia and Mukherjee, 2008; Kotabe and Murray, 1990, 2004; Mol et al., 2004, 2005; UNCTAD, 2004, 2005). As far as these services are concerned, this chapter will focus on R&D specifically. Like advanced subcontracting, the outsourcing phenomenon of R&D services is another example of a boundary decision that does not perfectly fit with TCT. Due to the fact that firms are both increasingly fragmenting their product development activities and outsourcing some of these stages to external specialized providers (UNCTAD, 2005), we analyze the governance-mode decision related to R&D services.
For the purpose of this chapter, we define R&D services as those related to the design and development of new or improved products and processes. Examples of this kind of service are basic research services, applied or experimental research services, software development, design and development of products or processes, prototyping, engineering, or testing. The interest in studying this phenomenon lies in the fact that in R&D services the main attributes related to opportunistic behavior – asset specificity and transfer of tacit knowledge – are usually present. Consequently, there would be no incentives to outsource them. However, the reality is that, due to the growing complexity and multidisciplinary nature of the innovation process, and thanks to IT advances (which allow for the codification and modularization of knowledge), the same outsourcing phenomenon that has taken place decades ago with firms’ production activities is now happening in relation to the different stages in the firms’ R&D value chain (Fosfuri and Roca, 2002; Pavitt, 1999). On the other hand, we can see how multinational corporations (MNCs) are increasingly creating strategic alliances in R&D with firms in emerging countries – for instance, pharmaceutical companies that are collaborating with biotech firms in India seeking to cut the cost of bringing new products to the market.

Thus, the dividing line between those R&D services that can be performed in emerging countries and those that must be located at home or in developed as opposed to developing countries has become blurred. In making these governance decisions, firms often trade off economizing on transaction costs vs. accessing external knowledge and enhanced flexibility, while many firms are partially integrated and simultaneously outsource some activities (Afuah, 2001). These firms seek to identify the most effective balance in both organizing alternatives to leverage their benefits and mitigate their costs (Rothaermel et al., 2006). Consequently, we argue that in order to analyze this trade-off and, thus, to try to explain firm R&D boundary decisions, TCT arguments are better complemented with other knowledge-based paradigms such as the KBVF and the RV.

In this regard, when deciding the most efficient mode of governance for an R&D service, the firm faces two distinctive but interrelated decisions: (i) the governance structure preferred for the service, and (ii) the location preferred to perform it. These two decisions need to be jointly analyzed because when considering the optimal mode of governance for an activity, besides the contractual costs that arise due to the nature of the activity, the firm has to consider the hazards that are originated
directly from the location of that activity within a specific political system (Henisz and Williamson, 1999; Hill et al., 1990; Kobrin, 1987). Specifically, we analyze to what extent the service will be performed in-house or through some strategic alliance with another firm. We will also analyze if the service is going to be performed in an emerging country or not. In order to do so, we will develop a theoretical framework which, whilst maintaining the assumption of minimization of production and transaction costs, integrates the contributions of other alternative paradigms. We argue that the main drivers for outsourcing in emerging countries would be the labor intensity of the service and the degree to which firm-specific knowledge is required to perform the service. We also argue that, whereas physical asset specificity is not necessarily an obstacle to organize these services through alliances, firm-knowledge specificity would lead to integration of the R&D service.

**Firm boundary decisions in the R&D process**

The recent evidence of R&D outsourcing and technology alliances shows the benefits that may stem from taking advantage of external knowledge and capabilities. Thus, integrating internal and external sources of technological knowledge allows firms to build a larger and broader portfolio of related products in order to gain and maintain a competitive advantage (Nicholls-Nixon and Woo, 2003). Considering that firms pursue different R&D sourcing strategies choosing among internal organization and outsourcing in each stage of the process, in this chapter we undertake the vertical boundary decision in relation to the R&D stages or services in the firm innovation process. To do so, we will develop an integrative theoretical framework based on transaction cost theory (TCT) (Williamson, 1975, 1985) together with some of the insights of alternative theory perspectives that can also address this topic, such as the knowledge-based view of the firm (KBVF) (Kogut and Zander, 1993) and the relational view (RV) (Dyer and Singh, 1998), as we think that the integration of these perspectives will shed more light on this phenomenon.

**A transaction costs perspective**

From the TCT point of view, a firm’s vertical boundaries are determined by production and transaction costs (Masten et al., 1991;
Monteverde, 1995; Williamson, 1975). Production costs – which include the direct costs of producing and delivering a product or service, and may reflect differences in scale or production capability – are determined by labor and capital requirements (Oster, 1999). Transaction costs theorists assume that external production costs are lower than internal production costs, since an external provider enjoys economies of specialization and scale that a firm does not enjoy if producing the service internally (Hill, 1990; Monteverde, 1995; Monteverde and Teece, 1982; Williamson, 1975, 1985). As a consequence, TCT argues that markets will be the most efficient mode of governance for any transaction unless it can be shown that external transaction costs are high. Transaction costs are mainly determined by asset specificity, the frequency of the transaction, and uncertainty (Williamson, 1985). According to Kogut (1988) and Oxley (1997) in the specific context of strategic alliances – and R&D outsourcing can be considered as one type of strategic alliance – transaction costs stem from two types of opportunistic behavior that may arise in them: (i) hold-up hazards caused by specific investments, and (ii) appropriability hazards stemming from the loss of value of the firm’s intangible assets. The following paragraphs will analyze these two types of contractual hazards separately.

**Hold-up hazards**

According to TCT, firm-specific investments create what is called hold-up hazards. As transaction-specific assets are of lesser value if dedicated to alternative uses, partners in the transaction have incentives to appropriate the rents from these specialized investments through ex post contractual bargaining or threats of termination (Klein et al., 1978; Masten, 1984; Monteverde and Teece, 1982; Walker and Weber, 1984; Williamson, 1985). As a result, the firms often have to establish and negotiate contractual safeguards in order to induce firms to make such specific investments. These safeguards serve the purpose of protecting specific assets and thus reduce the risk of opportunistic behavior of the partners. However, negotiating these safeguards is likely to be costly and the more specific the asset, the higher the transaction costs the firm has to incur when externalizing this transaction (Williamson, 1985). Thus, it is expected that when the service considered does require investments in these tangible transaction-specific assets, the firm will have to incur high transaction costs in order to
partner with a suitable provider willing to make those investments. Consequently, firm-specific assets requirements will have a negative effect on externalization.

**Appropriability hazards**

On the other hand, transactions that require the transference of firm-specific knowledge, that is, the transfer of specialized know-how or expertise, create what are called appropriability hazards (Oxley, 1997; Pisano, 1989, 1990; Williamson, 1991). Appropriability hazards arise when firms cannot fully protect their rights regarding the intangible assets that they brought to the alliance. When taking into consideration R&D governance decisions, these appropriability hazards are often related to the potential capture of a/the firm’s technological knowledge by competitors. As many studies have shown, potential knowledge spillover opportunities have emerged as a critical factor in explaining R&D location decisions (Belderbos, 2003; Cassiman and Veugelers, 2002; Shaver and Flyer, 2000). Thus, it is important to consider that the significance of this risk of potential knowledge spillover will vary depending on the absorptive capacity of the third party (Cohen and Levinthal, 1990), and also on the tacit nature of the knowledge being transferred. Therefore, from a TCT perspective, because firm-specific knowledge presents a high level of tacitness, property rights over this knowledge are very difficult to specify in contracts and, consequently, transactions that require the transfer of firm-specific knowledge will be internalized. However, the significance of these transaction costs will depend on the uncertainty or political risk associated with the institutional environment where the transaction takes place (Henisz, 2000).

**Alternative theoretical perspectives**

More recently, this primary argument of TCT, i.e., the assumption of opportunism, has confronted some criticism from a new theoretical perspective which is usually referred to as the Knowledge-Based View of the Firm (KBVF) (Grant, 1997; Kogut and Zander, 1993; Madhok, 1997; Malhotra, 2003; Moran and Ghoshal, 1996). Rather than considering the firm as a contractual entity, this perspective conceptualizes it as a knowledge entity. Firms define a community in which there exists a body of knowledge regarding how to cooperate
and communicate, and that is developed and is evolving over time (Kogut and Zander, 1993). As a result, firms differ in their capabilities to understand and apply knowledge. From this perspective, increasing firm-knowledge specificity, rather than triggering market failure, enhances the efficiency with which such activities are performed within the firm compared to markets. In summary, according to this KBVF, the boundary decision is thus based on the difficulties in transferring knowledge across firms.

Apart from TCT perspective, in relation to the role of transaction-specific investments it is also interesting to consider another theoretical perspective which is referred to as the relational view of the firm (RV) (Dyer, 1996; Dyer and Singh, 1998; Kim and Mahoney, 2006; Madhok and Tallman, 1998). From this view, inter-firm co-specialization may be a source of competitive advantage. Hence, a firm’s critical resources may extend beyond firm boundaries and relation-specific assets are thus considered as a potential source of inter-organizational competitive advantage. The RV argues that mutual benefits of collaboration include not only those resulting from \textit{ex ante} resource complementarity, but also those that might be generated due to \textit{ex post} investments in relation-specific assets by either party (Bensaou and Anderson, 1999; Dyer and Singh, 1998) and through inter-organizational learning over time, which in turn may help both firms upgrade their competence (Lee and Chen, 2000). The potential benefits from specialization, however, will be dependent on the transactors’ capability to develop safeguards which can control opportunism at relatively low cost, so that the gains from specialization are not outweighed by the cost (Dyer, 1997). Therefore, from this perspective, the establishment of a trustful relationship between transactors plays a fundamental role since it helps to reduce the risk of opportunistic behavior in the relationship (Barney and Hansen, 1994).

Hence, in order to predict firms’ R&D governance decisions, we consider both propositions based on TCT, together with insights from the KBVF and the RV of the firm. In this regard, we argue that an integrative model is more useful to address this issue, due to the fact that basing inter-organizational decisions on transaction costs alone could undermine the realization of collaborative benefits and hence the transaction value of inter-firm collaborations (Dyer, 1997; Madhok and Tallman, 1998). We believe that this consideration is even more valuable in an innovative context, where the benefits from inter-organizational collaboration can be a very important source
of competitive advantage, since it fosters creativity and knowledge-sharing.

The role of labor costs in governance choices within the R&D process

When considering the most suitable mode of governance for an activity, besides the contractual costs that arise because of the nature of the activity, the firm has to face hazards that originate directly from the location of that activity within a specific political system (Henisz and Williamson, 1999; Hill et al., 1990; Kobrin, 1987). Researchers examining international R&D are increasingly attuned to the importance of host country institutions on MNC R&D location and investment decisions (Patel and Vega, 1999; Pearce, 1999; Taggart, 1991), and have attempted to demonstrate how such institutions may influence international business entry decisions and outcomes (Delios and Henisz, 2000; Henisz, 2000; Henisz and Williamson, 1999). As shown in previous literature (Gatignon and Anderson, 1988; Henisz, 2000; Henisz and Williamson, 1999) the contractual hazards originated from a transaction are not independent from the institutional environment that surrounds the transaction. The state poses a threat to MNCs through policy shifts in taxation or regulation, through outright or de facto expropriation, or by permitting opportunistic exploitation of assets by local firms (Doh et al., 2005). As a consequence, in order to mitigate their exposure to these political risks, and depending on the significance of these hazards in the host country, firms may alter their governance choices depending on the place where the service is performed. Thus, our starting point is that firms make their governance choices taking into account both transaction and production costs:

- Transaction costs depend on hold-up and appropriability hazards and vary internationally depending on the institutional environment (patent protection rights, the efficiency of judicial systems and policy instability, and so on).
- Production costs depend on scale and scope considerations and vary internationally according to labor costs differences.

According to this, MNCs locate their production activities in those countries in which the activity is performed at the lowest cost possible using the governance structure that also minimizes the production
costs (Buckley, 1988). The actual environment, where advances in IT have reduced transaction costs across national borders together with the emergence of a global market of qualified providers even in emerging countries, enhances MNCs to disperse their activities worldwide in order to take advantage of comparative advantages. In relation to R&D services, the recent development of specialized and qualified providers in emerging countries implies that significant savings on production costs can be achieved due to labor costs differentials. However, due to the tacit nature of innovation activities, and as per with other high-value functions, locating these activities in these economies with weaker institutional environments also entails high risks to the firm which can ultimately lead to an erosion of the firm’s competitive advantage. As a result, the governance of R&D services depends on a series of trade-offs between labor costs and cross-country variations in transaction costs associated with hold-up and appropriability hazards. In this section, we analyze these trade-offs (see Figure 4.1). We also assume, according to the KBVF, that when entering into a transaction with an external firm that requires the transfer of firm-specific

Figure 4.1. A model of R&D governance decision trade-offs.
knowledge, not only external transaction costs may be high, but also external production costs, since there are important costs associated with the codification and transfer of this knowledge.

The growing trend to locate several activities of the value chain in emerging markets is explained by cross-industry differences in labor costs (Swamidass and Kotabe, 1993). In fact, firms are increasingly fragmenting their product development activities and they are increasingly outsourcing some of these stages to external specialized providers (UNCTAD, 2005), most of them located in emerging countries. Especially interesting is the growing outsourcing of R&D services which we define as those services related to the design and development of new or improved products and processes. Service production costs are determined by a firm’s labor and capital requirements (Oster, 1999). Consequently, production costs differentials take into consideration productivity differences that may arise due to the type of technology or machinery used, wages, or the level of qualification of the manpower. In this regard, we argue that the significance of costs reductions that can be achieved through locating in low-wage countries will be largely determined by the labor intensity of the service considered. A service is considered to be labor intensive when the cost of producing it is largely determined by wage costs. Hence, the higher the labor intensity of the service, the larger the production costs savings that can be achieved if performing the service in a low-wage country. Thus, the service labor intensity will be the main determinant of production costs and ultimately determine its preferred location.2

However, whereas the decision to locate these services in emerging countries can be explained by low labor costs, transaction cost variations across countries may change the optimal governance structure for these services due to differences in transaction costs associated with asset specificity and appropriability hazards. As previously stated, governance decisions are not only about choosing the level of ownership preferred over the service but also about its location, which will ultimately determine the more efficient mode of governance for the service. Thus, because both decisions are interrelated, when considering the mode of governance for a service, firms face a wide set of alternatives such as: (1) perform it internally at home; (2) perform it internally abroad within a foreign subsidiary; (3) outsource it to a provider located at home; (4) outsource it to a provider
Table 4.1  *Contexts for governance choices for R&D services based on transactional characteristics*

<table>
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<th>Context 1</th>
<th>Context 2</th>
<th>Context 3</th>
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<tbody>
<tr>
<td>R&amp;D service requirements</td>
<td>Neither firm-specific knowledge nor transaction-specific investments in physical assets</td>
<td>Firm-specific knowledge and transaction-specific investments in physical assets</td>
<td>Transaction-specific investments in physical assets</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td></td>
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<tr>
<td>Labor intensive?</td>
<td>Labor considerations may influence country location choices as well as organizational choice between in-house, alliance-based, and contract</td>
<td></td>
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<tr>
<td></td>
<td>No</td>
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located abroad; or (5) other hybrid governance modes such as the establishment of strategic alliances or the creation of a joint venture with a service provider. Herein, we argue that, when considering knowledge-intensive functions such as R&D characterized by high levels of specificity, the governance mode preferred ultimately will be determined by transaction-specific investments in physical assets, firm-specific knowledge together with the institutional environment and the labor intensity of the service. In the following paragraphs, we analyze the expected outcomes of governance choices according to these attributes.

Note that given these different contexts (see Table 4.1), in order to develop our theoretical predictions, we will assume that, as their default option, MNCs in developed countries will always prefer to perform R&D services either at home or in an OECD country. This is because, due to bounded rationality (Simon, 1991) and ease of coordination (Rangan, 2000), firms would prefer to look for locations with similar institutional environments where they incur lower transaction costs compared to emerging countries where we expect they will have to face higher political hazards and the information
asymmetry will be higher. Therefore, we expect that, whatever the level of ownership preferred over a given service – i.e., internal vs. external modes – MNCs will consider as their first option to locate them either at home or in an OECD country unless comparative advantages can be achieved by locating somewhere else, i.e., emerging countries.

Neither firm-specific knowledge nor transaction-specific investments in physical assets are required

When asset specificity is low, internal production costs are higher than external production costs (Besanko et al., 2002; Williamson, 1985). As asset specificity falls, an outside supplier’s component approaches a commodity product that can be sold to many other firms, giving it a scale advantage over an internal supplier that does not enjoy such benefits of specialization and scale. This is because, as the switching costs also remain low, the firm does not face a small bargaining problem (Klein, 1996; Klein et al., 1978; Williamson, 1985). This means that the firm will incur lower transaction costs when outsourcing this kind of service to an external provider. It is expected that the pool of global providers for this kind of standardized service will increase. An example of this kind of R&D service would be those related to testing and analysis. For this type of standardized services, firms can take full advantage of the specialization advantages of an external supplier and concentrate their development efforts on those activities at the core of the firm’s competitive strategy.³ As a result, thanks to ITC advances, the firms can access this global market and can choose world-class suppliers. Therefore, international outsourcing allows for a wider search and more competition among suppliers leading to higher levels of efficiency (Quinn and Hilmer, 1994). In this line, Fawcett and Scully (1998) stated that, by sourcing globally from the best suppliers available, firms can increase the value of the products that they produce while simultaneously reducing the cost of the final delivered product. In summary, these conditions make it easy for firms to switch trading partners with little penalty, given that other providers offer virtually identical products.

In addition, if the required knowledge to perform the service is not firm-specific – that is to say, the knowledge is codified, and thus the
firm does not have to provide specific personnel training to the service supplier – then it will be easily transferable to a third party and consequently its transferring costs will be low. Therefore, external outsourcing to a third party is also the most appropriate alternative from the point of view of the KBVF. One reason why firms are increasingly outsourcing some of the services of the R&D process is its growing modularity (Fosfuri and Roca, 2002). In these cases, the process of innovation is divided into independent activities in such a way that several firms can participate in it without the need to work as a team with any other firm or even without being aware of what the other firms are doing. They just have to meet some general specifications in their activities. Thus, because external production costs will be lower than internal ones and the firm will not enjoy an advantage in the internal transference of this knowledge, we expect this kind of R&D service to be externalized through arm’s-length transactions.

As a consequence of both low contractual and political hazards associated with the externalization of this kind of service, we expect firms to outsource them to wherever there are providers with the qualifications required to adequately perform it, independently of the labor intensity of the service. However, although we expect that we may find this kind of service outsourced to providers located worldwide, we expect that, depending on the services’ labor intensity, firms will have more or fewer incentives to outsource them in an emerging country. If the service is not labor intensive, its production costs will be mainly determined by its capital requirements. Consequently, the location of the service will be determined by providers’ differentials in productivity due to their investment in new technologies or scale of operation (in this case wage differentials would be a minor determinant). As a result, this kind of service is more likely to be outsourced either to domestic providers or to providers located in other developed markets in the OECD, since it is expected that providers at these locations will be more technologically advanced compared to those in emerging countries. Taking this into account, we propose:

*Proposition 1a.* When providing the R&D service does not require either firm-specific knowledge or investments in transaction-specific physical assets and it is not labor intensive, then the service is expected to be outsourced to either providers in the firm’s home country or providers in developed markets (OECD).
Consequently, on the other hand, the more labor intensive the service the more incentives the firm will have to outsource it to a provider in an emerging market. If the service’s labor intensity is high, external production costs differentials will be largely determined by wage differentials. That means that when considering this kind of R&D service where no specific investments are required, the firm’s decision of where to outsource them will be mainly determined by country wage differentials, since the production costs savings due to lower wages are supposed to be larger than the transaction costs the firm has to incur due to differences in the institutional environments. Consequently, in this case we propose that:

Proposition 1b. When providing the R&D service does not require either firm-specific knowledge or investments in transaction-specific physical assets and it is labor intensive, then the service is expected to be outsourced to providers in emerging markets.

**Firm-specific knowledge is required but transaction-specific investments in physical assets are not**

According to the KBVF, considering that the firm’s know-how is materialized in its organizational routines (Nelson and Winter, 1982), that the knowledge is usually of a tacit nature, and that it differs from one firm to another (routines are firm-specific), we will assume that if a service to be performed requires firm-specific knowledge, then that service will always be internalized. This is due to the firm’s efficiency relative to markets in transferring this kind of knowledge. Firm-specific knowledge is embedded in the organizational routines of the firm and is thus difficult to isolate and transfer to external parties. As pointed out by Cantwell (1991), each time a knowledge-based capability is transferred to an external firm, it loses part of its value as the external firm cannot replicate the original capability easily and perfectly. In summary, KBVF arguments imply that whenever an activity to be performed requires firm-specific knowledge, the internal production costs are expected to be lower than the external production costs because the firm is more efficient at transferring this kind of knowledge than a third party. As a consequence, there would be no reason to externalize this kind of service.

Furthermore, from the point of view of the TCT the same conclusion is reached, although with a different argument. TCT argues that
knowledge that is firm-specific, and that is uncodified, is more difficult to protect, as it becomes trickier to effectively define property rights over it (Pisano, 1989). As a consequence, this difficulty puts the firm at risk of so-called appropriability hazards (Kogut, 1988; Oxley, 1997). An example of this kind of knowledge-based service would be, for instance, those involved during the idea generation stage within the innovation process. In this regard, organizational members who begin working together with internally generated ideas from an early stage in the innovation process are shown to associate more strongly with the project and have greater commitment to its successful completion, thus being more effective and more capable of creating a competitive advantage (Kessler et al., 2000). This would especially be the case if the knowledge associated with the idea is mostly tacit, complex, and systemic by nature (Chesbrough and Teece, 1996). However, the kind of services to be internalized would depend on what the firm’s core competence is. Thus, if a particular firm has a competitive advantage over rivals thanks to its more effective designing capabilities, it is assumed that these designing services will never be outsourced. This means that, considering this kind of service, the MNC decision of where to perform them within the company will be determined by subsidiaries or units’ differentials in productivity due to the level of technology investment or scale of operation, or their access to unique resources or networks. Consequently:

**Proposition 2a.** When providing the R&D service does require firm-specific knowledge but does not require investments in transaction-specific physical assets and the service is not labor intensive, then the service is expected to be performed either in the firm’s subsidiaries in the firm’s home country or the firm’s foreign subsidiaries in developed markets (OECD).

Note that, because we are developing our model following the rationale of minimization of both transaction and production costs, the requirement of other specific investments would not change our prediction as these investments would increase both external production and transaction costs. This is because, as already stated, and according to KBVF, when entering into a transaction with an external firm that requires the transfer of firm-specific knowledge, not only external transaction costs may be high, but also external production costs, as there are important expenses associated with the codification and transfer of this knowledge. Thus, while firm-specific knowledge
requirements may pose an obstacle to externalization, investments in transaction-specific physical assets may not necessarily be the case.

Once again, we will consider the scenario where this R&D service is labor intensive. If the service’s labor intensity is high, so labor costs represent a major part of the service total production costs, thus the service production costs will be largely determined by labor costs. This implies that the firm will have strong incentives to provide this kind of service in a low-wage country. However, when considering the most suitable mode of governance besides the contractual costs that arise because of the nature of the service considered, the firm has to face hazards that originate directly from the location of that activity within a specific political system (Henisz and Williamson, 1999; Hill et al., 1990; Kobrin, 1987). As a result, on the one hand, the firm will have a strong incentive to locate in an emerging country because of the potential internal production costs savings that it can achieve due to wage differentials. But, on the other hand, locating in an emerging country implies that the firm will be exposed to a risky institutional environment. However, this weaker institutional environment will not be damaging for the firm so far as the service is performed within a firm’s wholly owned subsidiary. Therefore, we expect that:

Proposition 2b. When providing the R&D service does require firm-specific knowledge but does not require investments in transaction-specific physical assets and the service is labor intensive, then the service is expected to be performed through a firm’s foreign subsidiary in an emerging country.

Transaction-specific investments in physical assets are required but firm-specific knowledge is not

As stated earlier, KBVF firms are social communities that serve as a more efficient mechanism for the transference of knowledge that is specific to the firm compared to markets (Kogut and Zander, 1993). As a result, whenever providing the service does not require firm-specific knowledge, then the external production costs are expected to be lower than the firm’s production costs because the firm will not enjoy an advantage over a third party in transferring this kind of codified knowledge. When externalizing this kind of service, the firm can benefit from the external provider specialization and, at the same time, the transferring costs of the knowledge required to perform
the service are supposed to be low because the knowledge is going to be easily transferable to a third party. Then, if vertical integration is not efficient, an alternative is the market or contract.

As stated before, from the point of view of TCT, an explanation for why market transactions are not chosen rests on potential exploitation of one party when assets are dedicated to the relationship and there is uncertainty over redress. As a result, in the case considered that the R&D service requires investments in firm-specific physical assets, and these investments are usually costly and risky for the investors, we can leave aside integration as economically infeasible and market transactions as too fraught with opportunistic risk, so the comparison will be between a joint venture and a long-term contract (Kogut, 1988; Williamson, 1975). This is because, in this situation, it is expected that the firm will face several difficulties in finding a provider willing to make those investments because it posits what in TCT is called the small number bargaining problem, which occurs when one of the contracting parties has invested in assets that are costly to transfer to alternative uses, i.e., firm-specific assets, making the investor vulnerable to opportunistic re-contracting (Klein, 1996; Klein et al., 1978). So, one efficient mechanism to solve these problems and reduce the risk of opportunism is to establish a long-term agreement with the provider. This long-term contract will serve as a safeguard mechanism from the risk of opportunistic behavior of both parties. This is because, should one party behave opportunistically, the loss of business or future rents deriving from terminating a long-term contract will be greater (Klein, 1996).

Thus, with repeated transactions in a stable environment, one can expect on the one hand contracts to become self-enforcing because of reputation effects, and on the other hand, hold-up and moral-hazard problems to be attenuated by the evolution of norms of reciprocity and cooperation (Axelrod, 1984; Sugden, 1986). An example of this kind of agreement would be the joint development agreement between Genentech, the largest biotechnology company in the world, and Alkermes, Inc., a small firm specialized in sophisticated drug delivery technology. Through this agreement, Alkermes was required to make substantial investments in adapting its technology – the drug delivery technology in which it was specialized, called microencapsulation – to Genentech’s successful therapeutic product, a genetically engineered form of the naturally occurring protein called human growth hormone (HGH) (Merges, 1999). The development of this HGH is an example
of R&D activity which requires transaction-specific physical investments from the part of Alkermes, but at the same time does not require the transfer of firm-specific knowledge on the part of Genentech. This is because the knowledge required to develop the HGH was patented. Through this joint R&D agreement, Genentech allowed Alkermes to exploit the HGH microencapsulation patent, which means that the knowledge being transferred is codificable and thus easy to protect. Therefore, as a result:

Proposition 3a. When providing the R&D service does not require firm-specific knowledge but does require investments in transaction-specific physical assets and is not labor intensive, then the service is expected to be outsourced through long-term contracts to either providers in the firm’s home country or providers in developed markets (OECD).

From a knowledge perspective, it can be argued that the establishment of a long-term contract with a provider, while acting as a protection to the opportunism of the other party, will also increase the willingness of both parties to cooperate and to improve and continue their agreement, thus enhancing organizational learning and firms’ productivity.

However, if we now consider the scenario where this R&D service is also labor intensive, we expect that the preferred mode of governance for this service may change. As stated before, if the service’s labor intensity is high, significant production costs savings can be obtained if the service is provided in low-wage countries. However, if the service requires transaction-specific investments in physical assets, then the transaction costs the firm would have to incur when outsourcing to an external provider would be too high because of the uncertainty and risk associated with emerging markets. This is due to the fact that the policy instability that usually exists in these countries may provide a loophole for the local service provider to behave opportunistically, due to the restricted capacity of the foreign firm to enforce its rights (Henisz, 2000). In this regard, TC theorists argue that joint ventures have two properties that are particularly distinctive when compared to long-term contracts: joint ownership and control rights, and the mutual commitment of resources. As a result, the situational characteristics best suited for a joint venture are high levels of uncertainty over specifying and monitoring performance, in addition to a high degree of asset specificity. This is because a joint venture addresses these issues by creating a superior monitoring mechanism and alignment of incentives
to reveal information, share technologies, and guarantee performance (Kogut, 1988).

In fact, one way to achieve this alignment is the development of rules of sharing costs and/or profits and the mutual investment in dedicated assets, i.e. assets which are specialized to purchases or sales from a specific firm. In summary, as stated by Kogut (1988: 321) “the critical dimension of a joint venture is its resolution of high levels of uncertainty over the behavior of the contracting parties when assets of one or both parties are specialized to the transaction and the hazards of joint cooperation are outweighed by the higher production or acquisition costs of 100 percent ownership.” Taking this into account, in this transactional situation we expect that the firm will prefer a joint venture to a long-term contract. The reason for this would be that the uncertainty it will face due to institutional differences with providers in emerging markets (i.e., economic or political instability, cultural and social differences) will be too high to be efficiently managed through a long-term contract. This is because a joint venture often serves the purpose of assigning management tasks to local partners who are better able to manage the local labor force and relationships with suppliers, buyers, and governments (Franko, 1971; Stopford and Wells, 1972). Thus, a joint venture, compared to other modes of governance, helps to resolve the foreign partner’s problems ensuing from cultural factors, though at the cost of sharing control and ownership (Kogut and Singh, 1988). Then, in summary, if the service requires investing in transaction-specific physical assets and the firm wants to benefit from wage differentials then the service is expected to be governed through the creation of a joint venture with a local provider. A joint venture will then act as a protection from opportunistic behavior on the part of the other party. Taking this into account, we propose that:

**Proposition 3b.** When providing the R&D service does not require firm-specific knowledge but does require investments in transaction-specific physical assets and is labor intensive, then the service is expected to be governed through the creation of a joint venture with a local provider in emerging markets.

It is interesting to note that the creation of a joint venture can be expected as the preferred option within this transactional situation from other theoretical perspectives. From a knowledge perspective, a joint venture can be a way to access local knowledge and access new markets, thus improving the firm’s competitive position vis-à-vis
rivals. For example, following Nelson and Winter (1982) a firm may decide to joint venture in order to retain the capability (or what they call “remember-by-doing”) of organizing a particular activity while benefiting from the superior production techniques of a partner. From a relational view, the firms’ ultimate objective in the make or buy decisions will be determined by maximization of total value, not just costs minimization. Therefore, it is considered that the benefits stemming from inter-firm collaboration are not only those resulting from *ex ante* resources complementarities but also those that can be obtained *ex post* due to the realization of relation-specific investment (Dyer and Singh, 1998) and through inter-organizational learning, which may help both parties to improve their competencies. As a result, from this perspective, a hybrid mode of governance such as a joint venture to provide a service that requires firm-specific investments and where there is mutual trust between parties, apart from enhancing productivity, may be a source of new knowledge for the firm, and an opportunity to learn from the local market the firm may be unaware of. This way, when considering R&D services, strategic partnerships, such as joint ventures, may be seen as an efficient way to access complementary assets.

For instance, the Japanese firms NEC Corporation and Fuji Heavy Industries created, in 2002, a joint venture called NEC Lamilion Energy with the objective of developing and manufacturing high-performance batteries for environmentally friendly automobiles. The aim of this venture was to combine NEC’s expertise in lithium-ion cell technology with Fuji’s battery pack technology to create rechargeable batteries for the automobiles (Schilling, 2005). So, as argued by Teece (1992: 20), strategic alliances may provide an attractive organizational form where the environment is characterized by rapid innovation and geographical dispersion in the sources of know-how as they enable firms to explore new technological developments more rapidly than would be possible independently.

Thus, our prediction model of modes of governance for R&D services based on the role of specificity and the labor intensity of the service considered can be illustrated as the following Table 4.2.

**Discussion and conclusion**

In this chapter, we have proposed a model for predicting the preferred mode of governance for a particular R&D service within the
Table 4.2 Integrative framework of preferred modes of governance for R&D services based on transactional characteristics

<table>
<thead>
<tr>
<th>R&amp;D service requirements</th>
<th>Context 1</th>
<th>Context 2</th>
<th>Context 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neither firm-specific nor transaction-specific investments in physical assets</td>
<td>Outsourcing to a provider in emerging country</td>
<td>In-house at firm’s foreign subsidiary in emerging country</td>
<td>Joint venture with provider in emerging country</td>
</tr>
<tr>
<td>Both firm-specific knowledge and transaction-specific investments in physical assets</td>
<td>In-house at firm’s subsidiary in home country or OECD country</td>
<td>Long-term outsourcing agreement with provider in domestic or OECD country</td>
<td></td>
</tr>
<tr>
<td>Transaction-specific investments in physical assets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Labor intensive?

Yes

No

Outsourcing to a provider in domestic country or OECD country

In-house at firm’s subsidiary in home country or OECD country

Joint venture with provider in emerging country

Long-term outsourcing agreement with provider in domestic or OECD country

firm innovation process. Our model highlights the influence of what we consider are the main drivers of this choice: on the one hand, the needs of firm-specific knowledge and transaction-specific investments in physical assets and, on the other hand, the labor intensity of the service. While we believe that these are the main factors conditioning the preferred governance form, there are other variables that may moderate the predicted influence of the aforementioned factors. Although for the sake of brevity not all of them can be studied, here we identify two critical dimensions that can be analyzed in order to incorporate other factors in our model. These two dimensions are: the firm’s tolerance to strategic alliances and the impact of the easiness of coordination and control. Thus, we herein analyze two factors that can exemplify these two dimensions: (i) the exploration/exploitation balance, and (ii) the use of ITC advances.

As different motivations for going abroad require different strategies, the mode of governance preferred for a R&D service may vary depending on the firm’s motivation to locate it in a particular location
(Nachum and Zaheer, 2005). While firms’ motivations to invest abroad have been traditionally based on the intention of firms to exploit their firm-specific advantages abroad (Hymer, 1960), the search for knowledge is now recognized as a major driver of foreign direct investment especially in high-technology industries (Chung and Alcacer, 2002; Kuemmerle, 1999; Wesson, 2004). Thus, knowledge-seeking investment is driven by firms’ needs to access complementary resources, notably various kinds of knowledge, in order to upgrade their own capabilities or to develop new advantages.

The globalization of markets, the location of specialized scientific and technological knowledge in limited regions (Almeida and Kogut, 1999; Rosenkopf and Almeida, 2001), together with the dynamism of markets, are driving companies to continually relocate their R&D activities worldwide to remain competitive. Hence, in order to maintain their competitive advantage, firms can no longer rely only on internal sources of innovation, but also on external ones. This need for external resources increases a firm’s tolerance for strategic alliances (Madhok, 1995, 1997). As a result, for some R&D services that are expected to be internalized because they require investments in transaction-specific assets, the firm may find instead a hybrid mode of governance or a strategic partnership with a local provider to be a preferred option. Joint venturing with local providers or establishing long-term agreements with them may allow firms to access local specialized knowledge and benefit from knowledge spillovers and collective learning (Scott, 1998) that could not otherwise be obtained.

For instance, from a dynamic point of view, it can be expected that as a result of continuous externalization of specific R&D services by MNCs to limited regions – even to emerging countries – some of these regions will be able to upgrade their capabilities. Thus, in the near future, MNCs may not be attracted to the prospect of locating some of their R&D services in emerging countries, not only because of lower labor costs but also because of their skilled labor force.

In fact, for instance, Bombay, Bangalore, and Delhi within India have quickly emerged as the key locations for software development. Apart from the lower development costs obtained by exploiting wage differentials, the primary locational advantages of these cities comprise infrastructure, including transportation and telecommunications infrastructure, and access to a skilled pool of labor. Thus, when firms’ investment motivations are knowledge-seeking the potential mutual
benefits of inter-firm collaboration may outweigh the transactional costs the firms have to incur to protect against opportunism. Note that one important limitation of our model is the assumption that emerging countries are always associated with low wages and with less technologically developed providers, which may not always be the case. In fact, the development of centers of excellence worldwide, including emerging countries, implies that in some cases locating in emerging countries may be driven not only by lower wages but also by access to specialized knowledge or technology.

Another factor that can be incorporated in our model is ITC advances and investments. Technological advances reduce the cost of distance, provide new ways to create value, and may change the motivations of cross-border activities (Nachum and Zaheer, 2005). IT reduces both control and coordination costs over distance and thus opens up a range of new possibilities for interaction over distance, both between MNCs and the market, and between subsidiaries of the same MNC (Christensen et al., 1998; Sampler, 1998). IT advances reduce the cost of transferring knowledge both within the firm and with external parties as they facilitate the transmission and codification of knowledge. As a result, firm-specific knowledge that was previously difficult to transfer to third parties without losing value, with the use of new ITs, part of this knowledge may be codified, standardized, and digitized.

Therefore, IT advances reduce the specificity of firms’ knowledge and R&D services that were previously internalized because they were costly to transfer to third parties may now be externalized (Afuah, 2003). Furthermore, IT advances reduce firms’ searching costs thus reducing the small-number bargaining problem considered by transaction costs theorists. For instance, with the emergence and diffusion of the Internet, firms have access to providers that are located worldwide facilitating access to best-in-world providers and simultaneously providers also have access to potential customers so reducing the room for opportunism if investing in firm-specific assets (Afuah, 2003). Consequently, IT advances allow for services that were previously internalized because they implied high levels of specificity to be now externalized.

In summary, this chapter argues that, whereas the location of R&D services in emerging countries can be explained by low labor costs, transaction cost variations across countries may change the optimal
governance structure for these services due to differences in transaction costs associated with hold-up and appropriability hazards. If the transaction of this service requires investments in transaction-specific physical assets, choosing a location in an emerging country with a weak institutional environment will increase transaction costs. If the transaction requires the transfer of firm-specific knowledge, the location of the activity would not change the optimal governance structure, as internal organization is always the preferred mode because internal production costs are lower (due to the difficulties in transferring firm-specific knowledge outside the organization) and external transaction costs are higher. Finally, moving overseas might reduce the possibility of relying on trust as a governance mechanism, not only because of changes in the institutional environment, but also due to the lack of previous relationships with local firms. Within our model, the effect of both knowledge-seeking motivations and IT advances on R&D boundary decisions has also been highlighted.

Notes
1 We gratefully acknowledge the financial support of the Ministerio de Educación y Ciencia and FEDER (project ref. SEJ2007–67329). One preliminary version of this work has been previously published as Working Paper no. 345 within the collections of working documents of the Fundación de las Cajas de Ahorros (FUNCAS).
2 Note that in order to develop our theoretical model the level of qualification of the manpower is not going to influence the firms’ decision of where to locate their R&D services as we are assuming that all of the potential providers that may be available to the firm have the qualification required to perform them. The level of qualification of the manpower will be considered then as constant.
3 In fact, in a recent survey we carried out among an international sample of high-tech firms, we found that R&D services related to testing and analysis were the most widely outsourced within their innovation process (A. Martinez-Noya and E. Garcia-Canal [2009] “Distinctive features of R&D outsourcing practices by technology-intensive firms,” Working Paper).
4 Obviously, in these cases the transfer of knowledge that is firm-specific would entail some kind of intangible transaction-specific investments such as human-specific training on the side of the supplier. However, even though there can be some hold-up problems arising from these
investments, the real threat for these transactions are those related to appropriability concerns.

5 Note that in this chapter, in order to develop our theoretical framework, we are considering MNCs to be decision-makers. Thus, we are making the assumption that MNCs will be experienced enough to deal with these differences in the institutional environments effectively, while taking advantage of wage differentials. In this regard, it is interesting to note that, for those firms of smaller size or those with less or no international experience this last proposition, 2b, may not hold (Cantwell, 1989; Hymer, 1960). On the one hand, and in relation to the level of internal demand for the R&D service considered, smaller firms may not be able to achieve enough demand to justify the establishment of a foreign subsidiary to perform these services. And, on the other hand, firms lacking international experience may find entering emerging markets through the establishment of a subsidiary too risky.


References


Blurring firm R&D boundaries


Outsourcing, fragmentation, and integration

The pharmaceutical industry

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Introduction

The outsourcing of non-core standardized tasks and processes which permit relatively easy measurement of performance and quality is a well-known story. Outsourcing is presented as an opportunity resulting from technological changes that permit the springing up of thick intermediate markets (Langlois, 2003; Milberg, 2004; Narula, 2001; Williamson, 1981). This allows firms to use markets to obtain intermediate products and services, with the associated benefits from specialization, economies of scale, and competition, resulting in lower costs and better quality intermediate products (Langlois, 2003). This is treated as a dynamic transaction cost story. Advances in the standardization and codification of production processes promotes a smooth interface between vertical stages of production. This allows principal firms to concentrate on core competence activities, with few coordination costs required to maintain the vertical relationship. Coordination costs are low because the outsourced intermediate product is the result of rote labor which can be easily measured and monitored by the new technology embodied in production equipment. In addition, the principal firm benefits from conservation of capital, diminishing uncertainty, and the spreading of risk. In this story, the principal firm retains knowledge-process core competences within the firm, not only because these competences rely on tacit information and ongoing knowledge creation (and are thus difficult to transfer to an outside entity), but also because they are the sources of the firm’s competitive advantages, requiring protection from appropriation (Dosi et al., 2006; Kogut and Zander, 1993; Sen, 2006). Langlois (2003: 347) describes the preconditions for this organizational transformation:
Decentralization implies an ability to cut apart the stages of production cleanly enough that they can be placed into separate hands without high costs of coordination. . . decentralization implies some degree of standardization of “interfaces” between stages.

However, the literature also provides a more complex story about outsourcing, involving long-term and collaborative inter-firm relationships (Lamoreaux, Raff, and Temin, 2003), and indeed a full “partnership continuum” of possible degrees of inter-firm engagements (Kleyn et al., 2007: 334). Outsourcing with “fuzzy” (relationship-complex) rather than smooth boundaries is typically associated with investment-based rather than intermediate-product-sourcing strategies (Cantwell, 1991; Narula, 2001), such as capabilities-seeking or technology-seeking (Doshi, 2004; Grant, 1996; Kleyn et al., 2007) or supplier-upgrading (Takeishi, 2002). Investment-based outsourcing usually involves the firm’s need to acquire tacit inputs such as skills, technology, or other tacit knowledge. This process leads to uncertain and difficult-to-measure results and unclear property rights, requiring closer monitoring and more “face-to-face interaction”; hence the fuzzy boundaries or relatively higher coordination costs (Balconi, Pozzali, and Viale, 2007; Cantwell and Santangelo, 1999; Narula, 2001: 369).

In the pharmaceutical industry, outsourcing increasingly encompasses non-standardized activities that were previously considered to be the exercise of the principal firm’s core competences, such as research and development (R&D), with outcomes that are uncertain, risky, and hard to measure whether undertaken internally or with an external partner (Bhatt, 2005; Doshi, 2004; John, 2006; Mehta and Peters, 2007). Furthermore, some of these new outsourcing arrangements, while contributing further to the formal (equity-based) vertical fragmentation of the production process, can involve substantial transaction or coordination costs, and in some instances require forms of integration between principal and vendor firms (Sen and Shiel, 2006). Thus the interfaces between stages of production in the pharmaceutical industry are fuzzy, requiring a substantial expenditure of resources to maintain satisfactory outcomes (Daniel et al., 1997; Galambos and Sturchio, 1998).

This chapter explores the nature of outsourcing and offshoring of R&D in the modern pharmaceutical, biopharmaceutical, and medical devices (“pharma”) industry, particularly with respect to the
Outsourcing of the management of clinical trials and of drug discovery. Both of these functions have been considered part of the core competences of pharmaceutical firms in the past (Piachaud, 2004), and both involve complex relationships rather than smooth interfaces between principal and vendor firms.

Two questions emerge: (1) How do these pharma practices fit within the typology of intermediate-product-based and investment-based outsourcing? (2) Does outsourcing of high-skill R&D functions imply that standardization and codification of tasks and skills is making redundant scientific labor not previously thought amenable to codification?

Typically, it is assumed that codification of skilled processes replaces high-skill tasks with standardized rote tasks and creates the possibility of replacing skilled labor with less skilled labor. This allows the reallocation of codified tasks to lower-margin contract providers working with less skilled and therefore poorly remunerated labor. In addition, typically, standardization and codification of production processes are embodied in new capital equipment and measuring instruments providing control of the labor process and quality of outcomes (Lamoreaux et al., 2003). This process, which redesigns human labor and its interaction with capital equipment, creates the smooth interface permitting relatively less costly outsourcing (Balconi, 2002; Balconi, Pozzali, and Viale, 2007). Coordination costs are low because new technologies give the principal firm sufficient control over the nature and quality of the outsourced intermediate products.

This chapter demonstrates that the pharmaceutical industry has been undergoing a trial-and-error transition period of restructuring in response to emerging constraints and opportunities. This has led to a variety of re-organizing responses, including mergers, alliances, outsourcing, and offshoring with respect to R&D operations.

The chapter shows that the outsourcing of parts or all of clinical trials (drug development or “DDV”) with high coordination costs is being accompanied by the beginning phase of standardization of aspects of clinical trials, and by the creation of new technological tools which can embody a codification of many of the tasks traditionally embedded in the clinical trial process. However, the outcome of this standardization process is unlikely to involve a larger role for unskilled labor. Instead, new technologies are separating out codifiable from non-codifiable tasks currently mixed together in the skilled-labor conduct of clinical trials. The new technology will perform previously time-consuming
codifiable tasks much faster, enabling an intensification, or significantly increased productivity, of the skilled labor involved.

An analytical focus on the transaction costs emanating from fuzzy boundaries associated with the outsourcing of clinical trials could direct attention away from the process by which investments in standardization and codification produce a smoother interface which can permit less costly (transaction costs) outsourcing in the future. A static focus on transaction costs must give way to a dynamic focus on firms’ investments to transform the economic environment, including current constraints such as transaction costs (Lazonick, 1991; Kapler, 2007).

The usually collaborative outsourcing of drug discovery (“DDS”) is different. This is more likely the manifestation of the continuing development of opportunities and threats presented by the explosive emergence of new biomedical science. What might be thought of as the transaction costs involved represent, instead, investments in new assets, i.e., in new capabilities and equipment necessary to exploit the emerging science, and the reallocation of fixed costs and risks among a network of contract research organizations (CROs). Focus on static transaction costs could obscure the endogenous production, through investment, of vertical fragmentation and integration (Ietto-Gillies, 2002).

The chapter is organized as follows: the next section discusses the extent of outsourcing and offshoring in pharmaceutical R&D, and the pressures leading to the restructuring of the industry. This is followed by a presentation of the modes of restructuring, and the standardization and codification of some labor processes in, the drug development (clinical trials) phase of R&D. We then examine restructuring in the drug discovery portion of pharmaceutical R&D. The final section provides concluding comments.

Outsourcing, offshoring, and restructuring pressures in the pharmaceutical industry

Outsourcing

In 2006, Goldman Sachs estimated that global pharmaceutical R&D spending by the US pharmaceutical industry\(^1\) would grow from $95 billion in 2005 to $161 billion in 2010, an average annual
growth rate of 13 percent (Parexel, 2007). Cockburn (2006) estimates that since 1990, European-based pharma firms’ research expenditures have been the equivalent of about 80–90% of the US bill, while Japanese firms have spent about 30–50% as much as US-based firms. This suggests pharmaceutical R&D expenditures by global pharma at $340–390 billion by 2010.

Drug development (DDV), including preclinical testing and clinical studies, usually makes up about 70% of the R&D budget (Piachaud, 2004). Outsourcing of US pharma’s DDV has been growing steadily since the late 1980s (16% annually from 2001–07 according to Getz, 2007) and represents the largest share of pharma R&D outsourcing, now estimated to include 22–25% of US clinical trials (Mehta and Peters, 2007; Parexel, 2007). Miller (2007a,b) conducted a survey of pharma firms and CROs showing that 94% reported an increase in outsourcing. CROs play a “major role” in 60% of all pharma R&D projects, up from under 30% in 1993 (Mehta and Peters, 2007: 30). US pharma’s global R&D expenditures are expected to grow 13% per year to 2010, while outsourcing of clinical studies is expected to grow 13–15% per year, reaching approximately $26–36 billion by 2010 (Gassman, Reepmeyer, and von Zedtwitz, 2004; Mehta and Peters, 2007: 30; Parexel, 2007). That would amount to about 20% of the US R&D budget, and about 30% of clinical trial expenditures.

Eighty three percent of CRO revenues come from clinical trials management (Mehta and Peters, 2007: 30). In 2003, there were approximately 270 CROs in North America, and over 1,000 CROs globally (Hindin, 2004). Between 2002 and 2005, CRO annual head-count growth of 7% exceeded that of US pharma by a factor of three, reaching 50,877 in 2005 (Getz, 2007).

Since the mid-1990s, outsourcing of DDS (drug discovery) processes has also become more familiar. In 2004, the outsourced DDS market was about $2 billion (King, 2004), with the market expected to amount to $7.2 billion by 2009 (Boswell, 2005; Finkelstein and Temin, 2008: 66). That would amount to 4.5% of the 2009–10 US R&D budget and 15% of the US DDS budget, with an average annual growth rate of approximately 50%.

Thus, total US pharma outsourcing, while expected to amount to only 24% of the total 2010 R&D budget, is clearly growing at a more
rapid rate than the R&D budget. CRO employment is also growing much faster than employment in pharma.

**Offshoring**

Increasingly, US pharmaceutical R&D expenditures are being offshored, either through offshoring to affiliates (through foreign direct investment or “FDI”) or via contracts with foreign CROs or with domestic CROs that are globalizing their resources (i.e., offshoring to unaffiliated [contract] parties or “offshore outsourcing”). According to UNCTAD (2005: 125), the pharma industry has the second largest proportion of offshored R&D at 38%. It is estimated that offshored US pharmaceutical R&D amounted to about 16% in the 1970s, growing to 21% in 2006 to $9 billion (Parexel, 2007: 5). In 2006, the top twelve US pharmaceutical firms by number of studies accounted for 41% of the clinical trials being sponsored by the industry, but they accounted for 48% (or 544 of 1,125) of the studies being conducted outside the US. Sixty-two percent of these foreign-located studies were being conducted in Germany (175 trials) and the UK (161 trials). Other favored locations included Eastern Europe and Latin America. India and Ireland each accounted for 4.7% (26 trials), China for 4.4% (24), and Russia for less than 1% (5). However, the growth rate in foreign-located clinical investigator participation in US Food and Drug Administration- (FDA-)regulated trials is highest in India, China, and Russia (see also Thiers, Sinskey, and Berndt, 2007). From 2001 to 2006, the number of participating investigators in India grew by 62.5%, in China 284%, and in Russia 253% (Parexel, 2007: 130). From 2002 to 2006, the number of FDA-regulated investigators globally grew by 15% annually, while the number of investigators in the US declined by 5.5% annually (Parexel, 2007: 129).

Drug discovery is also being offshored, with Indian, Chinese, and Russian firms especially making more deals currently with western pharmaceutical firms (Doshi, 2004; Finkelstein and Temin, 2008: 67). Drivers include an abundance of low-cost skilled labor, large “drug-naïve” populations, good health and information technology (IT) infrastructures, and offshore government attempts to address intellectual property issues (Bhatt, 2005; Clark, 2007; Doshi, 2004; *Pharmaceutical Executive*, 2006).
Pressures and opportunities in the industry promote restructuring

The restructuring of the pharmaceutical industry has been explained in the literature within the context of changing science and technology, pricing, cost, and regulatory pressures, concerns about a dwindling drug discovery pipeline among the large pharma corporations, and the decline of the blockbuster drug model (Hall, 2000; Hindin, 2004; John, 2006; Kleyn et al., 2007; Piachaud, 2004). Squeezing the pharmaceutical firms are increasing price pressures from governments, world health authorities, and insurance entities (Harris, 2008; King, 2004; Scherer, 2004: 929–31), increasing competition in a globalized industry, the fast-rising cost and length of development time to bring a new profitable drug to the market (Hall, 2000; Sen, 2006), and the declining proportion of new drug approvals (Doshi, 2004). Other pressures come from losses to generic drugs and expiring patents (Martinez and Goldstein, 2007).

Until 1980, the big US pharma firms were fully integrated operations performing tasks ranging from drug discovery through marketing in-house (Cockburn, 2004: 13–14). This model dated back to the interwar years. The chemistry-based discovery process (DDS) necessitated large labs and significant human capital, financial resources, and expensive technology (Piachaud, 2004: 93, 114). There was no need for outsourcing; internal personnel and expertise were sufficient to carry out the whole process. In addition, outsourcing would have raised concerns about dissipation of intellectual property and possibly diffusion of the pharma firms’ core competences. Patent applications are typically based upon data emerging from the lead optimization phase of drug discovery (Clark and Newton, 2004: 4). Lead optimization is “the process of determining whether a compound found to be effective against the target can be converted into a drug candidate for testing” (Finkelstein and Temin, 2008: 66; see also Clark and Newton, 2004).

An important driver in the restructuring of drug-discovery R&D has been the ongoing transition in the industry from the older chemistry-based science to that of molecular biology (Galambos and Sturchio, 1998). This transition has been accompanied by advances in drug-discovery technology (rapid throughput screening, combinatorial chemistry, bioinformatics, and proteomics, etc.) that have increased
possible drug targets by a factor of ten (Cockburn, 2004: 12; Doshi, 2004: 128). The new technologies are capable of boosting productivity, but they are extremely costly, as they require the acquisition of new scientific capabilities, infrastructure, and managerial reorganization by the big pharma firms (Cockburn, 2006: 14; Galambos and Sturchio, 1998; Piachaud, 2004: 73–74).

With respect to the drug development process (DDP), including preclinical testing and clinical trials, until the late 1980s, pharmaceutical firms viewed outsourcing to be too risky given a lack of trust in the practices that might be adopted by outsider vendors (Daniel et al., 1997). But pressure to cap internal resources (fixed costs) and the rise of CROs led to limited outsourcing attempts, initially in response to strained internal capacity during peak activity (Hall, 2000). Another push factor was the FDA’s skeptical response to results from trials monitored by the big pharma firms themselves (Hindin, 2004). Initially, some scientists relocating from pharma firms set up small, regional operations, specializing in clinical trial monitoring, project coordination, or data management (Hindin, 2004). CROs originally functioned as an offshoot of the pharmaceutical company, simply offering staff to supplement the pharma company’s internal resources, with little innovation or new process development occurring (Mattingly, 2003).

A few years ago, the estimated cost of bringing a new drug to market (i.e., the cost per approved NDA – or new drug application) was $802 million (DiMasi, Hansen, and Grabowski, 2003). In constant year 2000 dollars, this amounted to an increase of 70 percent since 1991. The real cost had grown by a factor of almost six from 1979 to 1991 (Cockburn, 2006: 11–12). About half of this is out-of-pocket costs; the rest is the estimated 11 percent annual cost of financial capital invested in research and testing (Scherer, 2004: 928; Parexel, 2007). For most of the past two decades, R&D costs have been rising at a faster rate than sales of ethical pharmaceuticals (Future Pharmaceuticals, 2006: 40; Parexel, 2007). Gilbert, Henske, and Singh (2003) estimated a cost of $1.7 billion for shepherding an NCE/NME (new chemical entity or new molecular entity) through successful launch during 1983–2000, and indicated that more recent data suggested higher costs and declining productivity. According to the FDA (2004: 8), only 8 percent of compounds discovered and placed in preclinical trials have reached the market in recent years, down from 14 percent
in the 1990s. In 2004 it was estimated that pharma had just 800 years remaining of the “exclusivity horizon” due to expiring patents, compared to 1,146 years in 1998 (Doshi, 2004: 28).

Many of the factors contributing to the high cost of drug development are well known. The development costs of the drugs that end up as failures must be added to the costs of the “successful” drugs. Less than one-third of the drugs that enter clinical trials make it to Phase III trials (Parexel, 2007: 147). Pharma applies for patent protection on new chemical entities (NCEs/NMEs) shortly before clinical tests in humans. Only 21–23 percent of NCEs/NMEs subjected to human testing get marketing approval, which takes place after the Phase III trials (Cockburn, 2006: 15; Scherer, 2004: 927–28). The length of time to bring a new drug from discovery to market is estimated by the industry at 90 months (Parexel, 2007: 146). Cockburn (2006: 11) estimates 6.5 to 18 years from the preclinical phase to the end of regulatory review. The time-to-market has been growing in part due to the increasing concerns about safety on the part of the regulatory authorities (Martinez and Goldstein, 2007). The US FDA (2004: 8) blames safety problems and the ineffectiveness of pre-trial testing in predicting failures before testing in humans commences.

Cockburn (2006) also suggests that some of the cost and time-to-market problems could very well be the result of the ongoing vertical disintegration within the industry, causing inefficient haggling over the division of rents. Parexel (2007: 173) reports from a survey of the industry that study delays were caused most often by the pharma-CRO contract budget, negotiation, and approval process.

Although the rising cost of developing drugs is much discussed, this does not appear to have hurt the industry’s profitability (Angell, 2004). Parexel (2007: 22) reports that pharma was the second most profitable industry in the US in 2006 after mining and oil. Finkelstein and Temin (2008: 59–63) point to steady, non-volatile profits for the ten largest pharmaceutical firms since 1980, but acknowledge the threats posed by the transitions in the industry with respect to science and the prevailing business model. Kermani and Langer (2007: 1) point to investors grown accustomed to “double digit growth performance.”

Critics of the industry contest the accuracy of the argument that pharma has encountered a cost crisis, charging that pharma counts marketing expenses as costs of drug development. Critics also point out the heavy reliance of the industry on public funds accessed through tax
breaks and public sector science. They charge that marketing expenses are more than double the amount invested in R&D, and that prices include huge mark-ups over cost (Public Citizen, 2003; Angell, 2004). While this debate is beyond the scope of this chapter, we rely on industry and regulatory actions that appear to follow from a fear of declining industry performance.

The FDA has been very concerned about the disappointing rate of translation of scientific breakthroughs into new safe and effective drugs. This has prompted the agency to define a “Critical Path to New Medical Products,” i.e., a detailed proposal for streamlining and speeding the transformation of discoveries into safe, effective remedies by updating the “toolkits” for drug discovery and clinical trials (FDA, 2004). Under the “Critical Path” rubric, the FDA is increasing pressure on pharma and biotechnology firms (“biotechs”) to invest in new technologies and practices, some of which will require substantial effort and expenditures up front.

Therefore, a combination of pressures has pushed the industry to restructure, in part, in order to achieve greater efficiencies and lower costs throughout the discovery, development, and commercialization phases. In addition to increasing the productivity of existing resources, restructuring is designed to provide access to new resources that can allow pharma to compete in areas opened up by changes in science and a spreading of risk and fixed costs among a network of pharma, biotech, service provider, and technological tool firms. The reorganization of the industry has included (1) mergers and acquisitions among pharma firms to acquire new capabilities, tools, and products for development; (2) mergers between pharma and biotech firms that allow pharma to acquire new scientific capabilities and that give access to development infrastructure to small biotech firms; (3) mergers among contract research organizations to acquire a portfolio of capabilities; and (4) vertical fragmentation of the discovery, development, and production process due to outsourcing and offshoring (Hall, 2000; Higgins and Rodriguez, 2006; Hindin, 2004; Kermani and Langer, 2007). The mergers among pharma led to layoffs of redundant scientists, thus contributing to a supply of outside skilled and experienced personnel to feed a growing CRO industry. The industry is in flux with respect to which tasks to outsource, which tasks are to be considered core competences, and how to measure and control vendor performance. The variety of new forms is a manifestation of a
trial-and-error search for a new business model to allow industry participants to compete successfully in a new environment (Piachaud, 2004).

**Outsourcing and offshoring clinical trials (drug development)**

Initial DDV outsourcing tended to be ill-organized and labor-intensive on the part of the sponsor firms, and therefore more costly than expected (Daniel *et al.*, 1997). This led to a period during which pharma had to devote significant time and effort to standardizing and institutionalizing many aspects of the outsourcing process itself, including search, negotiation, writing contracts, pricing and evaluation, and to creating centralized firm-level outsourcing-management teams capable of learning from experience and cutting waste and duplication of effort (Daniel *et al.*, 1997). CROs also invested in creating interface-management services to try to help to smooth the interface between sponsor and provider. However, the ideal of an outsourcing relationship characterized by an arm’s-length contract with a smooth interface, eliminating the need for costly coordination and monitoring expenditures, has not been achieved. The familiar problem is the asymmetric information with respect to the quality of the vendor’s product, which increases risk to the pharma sponsor and sets into motion efforts to reduce the risk (Lamoreaux, Raff, and Temin, 2003).

Azoulay (2003) describes the fraught relationships between principal pharma firms and CROs. In part, outsourcing is seen by pharma as a solution to the peaks and troughs of demand for skilled clinical personnel, as trials go through stop-and-start adjustments, without adding fixed costs in-house. However, these outsourcing arrangements are often unsatisfactory to pharmaceutical firms, which complain about a high labor turnover rate at CROs (Azoulay, 2003; Mehta and Peters, 2007: 32). One problem is that CROs are unwilling to commit a dedicated team to a long-term trial, or from trial to trial with the same product, due to the stop-and-start nature of clinical trials and to varying peaks of activity for each of the CRO’s projects. Therefore, the pharma sponsors are continually “starting over” with new CRO staff with varying qualifications who are unfamiliar with the product and trial history. In addition, continuity of procedures is not assured. Furthermore, when contracts with CROs are focused on cost and speed, the incentives are not aligned to elicit learning, discovery, or creativity.
from CRO skilled personnel in response to problems that emerge, which adds to pharma’s coordinating costs (Azoulay, 2003; Mehta and Peters, 2007: 33).

Therefore, outsourcing of clinical trials has tended to create new risks due to pharma’s incomplete control over CRO processes and personnel (Miller, 2007a). The new risks must be addressed with extra layers of monitoring, i.e., much higher transaction costs than would normally be anticipated from an arm’s-length arrangement. In other words, pharma has attempted to reallocate the risk of peaks and troughs in the demand for skilled personnel (and the risk of adding in-house fixed costs) to the CROs, but in the process, has created a new risk, i.e., the inability to control the processes and personnel assigned to specific tasks. This leads to a fear of a measure of unreliability with the results (Miller, 2007a), creating the potential for costly or even disastrous consequences in pharma’s relationships with the regulatory authorities.

Why, then, engage in outsourcing of clinical trials? There is some evidence that savings due to CRO specialization have been achieved. Getz (2006) shows that CROs can shorten time to market significantly while preserving data quality; in some cases CROs can conduct clinical trials up to 30 percent faster than pharma firms (Thakur, forthcoming: 58). They also bring experience from working in multiple therapeutic areas yielding skilled problem-solving abilities, and they have contacts and their own relationships with regulatory personnel (Getz, 2006).

In an industry context of rapid change and innovation, pharma has apparently accepted, for now, the benefits from outsourcing as well as the cost of new risks. The risk is managed with more devotion of internal resources to monitoring activities than initially expected by the sponsor firm, and this is apparently preferable as an interim solution. However, Mehta and Peters (2007: 33) warn that “[t]he benefits and transaction costs of managing alliances have to be constantly balanced.” That is, the transaction costs associated with outsourcing across fuzzy boundaries can erode the benefits from CRO specialization.

This situation of high-transaction-cost outsourcing is most likely a temporary solution as outsourcing practices evolve along two tracks. What is needed to reduce risk to the pharma buyer are methods to increase the buyer’s information about and/or control over labor processes within the supplier firm, i.e., institutions/technologies permitting
more measurement, monitoring, or actual control (Lamoreaux, Raff, and Temin, 2003). Along one evolving track, principal and provider firms have moved closer to relational contracting, or preferred provider outsourcing in the 1990s (Azoulay, 2003; Mattingly, 2003; Getz, 2006). This represents a conscious move toward a collaborative, not arm’s-length, approach to cost, risk, innovation, and complementary research streams (McCoy and Tremblay, 2003: 22). In this situation, the cost of monitoring a supposed arm’s-length relationship is to be replaced by collaboration with respect to best practices to increase the trustworthiness of future joint projects. The CRO becomes a partner in innovation and problem solving (Levina and Vaast, 2008). Sen and Shiel (2006) emphasize that the process of working out the management of outsourced projects creates learning by both firms that leads to a standardization or regularization of knowledge tasks which further integrates the two parties. It has been shown in other industries as well that a sponsor firm’s initial experience with intended arm’s-length contractors leads to the sponsor’s learning about the broader capabilities of the contractor and growing trust between the two. This often results in a more balanced collaborative relationship, with significant creative contributions from the service provider (Maskell et al., 2007; Levina and Vaast, 2008; Ulset, 2008).

The second track along which pharma outsourcing is evolving is due to the fact that both pharma and CROs are investing in new technologies and processes that are intended not only to reduce costs and speed innovation, but more specifically to standardize data and procedures and to codify and automate some skilled tasks. This will have the likely effect of smoothing the fuzzy pharma–CRO interface that exists currently (Balconi, 2002). In other words, the industry is investing in the creation of interfaces that will facilitate less costly outsourcing in the future.

Standardization and codification in drug development

The traditional conduct of clinical trials has been suffused with inefficient skilled-labor processes. Now that price, cost, productivity, and regulatory pressures have been felt across the industry, applied information technology presents the opportunity to speed up and automate parts of the drug-development process (Balconi, Pozzali, and Viale, 2007). One source of inefficiency has been that clinical trial
data collected, analyzed, and submitted to the regulatory authorities have not been standardized with respect to content, presentation, or software.

Unfortunately, the pharma industry is not standardized at all; there is often inconsistent information that eludes the review processes and quality checks... We believe standards will revolutionize clinical development. (Future Pharmaceuticals, 2006: 41)

Hospitals and clinics have no standard database for even weight, blood pressure, cholesterol. A global standard would help enormously. (Hindin, 2004)

The importance of a standard for the exchange of clinical trial data cannot be overstated... FDA reviewers spend far too much valuable time simply reorganizing large amounts of data submitted in varying formats... [A] standard structure will... speed new discoveries to the public. (FDA, 2004)

In order to speed up drug development, the FDA has been pushing the industry toward standardizing data collection and presentation, and announced in 2004 a preferred standard electronic format for submitting data in support of NDAs (New Drug Applications). The Study Data Tabulation Model (SDTM) format was developed by the Clinical Data Interchange Standards Consortium (CDISC), a global non-profit multidisciplinary organization “committed to the development of industry standards to support the electronic acquisition, exchange, submission, and archiving of clinical trials data” (FDA, 2004).

CDISC has developed standards for each stage of the drug-development process, including data transmission, data analysis, laboratory data, and non-clinical data, and standards cover both content of data files and processes such as data file formats, definitions and terminology, and submission procedures (Souza, Kush, and Evans, 2007). The goal is to create a single accepted format for data collection and exchange in order to create efficiencies in data collection and analysis of clinical trial data and in the review process by the FDA. In addition, long-term goals include the ability to share information more readily among agencies, the ability to analyze data across trials for similar products, and to create a central repository for all clinical trial data (Wood and Guinter, 2008). In 2004, approximately half of North American pharma reported using CDISC standards (Souza, Kush, and Evans, 2007). In November 2007, the FDA and Duke University
Medical Center entered into an agreement in which Duke would lead the effort to modernize clinical trial processes (FDA, 2007).4

CDISC is a part of a larger global endeavor to standardize drug-discovery and development tools and processes which began in the late 1980s as Europeans were standardizing pharmaceutical regulatory procedures across borders. Europe, Japan, and the US initiated a joint effort to adopt pharma standards with the International Conference on Harmonization in 1990 (ICH “History,” n.d.).5

As acknowledged by the FDA, standardization will promote “enhanced communication among sponsors and clinicians” (US Department of Health and Human Services [HHS], 2006). Furthermore, since CDISC is a global standards organization, it has ties with the European Medicines Agency (EMEA) and Japan’s Ministry of Health Labor and Welfare (MHLW) (CDISC, 2008a). It has been meeting with regulatory and academic bodies around the globe, including recently in China, Singapore, India, and Brazil (Kush et al., 2008). Standardization of data, in short, will help significantly to smooth the sponsor interface with outsourced and offshore vendors.

Codification refers to the transformation of tacit knowledge or competences into information, i.e., knowledge that is easily transmitted in written or spoken form (Balconi, Pozzali, and Viale, 2007).6 Dosi et al. (2006) define information as knowledge that is easily accessed, reproduced, and diffused. Tacit knowledge refers to know-how which requires direct personal interaction and experience in order to be acquired by another person. Tacit knowledge that is necessary to exercise judgment, interpret, solve problems, and create novelities is most difficult to codify. Codifiable tacit knowledge includes that which can be separated into bits of measureable logic once measurement technology has reached the necessary level of sophistication. Codified tacit knowledge may be “inscripted in artifacts (machines) that apply the rules followed by knowledgeable individuals” (Balconi, Pozzali, and Viale, 2007: 833). Subsequently, automated processes can substitute for older tacit knowledge. Applied IT has significantly increased codification possibilities in pharma as it has done previously in manufacturing and in technology services (Balconi, 2002; Ernst, 2006; Nolan, Sutherland, and Zhang, 2002).

But codification requires costly investment, so whether it occurs is dependent upon the evolving context of economic costs and benefits. Tacit knowledge enabling judgment and creativity is less likely to be
codified because it is constantly devoted to different situations, limiting the repetitions of use which would be necessary to make codification efficient as sunk costs rise (Lamoreaux, Raff, and Temin, 2003).

Codification enables vertical disintegration for three reasons. First, it significantly improves the buyer’s knowledge of the content and quality of the purchased object or service because the required specifications are more securely built into the automated process (Balconi, 2002; Nolan, Sutherland, and Zhang, 2002). Thus codification reduces transaction costs associated with outsourcing and offshoring (Balconi, 2002: 375), indeed, enabling a relationship closer to the ideal of an arm’s-length contract.

Second, while the above discussion implies a sharp distinction between types of knowledge, i.e., codifiable and non-codifiable, these types are often mixed in any particular process. As Balconi, Pozzali, and Viale (2007) put it,

In general, all types of knowledge are somewhat mixed. For example, the scientists’ specific methodological knowledge about experimental procedures and techniques or their expertise about physical instrumentation and laboratory equipment are usually partly tacit and partly articulated but not externalized (843).

Similarly, in the conduct of clinical trials, skilled labor is applied to a process that includes codifiable tasks in the mix. In a somewhat different approach, Pedersen (2008) points out that not all tasks classified under R&D are high-skill tasks.

But, as Balconi also observes, this mixture comes under pressure in the face of cost and competitive challenges (2007: 841). In the context of pressures in the pharmaceutical industry, pharma, CROs, regulatory bodies, and standards organizations are developing technologies to separate out some of the routinizable components in the prevailing skilled-labor process in order to standardize and speed them up, thus intensifying skilled labor by expanding the outcomes associated with any “unit” of skilled labor. Here, codification is understood as a restructuring of the production process involving a finer division of labor, the replacement of some tasks previously performed by humans with artifacts embodying new technology, and the emergence of new tasks and new nodes for task completion, e.g., the “operator” role interacting with the new artifact (e.g., machine or computer), sending and responding to signals.
Third, codification and automation raise sunk costs and the risk of under-utilization of new capital equipment. This creates pressure on the principal firm to outsource to specialized providers, turn fixed costs into variable costs, and distribute the risk of investment (Balconi, 2002: 373).

The target for applied IT in pharma is the structure and sequence of skilled-labor tasks in the development process. One example is electronic data capture (EDC), a tool to reduce errors in data collection, speed the delivery of data to the sponsor, and thereby speed up the data analysis process. These systems replace a paper-based data reporting system which calls for the CRO trials monitor, when visiting study sites at hospitals, physicians’ offices, and universities, to gather, verify, and correct paper CRFs (clinical report forms), and duplicate and deliver them to the sponsor firm where the data are entered into an electronic database and subsequently analyzed by the statistical team. With electronic CRFs (eCRFs), the patient data are entered electronically at the study site, and immediately evaluated for errors with built-in logic checks, leading to an immediate prompt for clinical site staff to make corrections where necessary. This eliminates the delay in delivery of data to the sponsor and the need to enter data at the sponsor site before analysis can begin. It also economizes on skilled-labor tasks and reduces the number of monitoring visits necessary to achieve a reliable result. It has been estimated that use of EDC can reduce clinical development costs by up to 20 percent (Mitchel et al., 2006). By 2006, 29 percent of clinical trials were using electronic software, and usage on new studies had increased to 32 percent (Cline, 2007).

Another efficiency-improving tool is ePRO (electronic patient reported outcomes), which allows patients to electronically enter their own outcome data, economizing on the tasks performed by clinical staff and trial monitors. Looking forward, it is expected that the market for EDC and for ePRO will grow more than 23 percent annually (Getz, 2006). Thus, electronic tools are being created that will codify and replace some of the data gathering and monitoring tasks currently performed by clinical staff and monitors. The result will be an intensification of skilled labor, as more uncodifiable tasks will now be able to be performed by the same skilled-labor workforce.

In addition, the EDC tool makes possible further electronic streamlining of the clinical trial process through the possibility of the adoption of “adaptive” trial design. The more rapid analysis of data permitted
by EDC introduces the possibility to change the trial design mid-study in response to adverse events or the need to correct erroneous assumptions, without starting over with new trials. This conserves on skilled labor and could further speed the development process, possibly by as much as 30 percent (Tufts Center for the Study of Drug Development [TCSDD], 2006; Cline, 2007).

However, the change in industry practices takes time. For example, the SDTM model was recommended by the FDA in 2004, but the agency only recently began preparing a regulation to require it (CDISC, 2008b), which will most likely be followed by a two-year transition period (HHS, 2006). According to Getz (2006), most investigative sites have staff trained on eCRF and ePRO systems, but they complain that most sponsors have not yet standardized data collection, leading each site on average to have three disparate systems requiring incompatible computer terminals cluttering the site space and disparate reporting procedures for clinical staff and monitors.

Another tool developed to streamline clinical trials is an eProtocol system. The protocol is the design blueprint for the conduct of clinical trials. Because these are complex descriptive documents, and because of the lack of standardization in pharmaceuticals and the ambiguity in language, protocols are subject to varying interpretation and to amendment during operationalization. An eProtocol tool creates a modular approach to creating protocols that relies on a library or warehouse of electronically accessible modules of accepted processes and known chemical and biological properties and reactions. While these systems are familiar in the US, exporting the systems can help to increase off-shored participation in trial design if the new libraries contain data and procedures acceptable to sponsor pharma firms.

Summing up the likely effects of widespread applied IT tools,

The most profound impact of the shift to an integrated [electronic] clinical development environment will be that of standards on outsourcing activities...The adoption of standards will greatly facilitate the exchange of information across technology platforms and will foster new partnering and outsourcing relationships. Many of the activities that are so important today will ultimately be replaced by technology and entirely new ways of working will emerge. (Future Pharmaceuticals, 2006: 42) [emphasis supplied]

In other words, the pharma industry's evolving applied IT tools are eliminating some of the tasks currently performed by skilled personnel.
Automation embodied in new capital equipment and software can conserve skilled labor and increase its productivity by reducing the amount of time committed to codifiable tasks. Suggesting a parallel to the experience with skilled jobs in the IT field, an executive with a western CRO says “[N]ot all the jobs have gone away in information technology . . . They have evolved to different things. And the same may happen for [pharma]” (McCoy and Tremblay, 2003: 23) (emphasis supplied).

**Offshoring**

Given the pressures and opportunities for outsourcing, the location issue arises. Offshoring clinical trials offers an additional opportunity to reduce costs in countries with low-wage skilled labor and low-cost high-quality infrastructure, including IT infrastructure. For example, India’s health infrastructure and pharma/biotech industry offer 50–60 percent cost savings in the conduct of clinical trials (Doshi, 2004). But the advantages go beyond labor costs. Patient recruitment in the US and other industrialized countries is slow and costly, in part due to more highly medicated and healthy populations than in the rest of the world. This creates the need for trials to be geographically fragmented across the US, often with only a few patients at each site. Large “drug naive” populations in some developing countries offer “an abundance of disease” and therefore much faster identification and recruitment of patients, as well as geographic concentration of trials (Doshi, 2004: 133; Pharmaceutical Executive, 2006). Unitary public health systems also speed up the identification of patients and the conduct of trials. Countries trying to attract this business are revamping intellectual property laws, adopting good clinical practice (GCP) norms, and otherwise upgrading health infrastructure to FDA standards (Doshi, 2004; Bhatt, 2005). The ongoing standardization and codification in the industry will only make the offshoring relationship less costly to manage.

**Transaction costs and investments**

Current transaction costs associated with outsourcing are not determinative of inter-firm alliances in pharma. The problem of transaction costs is a dynamic one (Balconi, 2002), which evolves along with
technology and which is transformed by firms’ investments to modify the constraints facing them (Kapler, 2007; Lazonick, 1991; Milberg, 2004; Nolan, Sutherland, and Zhang, 2002). With respect to clinical trials, it is clear that high transaction costs resulting from inter-firm alliances are gradually being reduced by investments in learning, standardization, and codification, and an IT infrastructure that will foster a global convergence of skilled labor practices in clinical trials. The sponsor–provider interface will become smoother, and outsourcing and offshoring will likely become more common.

Outsourcing and offshoring drug-discovery research

Drug-discovery outsourcing began only in the mid-1990s in the US (Boswell, 2005); however, large European firms operating in small markets with few R&D resources started outsourcing in the 1980s (Gassman, Reempeyer, and von Zedtwitz, 2004: 97). Now the crucial lead optimization phase is outsourced by most major pharmaceutical companies (Clark and Newton, 2004; Finkelstein and Temin, 2008). Early discovery research is often licensed in by big pharma from small biotechs and universities; in some pharma firms, more than 50 percent of drugs in development come from outside the firm (Mehta and Peters, 2007: 30; Rogers, Maranas, and Ding, 2004).

The changes were catalyzed by the growing cost-, competition-, and science-based pressures on the industry discussed above. The science involved in drug discovery changed fundamentally from the mature chemistry-based model with declining productivity to a model founded on the life sciences. The life sciences expanded the possibilities for drug discovery, including a significant increase in the number of potential drug targets, but they also require many new scientific and technological capabilities, making it impossible for any one firm to acquire all of them (Galambos and Sturchio, 1998; Gopalan, 2007; Gradwell, 2003; Kermani and Langer, 2007). In addition, the capital investment requirements to take advantage of the new technological possibilities are steep (Piachaud, 2004: 73–74; Rogers, Maranas, and Ding, 2004). Small biotechs, often formed by academics taking advantage of new patenting possibilities, were created to develop new product leads made possible by the changing science and new technological tools (Cockburn, 2004; Cockburn, 2006: 14–16). Thus big pharma, biotech firms, and academic researchers created a new vertical structure in DDS
research, involving both contractual and collaborative arrangements. Piachaud (2004: 75) argues that this was an appropriate response to changing science, since the sources of innovation are to be found in scientific communities or networks made up of firms, universities, and research labs, where expertise is dispersed, and not within individual firms.

The choice of technology and network location for this DDS innovative activity is strategic, based upon the principal’s specific expertise and the availability of external complementary capabilities. For example, Abbott teamed with Cambridge Antibody Technology to combine the latter’s new technology with Abbott’s targets and animal and human models to develop a successful rheumatoid arthritis drug. Separately, Abbott used its developing internal DDS technologies to speedily develop an important HIV drug. “We had developed a high-through-put, highly robotized, crystallography lab that could determine the structure of proteins very quickly” (King, 2004). Abbott’s combination of partnering and internally developed innovations led to a tripling of the annual number of compounds available for clinical development compared to the rate it experienced in the 1990s (King, 2004).

The outsourcing of drug discovery, at least within the western countries, is not about contracting out rote tasks; drug-discovery partnerships are meant to be collaborative in order to facilitate the transfer of tacit knowledge. As such, they are recognized as coordination-cost heavy, involving a fuzzy interface between the collaborating firms. Nevertheless, outsourcing is seen as a necessity within the environment of rapid technological progress and heightened uncertainty. It would be considered risky to tie up capital with large new infrastructure and associated personnel because these would limit the firm’s ability to respond flexibly to scientific and industry changes in the future (King, 2004). “If it doesn’t work out after two or three years, they switch to some other options. They don’t have the infrastructure costs and large investment scenarios for drugs that did not work for them” (King, 2004: 7). Because of the innumerable possibilities and continuing changes in science, DDS partnering probably is not temporary (Galambos and Sturchio, 1998; Piachaud, 2004).

However, the managing costs associated with these collaborations should be seen not as transaction costs, but as investments that are required to obtain access to new technological assets and capabilities
which offer a promising route to new drug discovery and to processes which shorten time to development (Lazonick, 1991; Cantwell, 1991). In other words, DDS outsourcing fits the investment-based type of outsourcing.

At the same time, increasing competition among vendors (Clark and Newton, 2004: 8) has caused some restructuring in that sector as well. According to Clark (2007), three different models have been adopted in the CRO sector. Due to declining margins in this sector, some providers are making the transition out of services and into proprietary drug discovery. Others are adopting a hybrid model, combining services provision with proprietary drug discovery. Clark calls the third model a “hybrid onshore-offshore model” (2007: 10). Western-based vendors have built or acquired or made collaborative arrangements with offshore facilities in order to access skilled scientific labor at much lower costs and in some cases in response to their own clients’ offshore arrangements. Western CROs face some of the same pressures afflicting pharma: speed and cost (McCoy and Tremblay, 2003: 15–16).

The first publicly announced DDS CRO offshore operation took place in 2003, with the displacement of chemistry R&D from the US to India (McCoy and Tremblay, 2003: 15). In the onshore-offshore model, the western providers offer their clients either direct access to foreign scientists and facilities, or offer a western-based management of the interface between western and eastern labor. This yields cost advantages from geographic fragmentation along with the CRO’s management of fuzzy boundaries by experienced personnel. For example, SAFC Pharma offers clients the opportunity to work directly with scientists in India or through its UK team that offers to manage the relationship between the client and the offshore scientists (Clark, 2007).

According to Clark (2007), one of the drivers of the offshoring activity is the blossoming of vendor firms in Asia and Russia, and the efforts by these firms and their governments to move swiftly to address infrastructure quality and protection of intellectual property. These are attractive opportunities due to the availability of skilled labor at low cost. In 2001 it was estimated that Indian R&D cost 75 percent less than R&D by multinational pharma firms (Doshi, 2004: 132). In 2003, an executive of a German CRO estimated that the FTE (full-time equivalent) pay of a PhD chemist in India was 27 percent of that in the US; an FTE in China would earn 23 percent
of the US pay. Nevertheless, in 2003 it was estimated that India and China together had only 2–5 percent of the market, but their shares are expected to grow rapidly. Offshoring is also pursued by small biotech firms in areas where they lack capability (McCoy and Tremblay, 2003: 16, 23).

The nature of offshored tasks is more difficult to determine: Are they pedestrian and thus more amenable to arm’s-length contracting? Many pharma firms have expressed the opinion that offshored work is more routine, unsophisticated, less complex, more appropriate for scientists with less experience, and complementary to the advanced work of in-house scientists. An executive of one western offshore-outsourcing firm draws the distinction between information and tacit knowledge:

If you can write it down and give it to somebody to make it, that’s probably going to be made offshore . . . But if you are looking for input on planning or computational modeling . . . that’s probably still going to be done in the US and Europe. (McCoy and Tremblay, 2003: 18)

Another executive says

[F]ast-moving projects or collaborative drug discovery agreements involving biotech firms must be conducted locally [in the US]. (McCoy and Tremblay, 2003: 23)

However, some offshore CROs are working in sophisticated areas such as lead optimization (Bhatt, 2005; Clark, 2007; Finkelstein and Temin, 2008). Furthermore, non-western CROs aspire to provide more complex services, and are taking steps to acquire more capabilities. One example is an Eastern European CRO that has established a lab in California to access the capabilities to offer more customized work (McCoy and Tremblay, 2003: 23). The possibility of moving advanced work to offshore CROs has grown as the CROs and their governments push changes in their pharma industries, and as trust and collaborative relationships between western pharma and offshore CROs have grown (Bhatt, 2005). An example is GlaxoSmithKline’s contract with an Indian firm for lead optimization. Another offshore CRO finds that some of its western clients enthusiastically do away with their arm’s-length relationship with the contractor’s scientists . . . The customers do trust us, and there is a very high value addition in their teaching our people their way of doing things. (McCoy and Tremblay, 2003: 22)
In other words, part of managing the sponsor-vendor boundaries includes transfer of western pharma procedures and practices to CROs. CROs are also offering “near-shore” offshored operations by acquiring facilities in or nearer the industrialized countries, such as Pfizer’s manufacturing plant in the UK and a marketing-and-distribution firm in Denmark (Bhatt, 2005).

As in the case of offshored DDV, big pharma has been learning about CROs’ talent and capabilities, and entrusting them with more advanced projects (Bhatt, 2005; Maskell et al., 2007; Ulset, 2008). Where this leads to more equal partnerships, even offshored DDS resembles investment-based outsourcing more than arm’s-length intermediate-product-based arrangements.

Conclusion

According to the New Institutional Economics, associated especially with Oliver Williamson (e.g., 1981), vertical fragmentation of industry (including outsourcing and offshoring) and the emergence of intermediate markets is likely a response to a reduction in transaction costs between the stages of production. Yet, outsourcing and offshoring in the US pharma industry is growing rapidly while coordination costs are acknowledged to be high.

This chapter has described outsourcing and offshoring trends in the industry and the pressures and opportunities driving these trends, including the emergence of biomedical science requiring new capabilities and capital investments, and the increasing cost and falling productivity of new drug production. The huge capital investments that would be required to keep all R&D in-house given the new scientific possibilities would expose the firm to unacceptable levels of risk, especially given the still rapidly evolving science and technological toolkit. Outsourcing and offshoring have become the vehicles for investing in new scientific capabilities, and reallocating fixed costs and risk among a network of biotech and technology-tool firms, academia, and CROs. In addition, fragmentation of research elicits cost savings due to CRO specialization and wage and overhead arbitrage. Nevertheless, equity-based fragmentation of the industry, especially with respect to drug-discovery research, is associated with increasing integration as pharma clients and vendors move toward more equal partnership roles.
outsourcing, fragmentation, and integration

involving frequent and complex interaction. What might be thought of as the transaction costs involved actually represents investments in the quality, reliability, and productivity of the collaborative effort.

With respect to the outsourcing and offshoring of clinical trials, pharma clients and vendors are investing in technologies, tools, and management initiatives that will have the effect of reducing coordination costs between the parties, creating a smoother interface and allowing these relationships to approach a more arm’s-length character. Part of this investment effort involves the use of IT to standardize and codify many of the skilled-labor tasks involved in clinical trials, just as has happened in manufacturing and the IT industry itself in the past. This will reduce the fuzzy boundaries between clients and vendors because it will increase pharma’s control over CRO procedures and personnel and reduce the problem of measuring the quality of the CRO’s product. That is, the asymmetric-knowledge problem will be reduced. It will also increase the productivity (and thus lower the cost) of skilled labor. Attention to static transaction costs tends to obscure the dynamic process of investing and learning as firms seek more control over their environments (including transaction costs). In this view, the conditions yielding new intermediate markets are, in part, endogenous. Investing and learning transform static transaction costs.

Notes

1 Data apply to the members of the Pharmaceutical Research and Manufacturers of America (PhRMA).
2 Blockbuster drugs are those that achieve sales of more than $1 billion (Gilbert, Henske, and Singh, 2003).
3 Prior to the interwar years, outsourcing to universities or independent scientists was common (Piachaud, 2004: 114).
4 Among the goals of the collaboration were (1) creating standards for monitoring, auditing, case report form design, and data quality; (2) creating standards for clinical trial sites, establishing accreditation programs for investigators and sites, and developing tools to measure performance; (3) identifying best practices and providing training; (4) utilizing electronic data management systems (Clinical Trials Transformation Initiative [CTTI], 2007).
5 Harmonizing efforts are directed toward development of tools, procedures, and practices to improve safety and quality, electronic data transfer,
and standardization of medical terminology and coding dictionaries (ICH “Guidelines,” n.d.).

6 Much of this discussion of codification relies upon Balconi, 2002 and Balconi, Pozzali, and Viale, 2007.

References


Towards a better understanding of multinational enterprises’ R&D location choices

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Introduction

Economic globalization and the emergence of attractive new regions for the location of economic activities have led many multinational enterprises (MNEs) to review their location strategies, in order to optimize their global value chain. In particular, recent years have seen a growing internationalization of Research and Development (R&D). Historically, R&D has typically been based close to the center of the firm’s operations, because it is considered a highly strategic activity. Recently, there is growing evidence that MNEs are moving to a more dispersed approach to the firm’s innovative capacity, and are increasingly locating R&D units abroad (Doh et al., 2005). According to the United Nations Conference on Trade and Development (UNCTAD, 2005), MNEs, which account for half of all worldwide expenditure on R&D, now conduct 28 percent of their R&D abroad. This movement towards internationalization is emphasized by the fact that emerging countries are becoming increasingly attractive destinations for the location of R&D activities. Researchers and specialists expect this trend to become more marked in the coming years (Cantwell and Janne, 1999; Dunning and Narula, 1995), with these activities increasingly based in emerging economies (UNCTAD, 2005). This recent development in the R&D function raises the question of how MNEs manage their high value-added innovative activities, particularly their location choices.

Researchers have identified firm-level and industry-level characteristics that guide the Foreign Direct Investment (FDI) decisions of the world’s largest firms (Nachum and Zaheer, 2005; Terpstra and Yu, 1988). However, as Dunning (1998) notes, this stream of research is now being complemented by an interest in the spatial aspects of
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FDI, taking into account the characteristics of the host regions. Porter (1990) suggests that the competitive advantage of a company operating in more than one country stems not only from its activities, but also from its location. Further, various surveys have demonstrated that MNEs seek locations that offer the best economic and institutional facilities for the efficient utilization of their core competencies (Dunning, 1998). Along with the economic and institutional factors, MNEs are also attracted by the presence of other foreign investors in a particular region, and this leads to agglomeration within particular clusters, defined as “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in linked industries, and associated institutions...in particular fields that compete but also co-operate” (Porter, 1990: 197). This location within clusters is particularly interesting in the case of R&D activities, because it has been argued that co-location facilitates knowledge spillovers between firms (Sorenson et al., 2006).

In this chapter, we study how the host-country and the region-level characteristics affect MNEs’ R&D location decisions. The regional level in our analysis refers to regions within countries and not to regional blocks (Europe, Asia, etc.). Our aim is to identify the greatest number of factors that MNEs take into account when they select regions in which to locate their innovative activities. To do so, we analyze different streams of both the theoretical and the empirical literature. We also consult ten experts (eight French and two British) on this matter. The study results in an extensive list of factors that determine R&D location choices, on the basis of three sources of evidence: surveys of R&D practitioners that were reported in the literature; academic research in several disciplines (international business, management, economics, geography, sociology), and the opinions of experts. We evaluate the relative importance of each of the factors distinguished, and then highlight seven factors to which particular importance can be attributed. The contributions of this study are twofold. On one hand, the study contributes to the advancement of our understanding of the interplay between location characteristics and MNEs’ location decisions. On the other hand, it provides insights for policy makers who aim to enhance the attractiveness of their territories (cities, regions, countries) for the location of foreign R&D activities.

The chapter is organized as follows: the first section highlights recent trends and motives in the internationalization of corporate R&D. The
second focuses on the factors influencing the location activity of MNEs. The third presents the data and the methodology of the research. The fourth presents the analysis and the findings of the study, that is, the location-specific factors that influence R&D location choice. The concluding section outlines the limits and contributions of the study, and its managerial and policy implications, and suggests future research directions.

**International location of corporate R&D: trends and motives**

For many years, R&D was a function kept at headquarters and therefore internationalized very little, mainly because of its strategic character. However, in recent years an increase in the internationalization of R&D has been observed. This phenomenon is in large part the consequence of the internationalization of production, and it is now an important dimension in economic globalization. Some aspects of this process have been documented and discussed, and its existence is now accepted, but its underlying mechanisms remain poorly understood, particularly because of their complexity (OECD, 2005).

According to a recent study by OECD (2005), the internationalization of R&D is still mainly an intra-Triad phenomenon (Japan – Europe – USA), with the EU and especially the US as the major locations of foreign R&D. US firms, and even more so EU firms, have the largest shares of foreign R&D. In the last decade, the MNEs (especially European companies) have increased their foreign R&D activities, and more recently the trend towards internationalization has increasingly become more truly global, with the emerging markets currently attracting an increasing share of the R&D outlays of MNEs. The high-tech sectors and, in particular, the pharmaceutical industry, come top in terms of having the most internationalized R&D (OECD, 2005).

The internationalization of R&D is a process that can be observed not only in large high-tech firms, but also in Small and Medium-sized Enterprises (SMEs). Moreover, research institutions (universities, public or private laboratories), researchers and policy makers also play a role in this process. Nevertheless, as far as industrial R&D is concerned, studies show that multinational firms are the key actors in the field. They account for almost half of global spending on R&D ($677 billion in 2002), and for at least two-thirds of industrial R&D expenses (estimated at $450 billion) (UNCTAD, 2005).
The internalization theory, which can be considered the dominant explanation in International Business, has long taken the view that “subsidiaries exist to extend abroad the firm-specific advantage of the parent firm,” and that they are “arranged according to the R&D of their parents” (Rugman, 1981: 216). Indeed, it has been argued that R&D is conducted abroad in order to adapt products and services to local requirements (Prahalad and Doz, 1987), with knowledge being transferred from corporate headquarters to the subsidiaries. The literature provides empirical support for the notion that manufacturing operations are very often accompanied by R&D operations, in order to support the development of products adapted to local conditions (Doh et al., 2005). Thus, Defever (2006) finds a strong link between the locations chosen for production and those chosen for R&D. Analyzing the location choices of 11,000 companies, Defever argues that production and R&D are mutually attractive, and that the strong vertical links between these activities are capable of generating cumulative effects, such as those described by the New Economic Geography (Krugman and Venables, 1995). R&D is alone among corporate functions in having an attraction effect on production.

More recently, however, there is evidence that an increasing number of R&D outlays have been located in foreign countries for other reasons. Kuemmerle (1997) studies the changes in the R&D function, and concludes that a centralized approach to R&D is no longer adequate, for two reasons. First, there is an increasing amount of relevant knowledge in the world, and companies therefore need to be present in an increasing number of places, in order to gain access to that knowledge, and to absorb the research results generated by foreign universities and competitors. Second, companies selling their products around the world need to progress products from development to the market with ever-increasing speed. For these reasons, the R&D function is more and more independent of production, and requires the creation of global knowledge networks. Companies are currently basing their research centers abroad not only to attain proximity to local markets, but also to ensure that they are near (or in) centers of scientific excellence, and thus able to take advantage of the knowledge generated in these centers (OECD, 2004; Alcacer and Chung, 2007).

According to Patel and Vega (1999), a distinction can be made between two types of strategy, or two types of objective in location choice: “home-base exploiting” and “home-base augmenting.” In the
first case, knowledge is transferred from the home base to the subsidiary based abroad, and the objective is to use this knowledge to adapt products to suit the local market. In the case of “home-base augmenting,” the objective of the subsidiary is to provide new knowledge to the company, thus augmenting its knowledge base. The company will therefore seek to locate its R&D activities in a geographical area rich in knowledge, and favorable to its transfer and circulation. The characteristics and organization of that area therefore become key components in the choice of location.

Duning and Narula (1995) argue that there should be a trade-off between the transfer to host countries of the knowledge produced in the home country, and the exploitation of the knowledge base of the host country in order to augment the knowledge capital of the MNE.

Firms try to improve their existing technological assets, or to create new ones, by locating their R&D abroad. Labs located abroad provide access to knowledge present in these markets. The recent literature thus suggests that there has been a change in the role of foreign affiliates, which are active in R&D, not only for incremental innovation, based on existing activities, but also for more ambitious innovation, which creates new knowledge. Moreover, affiliates are becoming very active in the development of ties with other knowledge sources.

**Location strategies of MNEs**

The international location strategies employed by companies, especially multinationals, have received increasing attention since the 1960s. Researchers have sought to understand why multinational corporations are able to effectively extend their operations beyond their home country (Johanson and Wiedersheim-Paul, 1975; Vernon, 1966, 1975), and why they choose one country rather than another as a base for their activities (Buckley and Casson, 1976; Dunning, 1977).

Flores and Aguilera (2007) argue that previous research has identified as determinants of location choice the firm-level characteristics (such as size, performance, and industry), the firm relational linkages, and home-country characteristics and host-country characteristics. For many years, the firm-specific determinants of international economic activity have driven the interest of International Business scholars, but until the 1990s the geographical dimension of location was generally
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absent from explanations. However, there has been a shift in the factors influencing the MNEs location, away from those employed in the 1970s: MNEs are now increasingly guided by the characteristics of the locations in their location strategies (Dunning, 1998).

Indeed, the geographical dimension has a major impact on choices as to where to base corporate activities. Location strategies do not depend solely on factors internal to the company: they are also shaped by aspects related to the attractiveness of territories (that is, towns, cities, regions, and countries) as locations for the activities concerned. With the inclusion of such geographical and spatial aspects of the organization of activities, a new stream in location literature came into being, known as the New Economic Geography (Fujita et al., 1999; Krugman, 1991a; Krugman and Venables, 1995). Initiated by Krugman (1991a), this stream of literature examines how industrial activities are organized in spatial terms. It argues that industrial activities tend to agglomerate in certain regions, and it attempts to provide an explanation of the fact that some regions seem to attract more economic activity than others. Indeed, Krugman (1991a, 1991b) explains the agglomeration of activities by pointing to the effects “upstream” (forward linkages) and “downstream” (backward linkages). The first type of effect relates to the search for high demand, and it is encouraged by perfect labor mobility, one of the postulates of Krugman’s initial model. Downstream effects result from consumers’ search for diversity, and for this reason companies concentrate in locations able to offer the widest variety of goods. In their international location model, Krugman and Venables (1995) argue that the backward and forward linkages between companies (notably because of their interdependence at the intermediate goods level) lead to the choice of nearby locations (in the same region), and thus to industrial agglomeration.

Work taking the geographical or spatial dimension of activity organization into account converges with Porter’s thinking (1990) on the competitive advantage of multinational (or global) companies. According to Porter, the competitive advantage for a company operating in more than one country stems largely from two sources: its location (or the nations in which it operates) and its activities. The advantages linked to location arise either from the company’s country of origin, or from the other regions (countries) in which the company bases its activities. A multinational company uses the advantages of its home country to penetrate foreign markets. It may also seek advantages
based on the location of specific activities in other nations, in order to reinforce the advantages offered by its country of origin, or possibly to offset its inadequacies. Porter argues that there is therefore a “compelling need to reorient our thinking about corporate strategy in a way that sees location . . . as integral to a firm’s success” (2000: 254).

Among the host-country factors that influence location decisions, Flores and Aguilera (2007) distinguish between economic factors, on the one hand, and institutional-cultural factors on the other. Economic factors are those linked to the profitability that is expected from a host-country market. These factors include the size of the market of a particular country (Contractor, 1991), as expressed by such indicators as GDP, GNP, and growth rates; the number of potential customers; the infrastructure available in the host country (Cheng and Kwan, 2000; Loree and Guisinger, 1995); but also the expected costs of the MNE operations, notably wage levels in the host country (Meyer, 2004). The institutional and cultural factors emphasize the importance of non-economic factors in MNE location choice. They include the political, legal, and cultural dimensions. Flores and Aguilera (2007) argue that MNEs tend to locate their activities in those host countries that are politically, legally, and culturally close to their home country.

One recent trend in the areas of industrial and international economics is the fragmentation of the production process. Krugman (1995) argues that the international breaking down of the corporate value chain is one of the most important aspects of the international economy. Such fragmentation is particularly visible in multinational companies that choose locations in different regions for the activities making up their value chains. The organization and distribution of production and the other activities of the company are conducted at the global level, and this is part of what is called the global value chain (UNCTAD, 2002). This process involves activities such as production, distribution, marketing, and R&D. The logic underpinning the location choices for each of these various activities is not identical, and, for this reason, it is difficult to draw general conclusions as to the determinants of those decisions. In particular, because of their strategic importance and the characteristics of the assets they require, the location strategies of the R&D function present some specificity. The host-country requirements for setting up R&D units should therefore be more demanding and at a higher level than those for the production or marketing function, for example. In addition to the economic
factors that have typically been found to be the primary attractor for R&D units, it has been argued that non-economic factors are also increasing in importance (Florida, 1997).

In this chapter, we focus on R&D activities. We aim to understand which host-country and regional characteristics determine location choices. As R&D is a highly knowledge-intensive and strategic activity, the offshoring of it is a complex strategic decision that requires a careful and detailed examination of potential locations.

Research methodology

The methodology of this research combines an extensive analysis of the literature and qualitative face-to-face interviews with experts. We first identified several relevant streams of the literature, and we asked experts in the R&D management field to confirm the appropriateness of the choice of streams, and to provide suggestions for additional streams that could help us identify the determinants of the R&D location choices. The literature that we analyzed includes the following streams and topics: international business literature, R&D management, clusters, regional innovation systems, geography of economic activities, regional economic studies, economics of innovation, industrial districts, proximity, the international economics literature (in particular the location literature) and the strategic management literature. Both theoretical and empirical papers and books were analyzed.

We also identified previous surveys on location strategies, conducted on R&D practitioners, in which they were invited to evaluate the importance of different location determinants. In fact, some organizations and researchers have conducted this type of study, and have presented their results in academic articles or professional reports. Although we found evidence of a relatively small number of surveys conducted on R&D practitioners regarding location determinants, we decided to include them in our analysis since they reflect the opinion of the decision-makers in R&D location. While they concentrate mostly on specific countries, sectors, and/or time periods, these surveys collect direct evidence on factors determining R&D location. The firms surveyed are generally multinational enterprises, and essentially American or European (see Table 6.1).

The study of the academic work involved a detailed analysis of some 150 academic papers, book chapters, professional reports, and
Table 6.1 *Surveys on R&D practices conducted on R&D practitioners*

<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample</th>
<th>Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearce and Singh (1992)</td>
<td>World’s largest 167 multinationals across 30 countries</td>
<td>Various</td>
</tr>
<tr>
<td>Hakanson (1992)</td>
<td>150 subsidiaries of 20 Swedish MNEs</td>
<td>Various</td>
</tr>
<tr>
<td>Florida (1997)</td>
<td>207 R&amp;D facilities in the United States</td>
<td>Electronics, automotive, chemicals and materials, biotechnology</td>
</tr>
<tr>
<td>Kuemmerle (1999b)</td>
<td>238 foreign R&amp;D facilities from 32 American, Japanese and European companies</td>
<td>Pharmaceuticals and electronics</td>
</tr>
<tr>
<td>DIHK (2005)</td>
<td>1,554 German companies, 33% of which are large firms</td>
<td>Various</td>
</tr>
<tr>
<td>UNCTAD (2005)</td>
<td>68 among the world’s largest R&amp;D spenders</td>
<td>Various (IT, automotive, pharmaceuticals, chemicals, electronics)</td>
</tr>
<tr>
<td>Thursby and Thursby (2006)</td>
<td>229 respondents from US and European MNEs</td>
<td>Chemicals, healthcare, R&amp;D service, food, textile, metal, transportation, paper, genetic engineering, pharmaceuticals</td>
</tr>
<tr>
<td>Ernst &amp; Young (2006)</td>
<td>1,019 MNEs (50% European, 38% North American, 12% Asian)</td>
<td>Industry, automobile, energy (40%), B-to-B and B-to-C services (17%), telecoms and high-tech (9%), consumer goods (25%), real estate and construction (9%)</td>
</tr>
</tbody>
</table>
other types of document, and enabled us to identify more than twenty different factors that shape MNEs’ R&D location choices. The indirect evidence of motives for R&D location from analyzing the pattern of patents and R&D expenditures across countries, sectors, or time periods was also included in the academic source of evidence.

The third stage of the research consisted of interviewing experts in the field of R&D management. Eight French and two British experts were interviewed. During the interviews, the list of factors that emerged from the earlier stages was confirmed and completed by the experts. In addition, the experts expressed their opinions on the factors that they considered most important for R&D location choice. The interviews lasted one hour on average, and the data was analyzed using the classic qualitative methodology techniques (Miles and Huberman, 1984). The experts interviewed were from the leading public and private French institutions involved in R&D-related work, such as the Centre National de la Recherche Scientifique – CNRS (National Centre for Scientific Research; the largest public research organization in France), Agence Française des Investissements Internationaux – AFII (French Agency for International Investments), Observatoire des Sciences et des Techniques (Observatory for Science and Techniques), Association Nationale de la Recherche Technique – ANRT (National Association for Technical Research), École des Mines de Paris, Alstom and Schneider Electric. The British experts were from Cambridge University and the University of Birmingham.

The factors that were identified in surveys on practitioners, in the literature, or by the experts were then analyzed to evaluate the importance of each of them, and to highlight the most determinant ones. The factors were thus confronted with the three sources of evidence. We estimated the importance of each factor based on the results of surveys, insights from the existing literature, and the evaluation by experts. Each factor is graded from + to +++ for each source of evidence (academic literature, previous surveys, interviews). The number of mentions and, when available, the level of significance were used as indicators of the importance of determinants. Thus, if a factor was mentioned in at least one-third of the academic papers or surveys or interviews, and if it was not viewed as very important by these sources of evidence it is graded +. The medium-level importance (factors mentioned in from one-third to two-thirds of papers/surveys/interviews) is graded ++. If a factor was mentioned in more than two-thirds of
papers/surveys/interviews, we assumed that its importance was high, and we attributed it a maximal +++ grade. We proceeded in the same manner for the three types of source. Following the analysis of the existing literature and the interviews of experts, the findings were presented to a group of experts and practitioners from some of the largest French companies (such as Veolia, STMicroelectronics, or Areva) and leading public institutions. The great majority of them supported the results of the research.

Nevertheless, it is necessary to note that the validity of this analysis is limited, for two reasons. First, although we analyzed a great number of works, our analysis did not include all existing surveys and academic studies. In addition, we interviewed a limited number of experts. Second, given that it is difficult to provide an objective judgment of the importance of the factors if the judgment is not based on figures (quantified levels of significance), the subjective character of the grading is obvious. Nevertheless, we think that this analysis does provide a contribution to a better understanding of MNEs’ R&D location strategies. We believe that this analysis can serve as a starting point for studies of greater scope and complexity.

Findings

Location-specific factors that influence R&D location choice

What are the host-country and host-region factors that influence R&D location choice? Through the analysis of the existing surveys, literature, and interviews with experts, we identified thirty-two location-specific factors that drive MNEs’ R&D location. These factors can be grouped into eight categories: human factors; science and technology factors; factors related to the regions, agglomeration effects, proximity effects, and networks; factors related to the market or to demand; factors related to infrastructures; factors related to the overall environment of the R&D; factors related to financial aspects, including the role of the state in the financing of research; and cost factors for the firm.

Human factors
The quality of the workforce (engineers, experienced researchers, young researchers, post-docs, doctoral students, etc.) as a determinant factor for R&D location is highlighted by a large number of
researchers and practitioners. Doh et al. (2005) argue that MNEs’ R&D units in foreign locations have the same general human resource skill mix needs as in their home countries. Consequently, they tend to choose locations in which the scientific workforce has reached the required level of expertise (Cooke, 2001; Doh et al., 2005; Jones and Teegan, 2003; Kang and Lee, 2007; OECD, 2005; Taggart, 1991), and in which it is abundant (Sachwald, 2007), making it possible to meet the future needs of R&D operations (Doh et al., 2005). French experts have also indicated that the international openness of researchers is a determinant factor in R&D location.

Scientific and technological factors
It has been argued that MNEs appreciate the existence, in host countries or regions, of centers of excellence (OECD, 2005; Sachwald, 2007), and of renowned universities and research centers (Alcacer and Chung, 2007; Cooke, 2001; Kueemmerle, 1999a; Taggart, 1991; Zucker et al., 1997). Surveys conducted on American and European MNEs (OECD, 2005; Thursby and Thursby, 2006) show that these companies are also attracted by the technological specialization of the country and the international reputation of the host region. French experts and practitioners have also highlighted this aspect.

Factors related to regions, agglomeration effects, and networks
Cooperation and networks are found to give firms an important advantage in reproducing and building upon the knowledge of other firms (OECD, 2005; Sorenson et al., 2006) located in the same region. Powell (1990) suggests that networks favor the efficient transfer of information. Further, Podolny and Page (1998) argue that networks bring several kinds of benefits to the member firms: learning, legitimacy, status, and economic and other benefits. According to several authors, the tacit character of knowledge ensures that it can be efficiently transferred only through interpersonal contacts and the mobility of the workforce, and these processes are favored by geographic proximity (Audretsch and Feldman, 1996; Buckley et al., 2007; Head et al., 1995). The importance of social interactions is also underlined by Jacobs and De Man (1996), and by Saxenian (1994) in her analysis of Silicon Valley. According to the French “proximity stream” (Torre and Rallet, 2005), there are two types of proximity: geographic and organized. Geographic proximity is expressed by the distance in kilometers
that separates two units in a geographic space. Organized proximity, on the other hand, is not geographic but relational. It reflects the ability of an organization (in a broad sense) to make its members interact. The authors argue that geographic proximity is insufficient to enable firms to engage in cooperation unless it is complemented by organized proximity. The image of the region (Cooke, 1992, 2001; OECD, 2005) may also play an important role in attracting foreign R&D investment, as do also the existence of cooperative relationships between universities and the industry (Alcacer and Chung, 2007; Audretsch and Feldman, 1996; Jaffe, 1986; OECD, 2005; Porter, 1990). The desire to monitor competitors’ moves in a particular location (Doh et al., 2005) leads to clustering in regions in which other research teams are located nearby. However, the presence of other (competing) firms in a region may in some cases be a disincentive to locate in that region, since MNEs may consider the cost of outward knowledge spillovers, and decide to locate away from such risky locations (Liu et al., 2008). Lastly, both the regional aid policy towards R&D activities and the quality of regional institutions are also found to affect positively the decision to locate in a particular region (Cooke, 1985, 1992; OECD, 2001).

**Market or demand factors**

The importance of market factors in driving FDI in R&D is well established (Basile et al., 2008; Jones and Teegan, 2003; Taggart, 1991). Thus, the size of the market of a particular country as a determinant of the location of MNEs has received consistent support in empirical research (Flores and Aguilera, 2007). This factor can be complemented by the growth potential of the market: the number of potential customers (Flores and Aguilera, 2007). Both factors are particularly strong in influencing R&D location, since they are some of the key drivers in the location of production and, as previously mentioned, the R&D function often accompanies production abroad, given the necessity to adapt the products or services to meet local requirements (Prahalad and Doz, 1987).

**Factors related to infrastructure**

The availability of an adequate infrastructure in the host country has been found to influence positively the location of MNE activities (Cheng and Kwan, 2000; Loree and Guidinger, 1995). Infrastructure
here includes both the transportation and the telecommunication infrastructure. Along with a developed infrastructure, experts and practitioners point out that the international accessibility of a region is also a determinant of R&D location.

Factors related to the overall environment for R&D
The innovative character of the environment is found to motivate MNEs to locate their R&D in a particular region. As Maillat et al. (1995) argue, some locations can be characterized as an “innovative milieu,” that is, such places are more likely to produce innovations than other locations. Practitioners and experts seem to appreciate the easiness of new firm creations and spin-offs (Thursby and Thursby, 2006), the quality of life and the overall life environment (the pleasant life environment, quality of schools for children, opportunities for entertainment, etc.). A dynamic labor market may also be a driver for locating in a particular region or country (Doh et al., 2005; Head et al., 1995; Krugman, 1991a, 1995; OECD, 2005). If the entrepreneurial spirit of the region tends to favor innovativeness (Becattini, 1987; Piore and Sabel, 1984) that too may be considered a regional advantage for MNEs’ location. The protection of intellectual property is also an important issue for MNEs (Doh et al., 2005), which aim to prevent others making unauthorized use of their intellectual assets.

Factors related to financial aspects (including the role of the state in financing research)
State financing of research and science (Feinberg, 2000) may potentially be of interest to firms that might be attracted by subsidies provided by the national government. Firms may also be attracted by favorable taxation policies (Feinberg, 2000). Further, the experts highlight the importance of financial systems and credits for R&D, which the public authorities may provide at both the national and the regional level, in order to attract foreign investment.

Cost factors
Cost factors include the wage level in a region/country, and any other costs incurred by an R&D activity at a given location. It has been argued that lower-wage costs attract MNEs investment (Dunning, 1998; Flores and Aguilera, 2007), including investment in R&D (Sachwald, 2007). Low wage costs have been particularly emphasized
in the studies on investment in emerging economies (Kang and Lee, 2007; Liu et al., 2008; Shimizutani and Todo, 2008). Other costs include the costs of land, buildings, and physical infrastructure in general (Loree and Guisinger, 1995), and they seem to play an important role when the volume of investment is high (for example, establishing large-scale R&D laboratories).

Table 6.2 presents the thirty-two factors that we identified as determinants of R&D location, and the evaluation of the importance of each of them according to the three sources of evidence: the academic literature, surveys of practitioners, and interviews with experts.

We hypothesize that there are strong correlations between the different factors. For example, the costs for the firm should depend on such financial aspects as taxation, access to national and supra-national funds for research, and quality of infrastructure. Given these interactions, the policies destined to attract R&D investment are strongly interrelated whatever the level (national, regional, etc.) or the domain (labor market, infrastructure, financing, etc.) of action.

Among the thirty-two factors that we distinguished, some seem more important than others. Table 6.3 highlights the seven factors that can be considered of particular importance for the choice of R&D location.

Centers of excellence are characterized by several elements that are attractive to firms, such as the possibility of accessing high-level knowledge, and being in the “hot spot” for research. This allows firms to benefit quickly from new technological achievements.

The quality of the workforce is also estimated as very important, particularly because international competition in this domain is becoming very intense, as emerging countries like India, China, and the Eastern European countries are increasingly attractive from this point of view. The proximity of other research teams facilitates knowledge transfer thanks to concentration in a restricted geographic area. Proximity favors interactions and enables teams to combine complementary competencies. The success cases of clusters have shown that the role of universities and renowned research teams is crucial for the dynamism and vitality of these high-technology concentrations.

The importance of the cost factor is growing. In fact, given that new countries are appearing on the research scene, and that they have become increasingly competitive in other important factors (quality of the scientific workforce, renowned universities, etc.), competition in terms of cost is now more and more intense. The scientific offer of...
Table 6.2  *Analysis of factors that determine R&D location choices*

<table>
<thead>
<tr>
<th>Factors</th>
<th>Source of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surveys</td>
</tr>
<tr>
<td><strong>Human factors</strong></td>
<td></td>
</tr>
<tr>
<td>1. Quality of the scientific workforce</td>
<td>+++</td>
</tr>
<tr>
<td>2. Abundance of the scientific workforce</td>
<td>++</td>
</tr>
<tr>
<td>3. International openness of researchers</td>
<td>+</td>
</tr>
<tr>
<td><strong>Scientific and technological factors</strong></td>
<td></td>
</tr>
<tr>
<td>4. Existence of centers of excellence</td>
<td>+++</td>
</tr>
<tr>
<td>5. Renowned research centers and universities</td>
<td>++</td>
</tr>
<tr>
<td>6. Technological specialization of the country</td>
<td>+</td>
</tr>
<tr>
<td>7. International reputation</td>
<td>+</td>
</tr>
<tr>
<td><strong>Factors related to regions</strong></td>
<td></td>
</tr>
<tr>
<td>8. Networks of firms</td>
<td>+</td>
</tr>
<tr>
<td>9. Proximity of actors</td>
<td>++</td>
</tr>
<tr>
<td>10. Image of the region</td>
<td>+</td>
</tr>
<tr>
<td>11. Cooperation firms–universities</td>
<td>++</td>
</tr>
<tr>
<td>12. Presence of other research teams in the proximity</td>
<td>++</td>
</tr>
<tr>
<td>13. Regional aid policy</td>
<td>+</td>
</tr>
<tr>
<td>14. Quality of regional institutions</td>
<td>++</td>
</tr>
<tr>
<td><strong>Market or demand factors</strong></td>
<td></td>
</tr>
<tr>
<td>15. Attractiveness of the market</td>
<td>++</td>
</tr>
<tr>
<td>16. Market growth potential</td>
<td>+</td>
</tr>
</tbody>
</table>

*(cont.)*
Table 6.2 (cont.)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Source of evidence</th>
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<tbody>
<tr>
<td></td>
<td>Surveys</td>
</tr>
<tr>
<td><strong>Factors related to infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td>17. International accessibility</td>
<td>+</td>
</tr>
<tr>
<td>18. Infrastructure</td>
<td>++</td>
</tr>
<tr>
<td><strong>Factors related to the overall environment for R&amp;D</strong></td>
<td></td>
</tr>
<tr>
<td>19. Innovative environment</td>
<td>++</td>
</tr>
<tr>
<td>20. Ease of spin-offs and new firm creation</td>
<td>++</td>
</tr>
<tr>
<td>21. Quality of life</td>
<td>+</td>
</tr>
<tr>
<td>22. Life environment</td>
<td>+</td>
</tr>
<tr>
<td>23. Dynamic labor market</td>
<td>+</td>
</tr>
<tr>
<td>24. Openness to FDI</td>
<td></td>
</tr>
<tr>
<td>25. Entrepreneurial spirit</td>
<td>++</td>
</tr>
<tr>
<td>26. Intellectual property protection</td>
<td>+</td>
</tr>
<tr>
<td><strong>Factors related to financial aspects</strong></td>
<td></td>
</tr>
<tr>
<td>27. Role of the state in the financing of research</td>
<td>+</td>
</tr>
<tr>
<td>28. Financing of research centers</td>
<td></td>
</tr>
<tr>
<td>29. Financial system</td>
<td></td>
</tr>
<tr>
<td>30. Taxation</td>
<td>+</td>
</tr>
<tr>
<td>31. Credits for R&amp;D</td>
<td></td>
</tr>
<tr>
<td><strong>Cost factors</strong></td>
<td></td>
</tr>
<tr>
<td>32. Costs of R&amp;D (including wage and other costs)</td>
<td>++</td>
</tr>
</tbody>
</table>

these countries is in fact approaching the levels of developed countries, but at lower cost. That is why we are witnessing an important growth of R&D units in these countries.

The attractiveness of the market is a classic factor, and it has consistently obtained support from scholars and practitioners.
Cooperation between universities and firms (in particular in knowledge transfer) is particularly important for firms that locate R&D units for “home-base augmenting” (Kuemmerle, 1997; Patel and Vega, 1999). Although small firms are more interested in cooperation with universities, large firms also believe that they can derive advantage from this kind of network.

In total, thirty-two different location-specific factors seem to shape MNEs’ R&D location strategies. Of these, seven appear to be critical: the existence of centers of excellence; the quality of the scientific workforce; the presence of other research teams in the proximity; renowned research centers and universities; costs of R&D; the attractiveness of the market; and cooperation between universities and the industry.

Conclusion

In this chapter we studied the host-country and host-region determinants of MNEs’ R&D location choice. We showed that several
categories of factors exist, and we estimated the importance of each of
the thirty-two individual factors identified. The contributions of our
study rest in its scope, since it covered different data sources and ben-
etied from various points of view. The results of the study provide
some indications on how MNEs choose the locations in which they set
up their R&D activities, and they also offer some important insights
for policy makers striving to attract these activities to their regions.
Indeed, as Feinberg argues, “although many governments have imple-
mented policies designed to lure foreign R&D, the kinds of policies
which would be most effective depend critically on the factors influ-
encing R&D of MNCs location choices” (2000: 1). Our study can
therefore provide indications for policy makers regarding the factors
that should be targeted by policy measures.

Obviously, this research is not without its shortcomings, which limit
the generalizability of the findings, but at the same time suggest direc-
tions for future research. The major limit of the study is the lack of
empirical confirmation of the results. Several improvements of this
work are therefore possible. The first research direction would be to
conduct a survey that questions R&D practitioners on their location
decisions, in order to empirically validate the importance of each of the
location factors. The second research direction would be to test empir-
ically the findings, first on the French MNE data, and then on a larger
sample of companies. The third research direction would be to conduct
in-depth case studies of R&D location, to uncover the combinations
of factors that work together to define the choice of the host region.

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Does R&D offshoring displace or strengthen knowledge production at home? Evidence from OECD countries

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Introduction

This chapter aims to investigate whether offshoring of R&D activity in fast-growing economies impacts on the knowledge creation of home investing countries. This research question goes back to the debate on whether these investments really strengthen home countries’ knowledge production (Hemphill, 2005; Kotabe, 1990), or instead they hasten a possible hollowing out and/or a polarization of a home country’s competences (Bardhan and Jaffee, 2005; Lieberman, 2004; Teece, 1987). Despite further research conducted on this issue (e.g., Egger et al., 2001; Falk and Wolfmayr, 2005; Feenstra and Hanson, 1999; Gersbach and Schmuczler, 2006; Hansson, 2005; Hsieh and Woo, 2005; Naghavi and Ottaviano, 2009), consensus on the net impact of offshoring on the home country is lacking and additional empirical evidence is needed.

Available statistics clearly document an increasing degree of R&D internationalization by multinational firms as well as a recent change in the location and nature of their overseas activities (Belderbos and Sleuwenagen, 2007; UNCTAD, 2005). Specifically, both UNCTAD and OECD data show that Singapore, India, China, Korea, and, to a lesser extent, Brazil are increasingly attracting R&D by multinationals. In particular, UNCTAD estimates that of the 1,773 FDI projects involving R&D as a key business function during 2002–04, no fewer than 1,095 went to Eastern Europe and Asia, with India and China the most important destination countries (UNCTAD, 2005: xxvi). Official statistics for China mention that this country hosted some 750
foreign R&D centers, most of these established after 2001; for India it was estimated that by the end of 2004, over 100 multinational enterprises (MNEs) had established R&D centers (UNCTAD, 2005). Other recent surveys among MNEs on R&D investment plans more clearly suggest that China, India, Singapore, and, to a lesser extent, Brazil, are among the top ten of R&D investment locations behind the US and the UK. However, although offshoring poses challenges to strategic management research in understanding the development and deployment of firm-level capabilities (Doh, 2005), international business (IB) research has paid limited attention to this phenomenon. In addition, Doh and Pearce (2003) contend that theories of internationalization (e.g., Johanson and Vahlne, 1990; Vernon, 1966) and FDI (e.g., Dunning, 1977) have failed to adequately incorporate the distinctive nature of services and intangible activities which are those more increasingly sited offshore.

This study seeks to fill this gap by means of an exploratory cross-country analysis focusing on OECD countries investing in BRICKST (Brazil, Russia, India, China, Korea, Singapore, and Taiwan). Within this context, we test whether R&D offshore in BRICKST complements/substitutes knowledge production at home and whether and how it affects the sectoral focus/mix of knowledge production. To this end, we use the knowledge production function framework (e.g., Griliches, 1979), which suggests that the output of knowledge depends on two inputs: (i) domestic investments in R&D, and (ii) R&D conducted abroad. Bearing in mind the limitations of the macro approach adopted, our findings suggest a positive impact of R&D offshore in BRICKST on the knowledge production of home OECD investing countries. Moreover, knowledge production at home seems to benefit from both domestic R&D as well as from R&D activities offshore in BRICKST as far as high-technology sectors are concerned. Instead, in medium- and low-technology sectors OECD countries’ knowledge production at home is only fed by innovative activity offshore in BRICKST.

**Theoretical framework and hypotheses**

Despite the increasing interest in the offshoring phenomenon, a commonly shared definition of offshoring is still missing. A primary distinction made by UNCTAD (2004) concerned offshoring activities done internally within companies through the establishment of foreign
subsidiaries (i.e., captive offshoring) and offshoring activities done externally through outsourcing a service to a third-party provider (i.e., offshore outsourcing). In this chapter, we will use the term “offshoring” in general although focusing on captive offshoring only. Along the lines of recent studies (Bunyaratavej et al., 2007; Venkatraman, 2004), we then define international offshoring as the practice of placing activities at offshore locations outside the investing home country. Our definition does not necessarily imply that those activities are not carried out any longer in the home investing country once the offshore decision has been taken. In other words, the relocation of activities in other countries may well co-exist with the persistence of the same type of activities at home. We, therefore, use the term offshoring as interchangeable with internationalization.

We intend to capture the fact that offshoring per se has been a long-lasting phenomenon in the IB literature and does not represent something new. The international localization of manufacturing work and blue-collar jobs is indeed a long-lasting strategy. However, thanks to the fast pace of technological developments, companies have been able to increasingly create value by globally dispersing individual activities where they can be most efficiently executed (Zaheer and Manrakhan, 2001; Zaheer and Zaheer, 2001). Thus, what is new about the phenomenon at hand is the growing location abroad of a series of white-collar business processes that until a few decades ago could be executed only at home (Dossani and Kenney, 2006). The activities internationally offshore have over time climbed back up the value chain with manufacturing activities being offshore in the 1980s, IT departments in the 1990s and a range of other services relating to accounting, human resources management, finance, sales, and after-sales in the following decade. What, however, is nowadays raising many concerns is the increased offshoring of innovative activity in fast-growing emerging countries such as BRICKST. Offshoring is no longer limited to standardized IT or business processes, but increasingly involves new product development activities, R&D, and new product design (Engardio and Einhorn, 2005; Maskell et al., 2006; Patel and Vega, 1999; Subramaniam and Venkatraman, 2001). Western countries and developed market economies in general fear that they stand to lose their comparative advantage in knowledge-intensive products as new countries emerge with the basic capabilities needed to provide some technology-based services. This phenomenon has been amplified by the shift from traditional competence exploiting
(home base exploiting) foreign R&D activities – where MNEs undertake, outside their countries of origin, adaptation and modification of existing technological assets, to local demand conditions – to the competence creating (home base augmenting) ones, where MNEs “tap into” local technical and scientific infrastructures (Ambos, 2005; Cantwell and Mudambi, 2005; Kuehmerle, 1999). Accordingly, unlike the concentration in knowledge production recorded until a decade ago (Kumar and Russell, 2002), a significant proportion of MNEs’ R&D has moved to the countries of developing Asia (Lewin and Couto, 2006), which have emerged as new technology producers (Athreye and Cantwell, 2007), and in particular in BRICKST.

The increase in cross-border knowledge flows involves both technology transfer from headquarters to foreign subsidiaries and “reverse” technology transfer from foreign R&D units to domestic operations, as well as technological transfer between subsidiaries (Håkanson and Nobel, 2001). Theory and evidence on MNEs (Almeida, 1996; Cantwell, 1995; Dunning, 1998; UNCTAD, 2001, 2005) has traditionally acknowledged that FDI are more and more selectively tapping knowledge in specific host markets when designing their global knowledge sourcing strategies. Due to the immobility and partially tacit nature of knowledge, its transfer requires frequent interactions (Kogut and Zander, 1992). Accordingly, the “technology-seeking” or “knowledge-seeking” argument contends that firms may expand abroad in search of capabilities complementary to those available in their home markets and recognizes that home-country knowledge production provides the necessary absorptive capacity (Cantwell, 1989). This suggests that firms also use knowledge-seeking investments to source technical diversity (Chung and Alcácer, 2002). Recent research on offshoring has highlighted the significance of strategic determinants of offshoring decisions (Quinn and Hilmer, 1994) such as educational and cultural levels as reflected in higher wages (Bunyaratevej et al., 2007). Patel and Vega (1999) demonstrate empirically that companies invest abroad in core innovative areas where they are strong at home, suggesting that R&D offshoring decisions are hardly intended to compensate for technological weakness at home, but rather to further enhance home-country technological advantage. Hence, the hollowing out concern is just one side of the coin since knowledge developed in offshore locations can be transferred back to home investing countries where it can feed knowledge production. In line with the knowledge-seeking argument, we then pose that
H1: R&D offshore in BRICKST positively impacts on the knowledge production of the home investing country.

However, sectoral differences in the geography of knowledge production have been detected and explained mainly in terms of degree of knowledge tacitness and complexity (Cantwell and Santangelo, 1999, 2000). In that, innovative activity involving highly tacit and complex knowledge are geographically concentrated at home, while the development of more codifiable knowledge is more locationally dispersed. In this sense, offshoring suggests a complete decoupling of factors across geographic space with more tacit and complex innovative activities carried out in advanced economies, and more routinized and standardized activities offshore (Mudambi, 2008). This international division of labor in knowledge production has then favored the rise of a market for technologies (Arora and Gambardella, 2001) with more complex high-tech knowledge produced in developed countries and more standardized medium- and low-tech knowledge generated in developing countries and eventually transferred and traded across countries. This pattern is closely associated with the modularization of technology (Chesbrough and Kusunoki, 2001) which allows the firms to focus on activities associated to highest value-added in order to source abroad other activities associated with lower value-added more cheaply and efficiently (Ernst and Lim, 2002).

Accordingly, Hirshfeld and Schmid (2005) argue that, although firms in the US and Europe are increasingly attracted to emerging countries, advanced economies are likely to remain at the forefront of innovation activities in high-tech more advanced sectors, at least in the foreseeable future (Ernst, 2006; Lewin et al., 2009; Manning et al., 2008). The production of high-tech knowledge in developed countries is indeed fed by domestic technological capabilities as well as by medium- and low-tech knowledge generated abroad as a result of the modular character of technology (Chesbrough and Kusunoki, 2001). This is in line with results already obtained in the eighties by Mansfield and Romeo (1984) who documented the increased significance of complementary R&D activities by foreign affiliates of the US firms and their reverse knowledge transfer back to the US parents. They argue that technology developed abroad by US-based firms tends to be introduced about as rapidly in the US as in the country where it is developed. As a result, US firms’ competitiveness depends as much on overseas R&D as on domestic R&D. In the same vein, Kotabe (1989) has
added further evidence to support the importance of parent-affiliates’ R&D activities in determining the firm’s global competitiveness.

Therefore, as a result of the geographical decoupling of factors across geographic space made possible by technological modularization, two major patterns emerge from the above discussion. First of all, developed countries, where R&D in high-tech sectors has been traditionally conducted, locate innovative activities in BRICKST to further strengthen knowledge production at home in those sectors. To this end, both domestic and offshore R&D in BRICKST are inputs for knowledge production in the home investing country. Secondly, knowledge production in the home investing countries in medium- and low-tech sectors is mainly fed by R&D inputs from BRICKST economies where more standardized innovative activities have been increasingly offshore. Thus, we test the following hypotheses:

\( H2a: \) Knowledge production in high-tech sectors in the home investing country is fed by both R&D offshore in BRICKST and domestic R&D.

\( H2b: \) Knowledge production in medium- and low-tech sectors in the home investing country is fed mainly by R&D offshore in BRICKST.

Empirical analysis

The model

We frame our model within the traditional literature à la Griliches-Jaffe (see Griliches, 1979, 1990; Jaffe, 1986, 1989), where the relationship between innovative inputs and outputs is modeled through the so-called knowledge production function (KPF), a function intended to represent the transformation process leading from innovative inputs (both internal and external) to innovative outputs. Specifically, it can be written as follows:

\[
O_i = I_i^\lambda E_i^\phi
\]  

(1)

Where \( O \) is the innovative output, i.e., the knowledge produced; \( I \) is the internal innovative input and \( E \) is the external innovative input; \( i \) is used to index variously countries, industries or firms; for our study, it will index OECD countries. The parameters \( \lambda \) and \( \phi \) indicate the elasticity of new knowledge as concerns internal and external input, respectively.
Accordingly, our econometric model relies on the estimation of a knowledge production function where the production of knowledge is measured by patents (at the country level) and external and internal innovative inputs are measured by each country’s R&D projects abroad and domestic R&D expenditures, respectively. Additionally, as the literature on MNEs has acknowledged, the importance of knowledge spillovers stemming from the presence of foreign actors (for a recent survey, see Castellani and Zanfei, 2006), we “augmented” KPF by controlling for the presence of foreign MNEs in each country.

**Data and variables**

Data on R&D projects abroad come from the database fDI Markets (previously called OCO Monitor, see www.ocoglobal.com), which records information on greenfield FDI for all sectors and home/host countries, from 2003 to the present. Specifically, we selected data on projects concerning R&D activities, as far as OECD home countries are concerned, over the three-year period 2003–05. Figure 7.1 and Table 7.1 illustrate the role of emerging countries in hosting R&D activities by OECD countries. The figures show that BRICKST countries host about half of the whole foreign R&D activity.

As far as the variables employed in our model are concerned, our dependent variables aim at proxing the production of knowledge in
Table 7.1  R&D offshoring from OECD countries to BRICKST

<table>
<thead>
<tr>
<th>Destination country</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>49</td>
<td>66</td>
<td>71</td>
</tr>
<tr>
<td>India</td>
<td>33</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>Russia</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Singapore</td>
<td>7</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>South Korea</td>
<td>7</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Taiwan</td>
<td>13</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total BRICKST</strong></td>
<td><strong>116</strong></td>
<td><strong>158</strong></td>
<td><strong>154</strong></td>
</tr>
<tr>
<td><strong>Share BRICKST</strong></td>
<td><strong>48.33</strong></td>
<td><strong>53.20</strong></td>
<td><strong>49.20</strong></td>
</tr>
<tr>
<td><strong>Overall total</strong></td>
<td><strong>240</strong></td>
<td><strong>297</strong></td>
<td><strong>313</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ calculations on fDI Markets database.

the home country, in the period following the R&D offshoring initiatives. Therefore, following Griliches (1979), we use the total number of patents associated to research activities carried out in OECD home countries. The data source is the OECD Science and Technology Indicators, and specifically PATFAM, and is measured by the country’s triadic patent families over the period 1995–2005. Triadic patent families are defined at OECD (Dernis and Khan, 2004) as a set of patents filed at the European Patent Office, the US Patent and Trademark Office and the Japan Patent Office which protect the same invention and share the same priority date. The OECD has developed triadic patent families in order to reduce the major weaknesses of the traditional patent indicators that are commonly constructed on the basis of information from a single patent office. While patents filed at a given patent office represent a rich source of data, these data show certain weaknesses. The home advantage bias is one of them, since, proportionate to their inventive activity, domestic applicants tend to file more patents in their home country than non-resident applicants. Furthermore, indicators based on a single patent office are influenced by factors other than technology, such as patenting procedures, trade flows, proximity, etc. In addition, the value distribution of patents within a single patent office is skewed; many patents are of low value and few are of extremely high value. Simple patent counts would therefore give equal weight to all patent applications.
Additionally, in order to take into account the possible impact of R&D offshoring on the sectoral composition mix, we also considered the following dependent variables:

- **PS_HIGH** is measured by the number of patents associated to innovative activities carried out in the OECD home countries and filed under the Patent Co-operation Treaty in the period 2002–04 in high-technology sectors.
- **PS_MHIGH**, **PS_MLOW**, and **PS_LOW** measure the number of patents associated to innovative activities carried out in the OECD home countries and filed under the Patent Co-operation Treaty in the period 2002–04 in medium-high, medium-low and low technology sectors, respectively.

In order to further test the impact of R&D offshore in BRICKST, we also adopted as a dependent variable the international competitiveness of the country in knowledge-intensive goods (i.e., $HT\_EXP$), measured by the country’s average high-tech export share over the period 2002–05 and drawn from the World Development Indicators database provided by the World Bank.

As far as our explanatory variables are concerned R&D offshoring was measured by the number of overseas R&D projects, in BRICKST countries, over the period 2003–05 (i.e., $R\&D_{offBRICKST}$) as drawn from fDI Markets database. Domestic R&D expenditures were proxied by the country's R&D expenditures as a percentage of GDP 2005 (i.e., $R\&D\_GDP05$) based upon OECD data.

Finally, we also control for the presence of foreign MNEs in each country (i.e., inward FDI) and outward FDI, measured as follows. Based upon OECD data we drew a measure of FDI inflows as a percentage of GDP over the period 2000–05 (i.e., $IFDI\_GDP00\_05$) and a measure of FDI outflows as a percentage of GDP over the period 2000–05 (i.e., $OFDI\_GDP00\_05$).

Descriptive statistics and correlation coefficients are reported in Table 7.2.

**Results**

Results of the econometric models are reported in Table 7.3. Specifically, our estimates suggest that our first hypothesis is confirmed, that is, that overseas R&D investments in BRICKST countries are complementary to the home country’s innovative effort, new knowledge
Table 7.2 *Descriptive statistics and correlation coefficients*

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>1487.18</td>
<td>5080.44</td>
<td>4913.94</td>
<td>1085.95</td>
<td>474.24</td>
<td>16.35</td>
<td>14.27</td>
<td>1.81</td>
<td>3.60</td>
<td>3.77</td>
</tr>
<tr>
<td><strong>Std. dev.</strong></td>
<td>3578.59</td>
<td>9666.91</td>
<td>8833.08</td>
<td>1890.95</td>
<td>827.16</td>
<td>8.41</td>
<td>41.78</td>
<td>0.96</td>
<td>2.26</td>
<td>4.10</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>2.7</td>
<td>50.91</td>
<td>86.66</td>
<td>22.23</td>
<td>10.91</td>
<td>1.86</td>
<td>0.49</td>
<td>0.16</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>14965.89</td>
<td>41481.82</td>
<td>30374.46</td>
<td>6789.27</td>
<td>3516.83</td>
<td>32.54</td>
<td>227</td>
<td>3.89</td>
<td>9.69</td>
<td>16.94</td>
</tr>
<tr>
<td><strong>No. obs.</strong></td>
<td>30</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>29</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

**Dependent variables**

1. PATFAM
2. PS_HIGH 0.98
3. PS_MHIGH 0.91 0.94
4. PS_MLOW 0.88 0.93 0.99
5. PS_LOW 0.92 0.98 0.96 0.96
6. HT_EXP 0.45 0.48 0.37 0.35 0.42

**Explanatory variables**

7. R&Doff_BRICKST 0.84 0.89 0.75 0.74 0.88 0.46
8. R&D_GDP05 0.40 0.39 0.37 0.36 0.34 0.56 0.28

**Controls**

9. IFDI_GDP00_05 −0.35 −0.32 −0.32 −0.31 −0.28 −0.05 −0.23 −0.07
10. OFDI_GDP00_05 −0.18 −0.14 −0.15 −0.14 −0.10 0.23 −0.09 0.32 0.57
### Table 7.3 Results of the econometric models (dependent variables: patents and patent shares)

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATFAM</td>
<td>(1)</td>
<td>PS_HIGH</td>
<td>PS_MHIGH</td>
<td>PS_MLOW</td>
<td>PS_LOW</td>
<td>HT_EXP</td>
</tr>
<tr>
<td>R&amp;D off BRICKST</td>
<td>63.45 **</td>
<td>177.00 ***</td>
<td>128.86 ***</td>
<td>27.34 ***</td>
<td>15.35 ***</td>
<td>0.07 *</td>
</tr>
<tr>
<td>(7.01)</td>
<td>(8.66)</td>
<td>(4.24)</td>
<td>(4.24)</td>
<td>(7.70)</td>
<td>(1.85)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D GDP05</td>
<td>857.48 *</td>
<td>1936.18 *</td>
<td>2143.6</td>
<td>418.91</td>
<td>105.66</td>
<td>3.87 **</td>
</tr>
<tr>
<td>(1.93)</td>
<td>(1.83)</td>
<td>(1.42)</td>
<td>(1.25)</td>
<td>(1.02)</td>
<td>(2.23)</td>
<td></td>
</tr>
<tr>
<td>IFDI GDP00_05</td>
<td>−129.25</td>
<td>−292.66</td>
<td>−335.98</td>
<td>−76.15</td>
<td>−24.02</td>
<td>−0.02</td>
</tr>
<tr>
<td>(−0.63)</td>
<td>(−0.58)</td>
<td>(−0.47)</td>
<td>(−0.48)</td>
<td>(−0.49)</td>
<td>(−0.02)</td>
<td></td>
</tr>
<tr>
<td>OFDI GDP00_05</td>
<td>−125.53</td>
<td>−257.24</td>
<td>−307.90</td>
<td>−53.78</td>
<td>−8.59</td>
<td>−0.08</td>
</tr>
<tr>
<td>(−1.03)</td>
<td>(−0.74)</td>
<td>(−0.62)</td>
<td>(−0.49)</td>
<td>(−0.25)</td>
<td>(−0.17)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>−17.49</td>
<td>421.83</td>
<td>995.26</td>
<td>300.36</td>
<td>138.11</td>
<td>8.76 *</td>
</tr>
<tr>
<td>(−0.02)</td>
<td>(0.17)</td>
<td>(0.28)</td>
<td>(0.38)</td>
<td>(0.56)</td>
<td>(2.14)</td>
<td></td>
</tr>
<tr>
<td>No. obs</td>
<td>30</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>R2</td>
<td>0.77</td>
<td>0.85</td>
<td>0.62</td>
<td>0.60</td>
<td>0.80</td>
<td>0.39</td>
</tr>
<tr>
<td>Adj R2</td>
<td>0.73</td>
<td>0.81</td>
<td>0.55</td>
<td>0.52</td>
<td>0.76</td>
<td>0.28</td>
</tr>
<tr>
<td>F</td>
<td>20.34 ***</td>
<td>27.38 ***</td>
<td>8.29 ***</td>
<td>7.40 ***</td>
<td>19.88 ***</td>
<td>3.61 **</td>
</tr>
</tbody>
</table>

**Notes:** T statistics are reported in brackets.

**: significant at p < .01; **: significant at p < .05; *: significant at p < .10
creation and international competitiveness in knowledge-intensive goods, as depicted by the positive and statistically significant signs in all estimated models (R&D off BRICKST is significant at $p < .01$ in Models 1 to 5, and at $p < .10$ in Model 5). This result is in line with Kotabe’s (1990) analysis back in the nineties of the impact of offshoring by US firms on their innovative ability. OECD firms have developed what have been called dynamic (Teece et al., 1997) or combinatorial (Kogut and Zander, 1992) capabilities which enable them to acquire and synthesize new resources upon which to build new applications in a fast-changing environment.

H2a and H2b are also confirmed, as domestic R&D expenditures matter for the home country’s knowledge creation but less so as the degree of innovativeness decreases. This is illustrated by the positive and statistically significant signs (at $p < .10$) of the variable R&D GDP05 in Models 1 and 2 as well as by the statistically non-significant results gathered when running all the other models. The creation of new complex and tacit technologies is geographically concentrated in more advanced countries, while the creation of more mature and codified technologies is geographically dispersed in new fast-growing countries such as the BRICKST countries. This result seems also to confirm an international division of labor in knowledge production and the consequent rise of a market for technology (Arora and Gambardella, 2001).

As far as our control variable, both inward and outward FDI do not seem to be related to knowledge production as shown by the non-significant signs reported in the table. It should, however, be acknowledged that our dataset does not allow us to single out between origin and destination countries. Such a distinction may well shed some light on the role played in the story by inward and outward manufacturing investments.

Concluding discussion and future research agenda

Our findings suggest a positive impact of R&D offshore in BRICKST by OECD countries upon their knowledge production at home. However, such a knowledge production at home seems to benefit from both domestic R&D and R&D activities offshore in BRICKST as far as high-technology sectors are concerned, while in medium- and low-technology sectors it is primarily fed by innovative activity offshore
in BRICKST. Accordingly, on the policy front, these findings support the actions to motivate foreign R&D activity by MNCs with the due qualification that foreign investments should complement the domestic R&D of MNCs. In fact, we find only partial evidence of the evolution of offshoring strategies from home-base augmenting (HBA) to home-base replacing (HBR) innovation capabilities, pointed out by recent studies on innovation offshoring (Lewin et al., 2009). However, caution should be used when attempting to draw policy implications from the study since the choice of measuring knowledge output though patents may affect our results. Not all innovations are patented and not all of them are patentable (Cohen and Levin, 1989; Griliches, 1990; Trajtenberg, 1990). In this direction, cross-industry discrimination may be revealing. Along these lines, it should be acknowledged that different innovation outputs can be seen as the outcomes of several innovation inputs and not only as the consequence of R&D investments (see Conte and Vivarelli [2005], for an empirical analysis on the Italian case). For instance, the literature suggests that more complex product innovation generally relies on formal R&D, while process innovation (where it is not easy to single out pure innovation, diffusion, and imitation with any precision) is much more related to the acquisition of external technology, both through the “embodied technical change” acquired by investment in new machinery and equipment, and through the purchasing of external technology incorporated in licences, consultancies, know-how (Freeman, 1982; Freeman et al., 1982; Freeman and Soete, 1987).

Linked to the above, the study has many limitations and, therefore, our future research agenda is quite rich. First of all, as in Kotabe (1990), it is cross-sectional and the results are then based on relationships observed across various countries. Although the innovation lag period was considered, a cross-sectional study may not capture all the implications of a dynamic system which could change over time. Therefore, longitudinal studies and firm-level studies are strongly desirable to better cast the relationship between R&D offshoring and innovative activities at home before a proper conceptual logic can be developed. Firm level analyses, in particular, would allow researchers to test whether indeed smaller and medium-sized companies, which are more likely to be active in medium- and low-tech sectors, do actually adopt innovation offshoring strategies that augment their limited innovation capabilities, while larger MNEs have recently
Lucia Piscitello and Grazia D. Santangelo

started to replace their domestic innovative activities with R&D laboratories offshore abroad in emerging countries. Additionally, the study of complementarity vs. substitutability between innovative activities conducted abroad and those maintained at home could be empirically deepened, by using more sophisticated econometrics and non-parametric techniques. A further limitation of our study which needs to be addressed in future research refers to the R&D offshoring measure which unfortunately prevents us from controlling for the type of R&D project, i.e., whether it focuses more on research and/or development. This additional information would clearly allow a more fine-grained analysis on the dynamics of reverse knowledge flows by controlling for the characteristics of the knowledge offshore. Finally, data availability constrained our analysis to the extent that it fails to account for the technological development of the industry level for the host country firms as an important determinant in knowledge flows to home. Future research clearly needs to include this and other more micro, firm level variables which are recognized to be critical for the understanding of the offshoring phenomenon.

Notes
1 The KPF literature is quite broad. For a similar application on the impact of global engagement on the innovation activities of firms, see Criscuolo et al., 2005.
2 The pros and cons of using patents as an indicator of technological activity are well known and already widely discussed in the literature (e.g., Schmookler, 1950, 1966; Pavitt, 1985, 1988).
3 For the classification employed see Hatzichronoglou, 1997.
4 Patents counts are based on the priority date, the inventor’s country of residence, and fractional counts.

References


Innovation across tech-firms’ boundaries
A knowledge-based view

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Introduction

Nowadays, the business environment is becoming more and more dynamic and uncertain requiring firms to continuously innovate within short periods of time. Further, technological products are requiring more and more distinct and numerous bodies of knowledge which increases the complexity of the production process. In order to gain competitive advantage, firms tend to outsource the innovation process strategically, as a whole or in part, to external players. Traditionally, the knowledge creation process was considered a firm’s core capability to be kept internally, within its boundaries. However, due to the new rules of competition, firms have started to cooperate with external players in order to create new value and develop novel products. These emergent business tendencies have restructured different technology-oriented industries and reshaped the core capabilities of the firm. Indeed, the knowledge representing a critical input to the value creation process is becoming more dispersed over a network of interconnected organizations. Accordingly, a new governance structure has emerged to overcome the shortcomings raised by the wide-ranging multi-technological base of high-tech products. As a matter of fact, the extended enterprise (EE) is the result of an outsourcing strategy adopted by firms aiming mainly at reducing the complexity, increasing the creativeness, and lowering the cost of the innovation process. Thus, new core capabilities have emerged within the context of the EE, making the traditional core capabilities of a firm obsolete.
Drawing on the technology management literature and the resource-based theory, and more specifically the knowledge-based view, this chapter seeks to find reasons why companies outsource their core functions that constituted, in the past, their competitive advantage. Throughout the chapter, the authors will analyze the outsourcing decision of innovation of the modern firm, referring interchangeably to the technology-based firm. Reviewing the different perspectives on outsourcing, mainly from the resource-based theory, the authors extend the traditional definition of outsourcing to reveal emergent features of a firm’s strategic orientation and its reaction to the environment. Moreover, the chapter puts in perspective a new business model that has emerged as a result of the newly adopted strategy. A theoretical conceptualization of the EE from the knowledge-based view is introduced, and the implications underlying the outsourcing decision of the innovation activities within a technology-based firm are highlighted.

Thereafter, the chapter is organized into five main sections. The first section presents the assumptions lying behind the emergence of a new innovation process framework within the context of a technology-based firm. The second section introduces the new conceptualization of outsourcing according to the previously developed innovation framework. The third section describes the extended enterprise, defines its strategic search processes, and details the main capabilities that the EE needs to master in order to effectively and efficiently manage innovation. The fourth section ends up illustrating the features of the EE and its management capabilities through analyzing the Toyota case study. Finally, the chapter concludes with presenting the implications of the theoretical framework mentioned and suggests directions for future research.

Towards a new innovation paradigm for sustainable competitive advantage

The new competitive realm

Several transformations in the socio-economic context of the modern firm have changed the competitive environment to be more dynamic and unstable. These environmental features are continuously expanding due to the increasing number of factors influencing the daily operations of the firm, their interdependency, and their dynamicity.
Accordingly, the modern firm has to cope with and adapt to environmental needs in order to gain competitive advantage, or even to survive. A study of the life expectancy of firms has shown a drastic drop in average life from thirty to fifteen years over the period 1975–2005 (Foster and Kaplan, 2001). Additionally, another research study that examined 6,772 firms from different industries over a period lasting twenty-five years, demonstrated that only a small percentage of these firms has recorded high economic performance (Wiggins and Ruefli, 2002). Firms are exposed to environmental threats and ultimately to market failure, and only a few succeed in adapting and then prospering. Thus, technology plays an important role in creating firms’ sustainable competitive advantage and guaranteeing their success in the market through developing new products, discovering new processes, altering competitive rules, or readjusting the boundaries of their industries (Utterback, 1994).

Organizational adaptation and growth is a critical issue heavily researched in different fields of study such as management, strategy, organizational sociology, psychology, and economics (Christensen, 1997; Hannan and Freeman, 1984; Nelson and Winter, 1982; Porter, 1980). Among the organizational theories that emanated from such research, the competitive advantage model (Porter, 1980) and the resource-based theory of the firm (Barney, 1991; Grant, 1991; Penrose, 1959) have been used extensively to explain the adaptation and growth of a firm within its competitive environment. The assumptions made by the Porter model (1980) claimed that sustainable competitive advantage of a firm relies on both its market position and the positioning of its products within that specific market. The resource-based theory, on the other hand, argued that organizational competitiveness is mainly derived from the resources and capabilities of a firm and the way in which they are deployed for matching the emerging needs of the market (Barney, 1991; Penrose, 1959). Consistent with Penrose’s work claiming that “a firm is both an administrative organization and a pool of productive resources” (Penrose, 1959: 2), Wernerfelt (1984) and Barney (1986) fostered a theoretical departure from the neo-classical tradition which perceived the firm as a mere profit function, to viewing the firm as an organization able to manage potentially valuable resources. Therefore, viewing the firm as a bundle of resources, the resource-based theory extends Porter’s model by concentrating on the internal idiosyncratic resources of a firm and its
capability to create and develop its competitiveness within the marketplace (Grant, 1991).

The resource-based theory, and later on the knowledge-based view, described the intangible resources that can be sources of sustainable competitive advantage as rare, imperfectly imitable, valuable, and non-substitutable (Barney, 1991; Penrose, 1959). A stream of research then emerged recognizing the centrality of knowledge and capabilities as the most valuable intangible asset of a firm as well as the key element of a firm’s strategy (Drucker, 1993; Grant, 1996; Leonard-Barton, 1995; Nelson, 1995; Nonaka, 1994; Prahalad and Hamel, 1990; Quinn, 1992; Teece et al., 1997; Toffler, 1990; Zack, 1999). This literature additionally emphasizes the importance of strategic activities to integrate knowledge (Grant, 1996; Huber, 1991) and to convert dispersed, tacit, and explicit competencies into an aggregated body of organizational knowledge (Nonaka, 1994), giving rise to the knowledge-based view of the firm (Grant, 1996; Nonaka and Takeuchi, 1995). Knowledge is, then, the most valuable intangible asset and is considered the core element of innovation (Clark and Fujimoto, 1990).

Towards a new framework of innovation

Firms are increasingly innovative in order to cope with continuous changes and the uncertainty of the environment. Innovation processes are the basis of more complex and multidimensional dynamics due to the need for considering more factors (e.g., environment, manufacturability, etc.), cooperating with various actors outside the firm (e.g., research centers, alliances, etc.), as well as effectively and efficiently managing the commercialization of new technologies (e.g., timely and efficient introduction of new products to the market) (Nobelius, 2004). The complexity of the innovation dynamic is higher when dealing with a technology-based firm (TFB).

Granstrand (1998) has modeled a theoretical framework for the technology-based firm and defined its technology diversification strategy. He argued that the TBF is an organization encompassing various interconnected elements. Each involves or is influenced by, technology or technical artifacts (Granstrand, 1998). Conceiving technology as a “dynamic body of knowledge” with special features over other knowledge resources (e.g., protection through patent system), technological diversification plays a key role in the evolution of a TBF.
and its adaptation by performing strategic economies of scale, scope, speed, and space (Granstrand, 1998). This author further suggested that cross-fertilization between different technologies may bring to light new inventions, new functionalities, and higher product and/or process performance (Granstrand, 1998).

In the same vein, the quality of technology management and the capability to combine effectively heterogeneous technologies and their idiosyncrasies with the aim of reaping the potential benefits of the technological diversification, are considered to be critical issues. While technology diversification is a primary factor for the growth of a TBF, R&D expenditures increase as a result of the diversification strategy (Granstrand et al., 1997). The growth of R&D expenditures is mainly derived from the cost of acquiring the new technology and overcoming the troubles faced in combining various technologies (Granstrand et al., 1997). Nevertheless, Quinn (2000: 13) claimed that “leading companies have lowered innovation costs and risks by 60% to 90% while similarly decreasing cycle times and leveraging the impact of their internal investments by tens to hundreds of times.”

Additionally, given the growing complexity of multitechnology products and their production system, major innovations of technological products cannot be pursued by a single firm. This is essentially explained by the systemic interdependency among their subcomponents (Brusoni and Prencipe, 2001) and the multiple technological fields of knowledge and resources that go into their production. In order to gain competitive advantage and overcome the shortcomings of technological diversification strategy, a TBF needs to source its technological needs from external partners. Accordingly, firms are involved in new knowledge co-creation and knowledge transfer through vertical and horizontal networking (Möller and Svahn, 2003; Powell, 1996).

A new paradigm for innovation has emerged and is characterized by the joint efforts of loosely tied networks of organizations, driven more by pure and mutual interest and having different capabilities in new product development (NPD) management. A new era of partnering needs to be established based on crossing borders and functions instead of technology. Coalitions of autonomous but interdependent firms that are willing to coordinate some of their actions, and sometimes even to abdicate part of their activities and decisions to the focal firm in the network, hope to achieve greater benefits than any single member of the network can independently. Quinn (2000) claimed that strategically
outsourcing innovation can place a firm in a sustainable leadership position within its industry.

The new innovation framework for outsourcing

Resource-based approach to outsourcing

Over the past twenty-five years, the outsourcing literature has been predominantly concerned with transaction cost theory. Coase (1937) argued that a firm needs to perform its activities in-house rather than to turn to the market in situations of uncertainty. Numerous researchers have provided empirical support (e.g., Murray et al., 1995; Walker and Weber, 1984, 1987). However, this approach has ignored other features of organizational behavior that turn out to be of major importance. Recently, the outsourcing literature has incorporated other theories to analyze the phenomenon from other perspectives such as the resource-based theory to explain the decision of a firm to outsource.

The resource-based approach views the firm as a set of resources and capabilities that needs to be nurtured and that guides the firm’s strategy (Grant, 1991). Such resources have been classified into two major typologies: tangible and intangible ones (Grant, 1996). The first, which includes financial and physical assets, are easy to identify and evaluate (Grant, 1996). The second type of resource, which includes human, technological, and reputation assets, is deemed to be difficult to measure; however, it represents the main competitive advantage (Grant, 1996). Resource-based theory relates the internal features of a firm to its market positioning, arguing that the difference in organizational resources and capabilities may explain the difference in a firm’s performance over time and thus become a key determinant of the firm’s long-term competitive advantage. Within this context, outsourcing is considered a strategic decision affecting the resources allocated to business units within a firm and the firm’s extent of vertical specialization (Qu´elin and Duhamel, 2003).

Resource-based theory goes further to claim that firms can exploit resources that lie outside their boundaries by means of contracts (Barney, 1999; Grant, 1991). Thus, those resources that are difficult or costly to specify or include within contracts are kept in-house, while other resources can be outsourced and performed by a third party. Extending this perspective gave rise to the core competence
approach (Gilley and Rasheed, 2000; Prahalad and Hamel, 1990; Teng et al., 1995) presenting a distinction between activities that need to be performed within the boundaries of a firm, called “core competences” versus others that could be externalized (Peteraf, 1993). Further, Prahalad and Hamel (1990) claimed that while the long-term competitiveness of a firm relies on its core competences derived from its learning mechanisms, the short-term achievements of a firm are based on the attributes of its products (Prahalad and Hamel, 1990). Accordingly, Quinn and Hilmer (1994) identified the most effective core competence strategy as the one focusing on performing only a few activities that constitute its best capabilities and innovative value. Thus outsourcing core competences was held to be detrimental and would endanger the firm’s key value-added resources. Argyres (1996) also suggested that firms keep in-house those operations they perform better than their suppliers, while they may outsource those activities that they do not master. Additionally, Barney (1999) pointed out that firms need to consider the cost needed to develop their own capabilities versus the cost to acquire them from other organizations such as the threat of opportunism by the third party.

The new perspective on outsourcing

Despite the fact that innovation is considered a core capability, firms are today increasingly externalizing their innovation activities, relying partially or totally on external partners (Quinn, 2000). Outsourcing is no longer restricted to the firm’s complementary and non-core capabilities per se; instead, the outsourcing decisions have been extended to include also what used to be considered core capabilities. In fact, Granstrand et al. (1997: 18) stated that “rather than simply calling them ‘core’ competencies, a more accurate description of large multi-technology firms’ competencies is that they are ‘distributed.’” Accordingly, these firms are focusing more on enhancing their capacity by dispersing and coordinating complex activities along their value chains as well as exploring and exploiting new emerging technologies (Granstrand et al., 1997; Patel and Pavitt, 1997).

The new view of outsourcing and strategy defines a firm’s core capabilities as the ability to coordinate and integrate its distributed activities. For instance, two decades ago, Dell outsourced all design and innovation for its different sub-systems, software, and non-assembly production, to concentrate on its newly recognized core capabilities,
namely understanding customer needs, logistics, and component integration. This strategy made Dell the leader in introducing new products with the shortest innovation cycles.

Technology-based firms are increasingly involved in different collaborations, partnering activities, or inter-organizational networks (Gulati and Zajac, 2000; Hagedoorn, 1995). While contractual arrangements represent an important tool to govern the relationship among firms and manage outsourced activities (Barney, 1999; Grant, 1991), innovative activities are considered uncertain processes and the knowledge created through such processes cannot be defined a priori. Contracts are ineffective mechanisms for managing innovation activities subcontracted to external players. Instead, autocatalytic or self-sustaining motivations such as trust, mutual interest, and the network identification provide the glue for cooperation and ongoing joint work (Dyer and Nobeoka, 2000). We propose the following definition:

Outsourcing is a strategic decision that encompasses the subcontracting of some business activities to an external party by means of relational rather than contractual arrangements, while redefining the firm’s core capabilities and preserving the knowledge base of subcontracted activities for the purpose of enhancing long-term competitive advantage.

This definition entails three main features that extend the existing literature. The first suggests that outsourcing is a strategic decision for building sustainable competitive advantage. The second extends the scope of outsourcing to include traditional core capabilities. The last aspect illustrates the importance of relying on relational mechanisms (such as social norms, trust, etc.) to govern the outsourced activities rather than the traditional contractual arrangement under which it is difficult to manage tacit knowledge. Further, the firm needs to retain access to knowledge or processes that have been subcontracted to an external firm to effectively coordinate and integrate the distributed business processes.

The extended enterprise (EE) as an emergent governance structure

The new framework for the “extended enterprise” (EE) argues that the traditional way of networking cannot effectively deliver the capabilities for new value creation within the framework of multitechnology products; instead, a new way of coordination and collaboration is required
Figure 8.1. The extended enterprise framework (adapted from Filieri and Alguezaui, 2008).
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for a more efficient and effective management of an interdependent and dispersed knowledge.

Accordingly, the EE is defined as a firm whose activities are based on the interaction among diverse and numerous players (manufacturers, customers, suppliers), within and across organizational and industrial boundaries (Moore, 1997), through formal or informal linkages (Brown and Duguid, 1991; Wenger, McDermott, and Snyder, 2002) for jointly leveraging and exploiting resources, capabilities, and relationships (Filieri and Alguezaui, 2008). Figure 8.1 illustrates the extended enterprise framework and its relationship to different external communities. These cross-domain connections aim mainly at creating, sharing, recovering, and deploying new knowledge and capabilities derived from the network system in order to create value and provide continuous innovation. The EE is a new model, which is composed of a focal firm outsourcing its value-added activities to interconnected firms performing different product sub-systems (Chesbrough, 2007).

Distributed innovation process

The extended enterprise (EE) framework aims at handling the increasing costs of technology development and decreasing revenues from innovations (Chesbrough, 2007). An open innovation framework can mitigate environmental threats and accelerate innovation by effectively exploring and exploiting novel ideas, knowledge, and capabilities outside the firm. Innovation can be derived from different players such as lead users and customers, suppliers (Clark and Fujimoto, 1991; Kristensson et al., 2004; Prahalad and Ramaswamy, 2004; Thomke and Von Hippel, 2002; Von Hippel, 1986, 1988), research communities (Henderson and Cockburn, 1994), and even competitors (Gomes-Casseres, 1996).

Innovation is often the outcome of exploiting ideas and knowledge and fitting them into novel combinations rather than inventing new ones (Kogut and Zander, 1992). Indeed, Schumpeter assumed that innovation “consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence” (Nelson and Winter, 1982: 30). Kogut and Zander (1992) argued that the “combinatory capability” to generate new applications from existing knowledge may be a critical asset for sustaining competitive advantage. Within this context, the EE’s role is to gather and provide
the right knowledge to the right entity at the right time in the right format anywhere across the EE, as well as to combine these elements into novel products and/or processes (Filieri and Alguezaui, 2008). The innovation process of the EE is not sequential but carried out in parallel working groups with different expertise (Schilling and Hill, 1998). The boundaries between disciplines, firms’ units, products, and industries are then blurred and new capabilities (e.g., multi-layered integrative capability) become the strategic assets. Through this complex collaborative learning process, firms access a wide-ranging and extended array of new ideas and knowledge, thereby reducing development costs from idea generation to the commercialization phase. The strategy depicted in this chapter enables the firm to avoid redundancies of technologies and competencies throughout its network, reduce costs, and accelerate product development cycle time. Resources, once acquired and shared across the network, become a driver for continuous innovation and for the efficiency of the whole system.

However, knowledge codification processes are considered a prerequisite to the collaborative innovation process, enabling different players located at different levels and belonging to different domains or industries to meet and effectively share knowledge and information. It is also important to separate multi-player interactions in new product development (NPD) into two distinct stages: “divergent” and “convergent thinking.” The first stage is an exploratory and open-ended phase and is used for gaining fresh consumer insights and generating ideas at the ambiguous “fuzzy front end.” During the second phase, these ideas are discussed and validated and the new product is co-developed in the firm’s network of alliances, partners, suppliers, and so on. The different phases of NPD are often partially outsourced to partnering firms that continuously learn from each other, and that are ready to realize what the central firm asks of them, while reducing time-to-market and costs. Figure 8.2 shows the NPD process of the extended enterprise and its different stages. Toyota highlighted the superior performance achieved by firms which rely on tiers of external suppliers, and mobilize them in order to reduce development risks, time-to-market, and defect rates, while at the same time enhancing their capacity for innovation and flexibility (Clark and Fujimoto, 1991; Dyer and Nobeoka, 2000; Helper, 1991). To involve all these players in the NPD process, firms have created ad hoc technological platforms and communities of practice. For instance, Chrysler created a community of
innovators connecting 240 world experts from different knowledge areas, encouraged engineers to be innovative, and provided a channel for their ideas to be realized in new or improved products (Wenger and Snyder, 2000).

According to the new EE framework, competitive advantage in the future will be dependent on creativity and trust in the network, on the ability to search for ideas externally, and on the capability to communicate, learn, and anticipate changes. Moreover, the ability to maintain loyalty in this network and avoid free-riding or opportunism is important. The NPD process of the EE can be seen as a flexible and open process in which a huge and diverse number of players, linked to the focal firm in different ways, participate and collaborate, more or less directly, to develop new product concepts (Filieri and Alguezau, 2008).

**Strategic search crossing a firm’s boundaries**

The strategic focus of the modern firm is mainly on the NPD process as the key source for sustainable competitive advantage. To this end, the modern firm extends its boundaries and works closely with leading companies, uncovers new market opportunities, undertakes market experiments to discover future needs, or cannibalizes existing products (Jaworski, Kohli, and Sahay, 2000; Narver, Slater, and MacLachlan, 2000; Slater and Narver, 1998). Such a strategy forms the basis of the framework of the EE, where the reduction of time-to-market and
the speed of the innovation process are the main issues. This strategy takes into consideration the centrality of knowledge, and the value-added activities of sharing, deploying, and integrating the different knowledge bases into the firm.

In the traditional conception of the value-creation process, consumers, suppliers, and competitors were “outside the firm” and considered as opponents (Sawhney, Verona and Prandelli, 2005). Nowadays, it is exactly the opposite. Potential innovative ideas can come from lead users, customers, manufacturers, suppliers, research communities, and competitors through formal or informal linkages. Then, NPD is a process of co-creation (Prahalad and Ramaswamy, 2004), not merely a function of R&D departments. Within this context, a firm’s competitive advantage is a function of its ability to source knowledge crossing its organizational and technological boundaries, and its capability to identify and retain the most creative, connected, and acknowledged players in the business environment, as well as maintaining knowledge in-house.

A central emphasis of the EE strategy is to set up search processes or scanning of the external environment in order to identify the most innovative players as well as to grasp novel ideas and knowledge that have potential commercial value. Traditionally, past research focused on analyzing the impact of the search process within firms’ internal boundaries and along a single technological trajectory (Katila, 2002; Katila and Ahuja, 2002). Recently, authors have shifted their focus to include other actors in the search process, extending the search landscape of a firm within and outside the firm through its network crossing different technological trajectories (Laursen and Salter, 2006; Rosenkopf and Nerkar, 2001). There are two dimensions to measure a firm’s external search process: (i) breadth and (ii) depth. The first is defined as “the number of external sources or search channels that firms rely upon in their innovative activities” (Laursen and Salter, 2006: 134). The second dimension refers to “the extent to which firms draw deeply from the different external sources or search channels” (ibid.).

According to Levinthal and March (1993), the search strategy of a firm is affected by its past experience and the future expectation of its managers. Consequently, it is difficult for firms to determine the optimal search strategy in terms of depth and breadth, especially when the knowledge base of the firm is dynamic and changes over time.
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(Levinthal and March, 1993). Nevertheless, Laursen and Salter (2006) argued that organizations investing in broader and deeper search tend to have greater ability to adapt to environmental changes and innovate. The path-dependency nature of the search relying on past experiences may lead to myopic attitudes toward the potential exploitation of external knowledge sources (Levinthal and March, 1993). This results in over-embeddedness of the firm along the same technological trajectory, thereby obsoletting the current product portfolio. But adopting a broader search process may lead to other difficulties such as insufficient and inefficient convergence of these different external knowledge bases into a knowledge base with potential value (Koput, 1997). Additionally, the firm may incur higher costs in terms of resources and time for maintaining deep relationships with external partners (Laursen and Salter, 2006).

The firm needs to evaluate the costs and benefits of its external search process and try to fit the search strategy to the exigencies of the environment, at the lowest cost and within the shortest cycle times. The firm plays the role of integrator and coordinator of the dispersed specialized knowledge bases over its network. This cannot be realized without keeping in-house considerable knowledge underlying the various outsourced components, as well as building deep relationships with the other members of the network. The extended enterprise’s main core capability is the coordination and integration of the activities distributed over a network of firms.

Managing the distributed innovation process

Innovative firms are increasingly embedded in a dense network of relationships with various partners such as universities, suppliers, customers, etc. Two capabilities are required to generate value within the network: knowledge management capability and integrative capability.

Knowledge management capability

To achieve rapid and effective innovation, firms today have to enable and facilitate the activities related to knowledge acquisition, integration, sharing, storage, and exploitation (Grant, 1996). Firms then need to formulate a knowledge strategy (Zack, 1999). This phenomenon is more evident in complex NPD processes, where the increasing need
of different and cross-functional/industrial knowledge and capabilities has further decreased the benefits of innovations. Thus, a firm’s competitive advantage is related to its capacity to favor organizational learning and to manage knowledge within as well as outside its boundaries. Accordingly, knowledge management mechanisms and collaborative practices are the bases for knowledge creation and transfer (Dyer and Nobeoka, 2000; Nonaka, 1994) in order to improve a firm’s innovative performance.

Knowledge refers to a fluid mix of framed experience, values, contextual information, and expert insights providing a framework for evaluating and incorporating new experiences and information (Davenport and Prusak, 1998). Knowledge management comprises methods, procedures, and tools which support the core activities of generating, transferring, storing, and applying both tacit and explicit knowledge (Mertins et al., 2000). Most organizational knowledge is tacit, difficult to codify and embedded in complex tasks. By contrast, explicit knowledge or information includes “facts, axiomatic propositions, and symbols such as information on size and growth of a market, production schedules, and so forth” (Dyer and Nobeoka, 2000: 63), which is easy to codify and to communicate. Explicit knowledge is easy to manage and share, while tacit knowledge, being derived from particular circumstances and events, is unique and hard to replicate (Zack, 1999). Both tacit and explicit knowledge reside at four levels: individual, group, organization, and inter-organization (Hedlund, 1994). Therefore, knowledge-sharing, conversion, and learning not only occur at the individual level, but also at the inter-organizational level (Nonaka and Takeuchi, 1995). Recent studies of inter-organizational cooperation identified several obstacles to transferring knowledge crossing the borders of a firm (Simonin, 1999). Among these barriers, authors include the degree to which knowledge is tacit, specialized, and complex (Simonin, 1999; Zander and Kogut, 1995), as well as whether it is system-embedded or autonomous (Mosakowski, 1997; Simonin, 1999).

Previous researchers have identified two main mechanisms of knowledge transfer: people-to-people and people-to-document. In the first case, people interact with other people through face-to-face meetings or computer-mediated communication tools. Face-to-face meetings are much more expensive and more frequent at project kick-off, and later, in the form of milestone meetings (Carmel, 1999). Face-to-face
meetings are aimed at establishing trust, a factor that strongly influences knowledge transfer. In the second case, people learn from impersonal learning tools, such as documents, books, tutorials, and so on. People-to-document interfaces are supported by information and communication technologies (ICTs) and knowledge management systems. Kogut and Zander (1992) pointed out that knowledge codification is a key element in the facilitation at knowledge transfer among the members of a network by translating the tacit knowledge into documents which are then easily shared. The extended enterprise needs to be engaged heavily in codification practices in order to facilitate the management of knowledge and capabilities and to enhance the value co-creation among the members of the network.

**Integrative capability**

Granstrand (1998) distinguished between outsourcing the production of components and outsourcing its underlying knowledge. Recent literature claimed that large firms are expanding their technological knowledge repositories beyond the core/distinctive competences to involve background, marginal, and niche ones; recognizing the importance of background competencies (Granstrand, 1998; Granstrand et al., 1997; Patel and Pavitt, 1997). The latter refers to the technological competencies enabling the firm to effectively manage and coordinate changes in complex production processes or value chains, as well as to learn about new technologies and benefit from emerging opportunities (Granstrand et al., 1997). Brusoni and Prencipe (2001) argued that the knowledge possessed by a network led by a system integrator firm often extends beyond what it actually does. They empirically found that though firms outsource their high-value activities (e.g., detailed design and manufacturing) to specialized suppliers, they keep the underlying knowledge in-house, namely “integrative capability.” This latter refers to the firm’s ability “to set the requirements, specify source equipment, materials, and components, which can be designed and manufactured either internally or externally, and integrate them into the architectures of existing products” (Prencipe, 1997: 1275).

The EE plays a critical role in integrating knowledge distributed over the network into a product architecture, coordinating the co-creation activities among the members of the network during the value creation process. This may entail the risk of opportunism. Because of the tacit nature of knowledge, contractual arrangements cannot specify all
contingencies. Control is maintained, and opportunistic behaviors are moderated not so much by the formal structure managing dyadic relationships, but by social norms, reputation, and trust. Several authors emphasize the importance of trust-based, informal networks for innovation (Kreiner and Schultz, 1993; Liebeskind et al., 1996). Trust governing the relationship between two firms within the value creation process is more relation-specific than institution-oriented. This relation-specific trust is derived from previous experiences with the firm, its reputation, potential long-term collaboration, or the like. Consequently, to enhance and better perform its innovation activities, the EE needs to cultivate a culture of trust and long-term commitment between its network’s members through developing various social mechanisms. Toyota represents a leading company that succeeded in building a devoted network of collaborators and partners through social tools for enhancing innovation, reducing costs, and increasing flexibility and adaptation.

**Case study: Toyota**

Generally, firms zealously guard their proprietary knowledge and are reluctant to share it with external actors. In fact, Toyota relies on suppliers for more than 70 percent of the value of its vehicles (Dyer and Nobeoka, 2000) and the network collaborates more strongly than others. Toyota was able to increase its worker productivity, lower inventories, and improve product quality at a faster rate than competitors. Further, Toyota recognized the importance of establishing strong trust between it and the other members of the network, such as suppliers, component manufacturers and so on, by the creation of three key inter-firm organizations (1) the Suppliers’ Association, (2) the Knowledge Transfer Consultants (OMCD), and (3) the Jishuken/PDA core groups or small-group learning teams.

These inter-firm organizations were established in order to foster common routines, defined as “pattern(s) of behaviour that (are) followed repeatedly without conscious awareness, and (are) subject to change if conditions change” (Nelson and Winter, 1982: 263). These range from well-specified technical routines for producing artifacts, to procedures for hiring and firing, ordering new inventory, R&D, and business strategies (Nelson and Winter, 1982). According to Pentland and Reuter (1994), a routine can be a varied repertoire of responses
In which individual moves are patterned as “grammars of action,” featuring the use of narrative data and methods to better explain processes (Lorenzoni and Lipparini, 1999). Five network focal points were purposefully designed by Toyota to facilitate knowledge transfers and integration across organizational boundaries:

1. **Supplier association (kyohokai).** These associations are established to promote “mutual friendship” and the exchange of technical information between Toyota and its suppliers. Toyota’s kyohokai meet every other month (e.g., general assembly, top management meetings) to facilitate high-level communication of explicit knowledge-sharing (e.g., production plans, market trends) among members. More frequent interactions occur within the association’s topic committees (e.g., cost, quality, safety, etc.). Suppliers’ associations are also an important vehicle for creating the “identity” of the “Toyota Group.”

2. **Onsite consulting.** The Toyota Operations Management Consulting Division (OMCD) is the organizational unit within Toyota that is assigned the responsibility to acquire, store, and diffuse valuable production knowledge residing within Toyota’s Extended Enterprise. The division consists of six senior and highly experienced executives and about fifty consultants that Toyota sends to the suppliers’ sites for a period ranging from one day to many months, and its assistance is for free. One of the most important features of this routine is that Toyota demands that participating suppliers let other suppliers see their operations and best practices when the project is completed. By enabling supplier-to-supplier knowledge transfer, such a routine has a strong impact on process quality and productivity.

3. **Voluntary learning teams (Jishuken/PDA core).** These teams are groups of 55–60 key suppliers (jishukenkyu-kai or jishuken) organized by the OMCD with the goal of assisting each other with productivity and quality improvements. These groups are composed of executives (plant managers, assistant plant managers, and/or section managers) and they are built based upon: (1) geographic proximity; (2) competition (direct competitors are not in the same group); and (3) experience with Toyota. Each year these groups meet together with the OMCD manager to determine a “theme” (project) selected by suppliers (with Toyota’s input) in strategic and
Table 8.1  Toyota routines for suppliers’ network management

<table>
<thead>
<tr>
<th>Routine</th>
<th>Communication process</th>
<th>Type of knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supplier association</td>
<td>Many-to-many interactive</td>
<td>Explicit knowledge</td>
</tr>
<tr>
<td>2. Onsite consulting</td>
<td>Many-to-one and many-to-many, interactive</td>
<td>Tacit knowledge</td>
</tr>
<tr>
<td>3. Voluntary learning teams</td>
<td>Many-to-many interactive</td>
<td>Tacit knowledge</td>
</tr>
<tr>
<td>4. Problem-solving teams</td>
<td>Many-to-one interactive</td>
<td>Tacit knowledge</td>
</tr>
<tr>
<td>5. Inter-firm employee transfer</td>
<td>One-to-one interactive</td>
<td>Tacit knowledge</td>
</tr>
</tbody>
</table>

relevant areas. When a theme is established (e.g., “Eliminating supplier design defects”), the group establishes a schedule to visit each supplier’s plant to develop jointly suggestions for improvement. In addition, a quality management conference is held once each year and offers suppliers the opportunity to learn from cases of successful supplier quality improvement.

(4) **Problem-solving teams.** These teams are designed to bring knowledge to solve emergent problems within the network. If a supplier has a quality problem of which the root cause is not easily determined, the OMCD or the QAD (Quality Assurance Division) set up a problem-solving team (including various divisions and possibly even other Toyota suppliers) to fix it. Once the problem-solving team has identified the source of the problem as being in product design, Toyota’s Design Engineering Division is asked to work more closely with the supplier to find and implement an effective solution.

(5) **Inter-firm employee transfer.** The transfer of employees (*Shukko*) is carried out to help large assemblers maintain control of suppliers and provide an opportunity to shed unwanted employees. Further, this mechanism is used for creating a network identity and transferring knowledge from Toyota to suppliers.

Table 8.1 summarizes the five learning routines adopted by Toyota and the nature of these processes – either bilateral or multilateral – determining the type of knowledge that can be transferred through these processes.
Unlike US automakers that tried to implement the same routines and processes, Japanese automakers have created a high level of trust that enormously facilitated the knowledge-sharing process and reduced transaction costs. In fact, Toyota spent only 21 percent of its face-to-face interaction time on negotiating contracts and prices. Trust, which characterizes the Toyota network, has a positive effect on its procurement productivity (value of goods purchased per procurement employee). Besides, the knowledge-sharing among the members of Toyota network was reciprocal. All Toyota’s knowledge and capabilities are open to Toyota’s suppliers on the condition that every supplier share and open its plant to other members of the network. Toyota states: ‘we will help you, but in return, you must agree to help the network’ fostering a win-win strategy that is focused on transparent, equity-based, and long-term collaboration with suppliers. Free assistance created a state of reciprocal obligation within the network. Suppliers that did not respect these rules of openness were sanctioned by Toyota with lower commitments.

Production processes and innovation-related activities are not viewed as proprietary and Toyota accepts that some valuable knowledge will spill over to benefit competitors. Any valuable knowledge that Toyota or a supplier possesses is viewed as accessible by virtually any member of the network (with perhaps the exception of a direct competitor).

While outsourcing its productive processes, Toyota maintains “control” over the whole network through its social system. The outsourcing of business processes is accompanied by the capacity to learn from suppliers’ experiences and to share such knowledge with other suppliers, namely the capacity to locate, gather, and transfer the right knowledge to the right actor across the Toyota suppliers network at the right time in the right format. This capability increases Toyota’s reputation among its network of partners and legitimizes its leadership role (power and relevance).

Toyota itself thus accesses a greater amount of knowledge and information. It learns from the network, but at the same time, monitors and coordinates its activities. The greater the knowledge asymmetry with the members of the network, the greater is Toyota’s control and power over the network and the appeal of being part of this network. Face-to-face meetings are important mechanisms since tacit knowledge “is created and shared via direct person-to-person interaction, story-telling,
and shared experience” (Zack, 2000: 81). However, face-to-face frequent communication is also aimed at increasing the level of trust across the network. In fact, frequent communications have been found to be a strong predictor of trust-based relationships (Daft and Lengel, 1986; Fidler and Johnson, 1984).

Toyota shows how it is possible to outsource the main part of the production process to external partners and legitimates its position of expert in the network by accumulating suppliers’ networks knowledge and distributing it to the others. Suppliers will find additional benefits of being part of the network by learning other suppliers’ best practices, improving productivity, and getting more commitments from Toyota. Knowledge-sharing transfer through organizational routines helped Toyota to increase worker productivity, lower inventories, improve product quality, and introduce new products at a faster rate than competitors.

**Conclusion**

This chapter illustrates how innovation processes are becoming distributed over trust-based and long-term networks. This new way of collaborating and innovating provides various advantages such as cost reduction, helping firms to diminish their cycle time, and an increase in returns. Previously, innovation had been considered a core capability that needed to be performed within the firm’s boundaries. Recently, numerous technology-based firms have adopted a strategy consisting of outsourcing innovative activities to collaborators specialized in different technological domains. This reshapes the definition of the core capabilities of a firm that are needed to sustain its competitive advantage.

This new orientation gives rise to a new business model, namely the Extended Enterprise. The authors have conceptualized the EE as a collection of dispersed and interdependent resources, dynamic capabilities, and relationships, following a win-win strategy in their interaction with new and different players (such as customers and suppliers), organizations, and industries. Considering the increasing uncertainty of the economic environment, the main strategy of the EE is to focus on new product developments as the main source of sustainable competitive advantage. Accordingly, the EE reduces time to market and speeds up the innovation process, giving rise to a more distributed
network of specialized and interdependent knowledge bases involved in the value creation process. The focal firm then aims at boundary-spanning activities for two main reasons. On the one hand, the firm needs to sense the market in order to detect new ideas and opportunities, to establish novel technological designs. But the focal firm is also responsible for ensuring adequate resource allocation of the different innovation activities to the different members of the value chain. Thus, the EE can be seen as a “novelty seeker” and “network shaper” (Teece, Pisano, and Shuen, 1997). This strategy is aimed at accelerating the NPD process and reducing costs.

The EE’s knowledge management capability aims at managing knowledge within the network and facilitating the knowledge-sharing activities that result in high performance. The codification of knowledge is considered a prerequisite for transferring knowledge among members of the network. Integrative capability refers to the ability of the firm to integrate and coordinate the activities required for an effective co-creation system. Several authors distinguish between the outsourcing of activities and the outsourcing of their underlying knowledge. They argue that while firms outsource the development of products, they maintain key knowledge in-house as well as coordinating knowledge dispersed over the network, while at the same time sensing new opportunities. Relational governance is perceived as an adequate tool for managing the distributed processes and resources within the framework of the EE. Contractual agreements, which were traditionally used for managing cooperation among firms, are seen as ineffective. This is principally due to the tacitness of knowledge that cannot be specified a priori. Thus, the EE, as it is illustrated through the case study of Toyota, relies on novel mechanisms to develop trust and norms of commitment to its network, as a tool to manage dispersed activities, and develop a culture driven by innovation. Future research may contribute to the literature by developing other examples of firms adopting the extended enterprise model.

The EE framework offers several insights for managers about the path their firms need to follow to gain sustained competitive advantage. In the current environment, firms have to open their boundaries, and draw on external knowledge and capabilities from an increased number of players having different roles and functions, such as lead users, suppliers, research centers, universities, manufacturers, employees, or partner firms. Even competitors may become strategic partners,
and the integration of different core competencies can lead to superior returns on investments, eliminate other competitors, and create new markets or products.

References


Suitable organization forms for knowledge management at various R&D functions in decentralized and cooperative R&D networks

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Introduction

Companies engaged in Research and Development (R&D) in highly competitive global industries have to take into consideration numerous factors such as reduced delivery time, cost reduction, and increased demands for differentiated products with higher quality (Balbontin et al., 2000). Management issues, such as supply-chain management, alliance strategies, and outsourcing strategies, have been introduced to solve the aforementioned problems, and have become primary methods used by many companies (Boyle et al., 2006; Li et al., 2005). Stiff competition has forced companies to consider the relocation of R&D activities to foreign locations (“offshoring”) and/or to external service providers (“outsourcing”) in networks to develop new strategies, capacities, and capabilities. By tapping into external networks, the companies can make use of focused expertise and concentrated resources. They can also take advantage of diversified cutting-edge technologies by sharing risks and benefits with the participants inside the networks. The trend of R&D management structure is changing from being ethnocentric centralized to geocentric centralized, and then to polycentric decentralized. The current R&D management structure tends to be decentralized and cooperative. The primary manufacturing operation has become the mass customization system in industry. All of these are to meet the urgent demands for carrying out R&D in decentralized and cooperative R&D networks.

Even though carrying out cooperative R&D is important, only very few researchers have examined R&D in decentralized and cooperative R&D networks (Andersson et al., 2002; Belderbos et al., 2004; Helble and Li, 2004). But important questions related to suitable
organization forms for the distribution and the creation of knowledge in R&D networks remain unanswered. This is in fact a critical advantage for innovation in companies (Dodgson, 1993; Song et al., 2006). Accordingly, this chapter first determines the critical success factors (CSF) of decentralized and cooperative R&D networks, and then proposes suitable organization forms for knowledge management (KM) for different R&D operations. In addition, analytic network process (ANP) is frequently applied to analyze the inter-relationship of the problem and to prioritize the preferences by generalizing experts’ opinions, (which are often imprecise and vague). To compensate for this deficiency and solve the aforementioned problem, a fuzzy ANP is proposed to examine suitable organization forms.

The rest of this chapter is organized as follows: the second section examines the main tasks of knowledge management activities. The critical factors for the success of decentralized and cooperative R&D networks are studied in the following section. Next, a fuzzy ANP model considering confidence level and risk indicator is constructed. This is followed by an examination of case studies to select and analyze suitable organization forms for KM for different R&D functions. Discussions and conclusions are provided in the last section.

Main tasks of knowledge management activities

In recent years, the intensity of horizontal and vertical relations among companies in the knowledge intensive industries has increased to a large extent. Knowledge has become a critical factor that affects industry dynamics (Ozman, 2006). In most industries, companies need to be persistent with the strategies that promote relations with other actors in manufacturing networks, not only for physical investment returns, but also for sharing knowledge and making use of knowledge spillovers. A major process that accompanies this relationship between the companies is knowledge flow which is usually deemed as an engine for innovation.

Globalization and other rapid changes in technologies and markets require companies to develop new knowledge to keep them competitive (Song et al., 2006). Knowledge management (KM) is the ability to create, acquire, capture, store, maintain, and disseminate knowledge among companies inside decentralized and cooperative R&D networks.
Knowledge diffusion and transferring

The biggest challenge for KM is knowledge diffusion (Quinn et al., 1996). A decentralized and cooperative R&D management structure, which relocates R&D activities to the foreign locations (offshoring) and/or to external service providers (outsourcing) in networks, has three different roles: (i) for the input-oriented organization: it is the input for innovation, organization by scientific discipline or technical area, and organization by type of activities; (ii) for the output-oriented organization: it is the output for innovation and organization by product lines or projects; (iii) for the matrix organization: it is the combination of input and output for innovation. Suitable organization inside decentralized and cooperative R&D networks needs to be understood to effectively distribute new knowledge and use the existing knowledge at different R&D functions. Nine senior managers (this is detailed in Section 5) were asked to distinguish R&D functions by diversification, technology freshness, change rate, human resources exchange (Lundvall, 2004), interdependence between units, innovation, and information flow (Andersson et al., 2002; Kuvaas, 2008). Based on their responses, characteristics of each R&D function are discussed as follows:

Input-oriented organization

For R&D in this stage, the rate of change in technical disciplines is greater than the rate at which projects are completed. The higher the degree of sophistication and the less mature the technology, the greater the need for acquiring knowledge. The preference for a discipline-based structure will also be higher in this case. The development outcomes are always unpredictable and incomparable. Radical innovation and product innovation tend to be far away from the core technologies of the existing R&D knowledge, but receive innovation motivation from the network. The information flow within the internal R&D team is small, but with an outside team the flow is very high and relatively mutual. Since the knowledge in the decentralized and cooperative R&D networks should be effectively used and learned by internal R&D teams, it is important to strengthen the interactive exchange between the internal teams and networks. The most suitable form of organization for this specific function is the one that can provide both the strongest alignment with the strategies of decentralized and cooperative R&D
networks and the strong transfer of common knowledge among the teams.

**Output-oriented organization**
This kind of R&D function should be selected when there is strong dependence on technologies in a certain product category, or the products have considerable variety. The technical specifications are standardized with slight changes, and R&D outcome is predictable and comparable. Critical human resources and development in cost, time, quality, and flexibility largely come from internal experience. Accessorial innovation and the products for the new projects largely come from the internal teams. Information flow is guided by the rules and regulations of the existing internal experiences. The most suitable organization form promotes strong adherence to the specific expertise and strong knowledge transfer within engineering functions.

**Matrix organization**
Written reports focusing mostly on quantifiable and explicit experiences, such as quality, scheduling, and technical parameters, are necessary to ensure inclusion of ongoing operations. These procedures are mainly related to incremental innovations. Within the organization, critical external human resources, core technologies, and information flow can be transferred into the internal teams. On the other hand, external teams can also access critical human resources, complementary technologies, and information flow from either internal or external teams. Human resources, core technologies, and information flow between internal teams and external teams remain constant. Thus, the most suitable form of organization for this specific function is the one that can provide the biggest possibilities for supporting transfer and sharing of knowledge as well as provide strong transfer of specific knowledge among teams.

**Knowledge absorption and retention**
In a decentralized and cooperative R&D network, it is not a single company but the network that shares a particular body of integrated core capabilities, complementary assets, and the learning capability (Kash and Rycoft, 2000). Explicit knowledge focusing on a network’s specific products can be stored in a database that is shared among
the participants. Implicit or tacit knowledge is the network’s “know-how” capability, and maintained by individuals from different enterprises. This combination of knowledge should give the network the ability to innovate. Complementary assets are supplementary bodies of knowledge that have been accessed to take full advantage of core capabilities within the participants. The learning capability includes both the accumulated participants’ knowledge that exists individually and the knowledge that exists in the network as a whole. Network core capabilities and complementary assets are constantly modified by a range of network learning processes in finding the solutions to the problems. The learning concept includes information, people, and units (Pinheiro, 2002). Learning in each unit is reflected by an increase in productivity and market shares. This is a result of the scale-effects, better communications, establishment of routines, and the other possibilities. However, learning is not merely the aggregation of individual and unit learning (Heitor, 2001). It results from the interaction of people and units across the network. It also depends on the network relationships between people and units that are established under the background of the unit’s culture and its market.

**Knowledge induction and creation**

Although knowledge-seeking and knowledge-transferring processes focus on the exploitation of the existing knowledge or the distribution of the new knowledge, the creation of the new knowledge is the most beneficial for innovation and the subsequent R&D results (Armbrecht et al., 2001). Accordingly, suitable organizational forms need to be applied for distributing the existing knowledge and creating new knowledge relating to the extents of knowledge spillover and innovation at different R&D functions. In general, there are five organizational forms for KM as follows (Brown and Duguid, 2000; Cooper et al., 2002; Nonaka, 1994; Soderquist, 2006):

(A) A sequential KM function: this type of organizational form collects, develops, and disseminates knowledge at each stage, and automatically transfers knowledge to the next procedure. There is no specific KM task force in this method.

(B) A central KM function: a team of specialists headed by a chief knowledge officer is in charge of KM-related activities.
(C) A project-decentralized KM task force: a task force headed by a leader reporting to the project manager is in charge of internal KM-related activities in each development project.

(D) Functionally located KM cells: this form develops knowledge in support of development projects and disseminates knowledge to the project groups; it is the responsibility of a cell within the specialized functional departments.

(E) A matrix KM function: this form collects, develops, and disseminates knowledge automatically and simultaneously within all R&D activities. There is no specific KM task force in this method.

How to analyze and select suitable organization forms for KM at different R&D functions will be further analyzed in the later sections.

Critical factors for the success of decentralized and cooperative R&D networks

Dickson (1966) identified twenty-three criteria for selecting suppliers. According to him, cost, quality, and delivery performance were the most important. Weber and Desai (1996) also confirmed that quality, delivery, and cost were considered to be most important. However, with the increasing importance of strategic outsourcing and global competition, the approach to traditional criteria has changed to reflect the new requirements for the role of the suppliers in the supply chain (Choy et al., 2005). Strategic evaluation of the suppliers requires consideration of the supplier practices and capabilities (Talluri and Narasimhan, 2004). Because of the importance of concurrent engineering and the supplier’s involvement in the new product development, suppliers’ R&D capabilities are examined while assessing their performance. Dulmin and Mininno (2003) defined the R&D criteria as suppliers’ efforts in the project team. De Toni and Nassimbeni (2001) put forward a framework for the evaluation on suppliers’ R&D efforts. Support offered by the supplier in product simplification, component selection, and the design for manufacturing etc., during development stages were used in the evaluation criteria. The use of these criteria leads to a substantial improvement in quality, cost, and delivery performance (Maffin and Braiden, 2001). Emden et al. (2006) proposed a successful framework for selecting partners
for the development. The framework identifies three broad phases: (1) technological alignment (technical ability, market knowledge complementarities, and overlapping knowledge bases); (2) strategic alignment (motivation correspondence and goal correspondence); and (3) relational alignment (compatible cultures, propensity to change and long-term orientation). The new paradigm requires the manufacturer to mass-produce customized products based on individual customer needs. Therefore speed, flexibility, quality, and cost are becoming increasingly important in the competitive environment (Olhager and Selldin, 2004).

By evaluating suppliers based on consistency, reliability, relationship, flexibility, price, service, technological capability, and finances, Choi and Hartley (1996) also addressed twenty-six criteria for selecting suppliers. Verma and Pullman (1998) ranked the importance of the quality, on-time delivery, cost, lead time, and flexibility of the supplier. According to Vonderembse and Tracey (1999) supplier selection criteria and supplier involvement determine the supplier and its manufacturing performance. They further conclude that the supplier selection criteria could be evaluated by supplier’s product quality, availability, reliability, and performance. Supplier involvement could be evaluated by the supplier’s R&D and products improvement, and supplier performance could be evaluated based on its product delivery, damage, and quality. Furthermore, manufacturing performance could be evaluated by the supplier’s product cost, quality, inventory, and delivery (Chang and Wang, 2006). After comparing the advantages and limitations of nine previously developed methods for supplier evaluation, Muralidharan et al. (2002) concluded that the product quality, delivery, price, and supplier’s technical capability, finances, attitude, facility, flexibility, and services were used for evaluating the suppliers. Knowledge, skill, attitude, and experience were used for assessing the individuals employed by the supplier.

There are many CSFs in decentralized and cooperative R&D networks, and CSFs change when the environment changes. Therefore, it is necessary to list extensive questionnaires, organize experts’ opinions, and use statistical analysis to obtain objective results. Thirty-one CSFs are finally collected from extensive literature reviews and expert interviews. Questionnaires related to the importance of each CSF were answered by experts in high-technology industries. After factor analysis, nine CSFs with eigenvalue bigger than 1 were extracted as common
factor dimensions. Table 9.1 lists the eigenvalues, variances, and cumulative variances of these nine CSFs, and they explain 78.31% of the variances in the original data. Rotated method, varimax with Kaiser Normalization, is adopted to name the extracted factors. The evaluation factors in the same group are put together, and the factors with a loading greater than 0.45 are selected. After factor analysis, the most important extracted factors for cooperative R&D networks are as follows: relational alignment, technological alignment, design capabilities, speed, costs, quality, strategic alignment, resources, and equipment. Nine critical success criteria summarized in Table 9.1 with a fuzzy ANP model developed in the following section will be applied for analyzing suitable organization forms for KM in the case studies later.

A fuzzy ANP model considering confidence level and risk index

Analytic hierarchy process (AHP) is one of the most commonly used methods for multiple criteria decision-making. Through AHP, evaluations from decision-makers can be integrated and a complicated problem can be transferred into a simple hierarchy system. Within the system, the factors are listed from higher to lower hierarchies, and the qualitative and quantitative factors can be evaluated in a systematic manner (Saaty, 1980). Analytic network process (ANP) generalizes AHP by replacing hierarchies with networks, and it can solve complicated hierarchical relationships better than AHP (Karsak et al., 2002). Because the oversimplification of the model may not lead to a good evaluation result, ANP may be needed to resolve the problem.

An assumption of ANP is consistency, or transitivity of preference. However, this may not always be true in reality (Murtaza, 2003). The results may be misleading if the uncertainty (fuzziness) of human decision-making is not taken into consideration. Because decision-making problems are fuzzy and vague, a good decision-making model should be able to tolerate the vagueness or ambiguity (Yu, 2002). Therefore, the combination of fuzzy theory and ANP should be more appropriate and effective than traditional ANP in an uncertain environment. Some applications of fuzzy AHP (Carrera and Mayorga, 2008; Lee et al., 2006) and fuzzy ANP (Mohanty et al., 2005) have been made in this context. However, few applications of fuzzy ANP with
Table 9.1 *Factors, eigenvalues, and cumulative variance in each dimension*

<table>
<thead>
<tr>
<th>Dimension name</th>
<th>Critical success factors of R&amp;D cooperative networks</th>
<th>Eigenvalue</th>
<th>Variance (%)</th>
<th>Cumulative variance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relational alignment</td>
<td>Similar cultures, ready to change, long-term orientation, relationship, trust, attitude</td>
<td>6.21</td>
<td>17.23</td>
<td>17.23</td>
</tr>
<tr>
<td>2. Technological alignment</td>
<td>Product improvement, technology complementarities, market complementarities, overlapping knowledge bases, and skill</td>
<td>5.37</td>
<td>13.29</td>
<td>30.52</td>
</tr>
<tr>
<td>3. Design capabilities</td>
<td>Design, support in product simplification, support in component selection, support in design for manufacturing activities</td>
<td>4.83</td>
<td>10.57</td>
<td>40.09</td>
</tr>
<tr>
<td>4. Speed</td>
<td>Time, availability, flexibility</td>
<td>4.03</td>
<td>9.45</td>
<td>50.54</td>
</tr>
<tr>
<td>5. Cost</td>
<td>Cost, price, flexibility, availability</td>
<td>3.28</td>
<td>7.93</td>
<td>58.47</td>
</tr>
<tr>
<td>6. Quality</td>
<td>Quality, similar culture, consistency, reliability</td>
<td>2.27</td>
<td>6.82</td>
<td>65.29</td>
</tr>
<tr>
<td>7. Strategic alignment</td>
<td>Long-term orientation, motivation correspondence</td>
<td>2.03</td>
<td>5.37</td>
<td>70.66</td>
</tr>
<tr>
<td>8. Resources</td>
<td>Resources complementarities, experience, closeness</td>
<td>1.56</td>
<td>5.21</td>
<td>75.87</td>
</tr>
<tr>
<td>9. Equipment</td>
<td>Equipment</td>
<td>1.13</td>
<td>2.43</td>
<td>78.31</td>
</tr>
</tbody>
</table>
entropy weight have been made. We propose the following method that combines both fuzzy set theory and simplified ANP methodology (Kang and Lee, 2007; Lee et al., 2006):

(1) To set up an experts committee to define the problem and decompose the problem into a network. It is essential for a company to select an appropriate organization form for its further and successful development. The network structure should contain an overall objective at the first level, criteria for achieving the overall objective at the second level, and detailed criteria at the following level. To meet the requirements of simplified ANP, only the interrelationship among the detailed criteria that have the same upper-level criterion is taken into consideration. Alternatives under evaluation are at the lowest level. Based on the proposed network, a questionnaire is prepared to do a pairwise comparison of elements by their contribution. This is done to achieve the upper-level element, to examine the interrelationship among the detailed criteria, and to evaluate the performance of alternatives towards each detailed criterion.

(2) To establish fuzzy weight vector to determine the importance of each criterion in achieving the overall objective. A nine-point scale, as suggested by Saaty (1994) is used for pairwise comparison and relative ratings are assigned. A paired comparison matrix is made after each criterion has been compared. For example, \( m \) criteria, denoted by \( X_1, X_2, X_3, \ldots X_m \), are compared in pairs by their relative weights, denoted by \( w_1, w_2, w_3, \ldots w_m \), respectively. A matrix, \( W_1 \), is established to show the pairwise comparisons (Saaty, 1980).

\[
W_1 = \begin{bmatrix}
C_1 & C_2 & \cdots & C_m \\
W_1 & W_1 & \cdots & W_1 \\
W_2 & W_2 & \cdots & W_2 \\
\vdots & \vdots & \ddots & \vdots \\
W_m & W_m & \cdots & W_m \\
\end{bmatrix}
\]

The consistency property of the matrix is examined, and the original values in the pairwise comparison matrix must be revised by
the decision-maker if an inconsistent judgment is found (Saaty, 1994).

For a number of \( H \) experts, the synthetic set representing the relative importance level between factors \( p \) and \( q \) can be shown as (Saaty, 1994):

\[
c_{pq} = \left( \prod_{k=1}^{b} c_{pqk} \right)^{1/b}, \quad \forall k = 1, 2 \ldots, k
\]

(2)

\[
\alpha_p = \sum_{q=1}^{m} c_{pq}, \quad \forall p = 1, 2 \ldots, m
\]

(3)

\[
z_p = \alpha_p \div \sum_{p=1}^{m} \alpha_p, \quad \forall p = 1, 2 \ldots, m.
\]

(4)

After combining the experts’ opinions, the weights of criteria can be represented by a fuzzy weight vector as follows:

\[
\tilde{w}_1 = \begin{bmatrix}
\tilde{z}_1 \\
\tilde{z}_2 \\
\vdots \\
\tilde{z}_m
\end{bmatrix}
\]

where \( \tilde{z}_p \) can be \( \tilde{1}, \tilde{3}, \tilde{5}, \tilde{7}, \tilde{9} \).

(5)

(3) To determine the importance of each detailed criterion with respect to its upper level criterion we assume that there is no dependence among detailed criteria. After checking consistency property, the matrix and the eigenvector with respect to an upper level criterion \( m \) are as follows:

\[
W_{2m} = U_1(m) \begin{bmatrix}
U_{11}(m) & U_{12}(m) & \cdots & U_{1n}(m) \\
U_{21}(m) & U_{22}(m) & \cdots & U_{2n}(m) \\
\vdots & \vdots & \ddots & \vdots \\
U_{n1}(m) & U_{n2}(m) & \cdots & U_{nn}(m)
\end{bmatrix}
\]

, for each \( m \).

(6)

and \( w_{2m} = \begin{bmatrix}
U_{11}(m) \\
U_{21}(m) \\
\vdots \\
U_{n1}(m)
\end{bmatrix} \), for each \( m \).

(7)
where $n(m)$ is the number of detailed criteria respective to an upper level $m$, and the total number of detailed criteria $n$ is equal to the sum of all $n(m)$.

(4) To establish fuzzy judgment matrix. Both simulation results and experts’ opinions are used to evaluate the performance of the alternatives on the detailed criteria. For the simulation results, membership function is between zero and one, where “1” represents the best outcome and “0” represents the worst outcome. To represent linguistic terms for facilitating judgment and integrating different experts’ opinions, triangular membership functions are defined.

For a detailed quantitative criterion that is better with a bigger value, its membership function is as follows (Lee et al., 2006):

$$B_n = \begin{cases}
\frac{(x - x_n^-)}{x_n^+ - x_n^-} & x_n^- \leq x \leq x_n^+ \\
1, & x \geq x_n^+
\end{cases}$$

(8)

For a detailed quantitative criterion that is better with a smaller value, its membership function is as follows:

$$B_n = \begin{cases}
\frac{(x_n^+ - x)}{x_n^+ - x_n^-} & x_n^- \leq x \leq x_n^+ \\
1, & x \leq x_n^-
\end{cases}$$

(9)

where $x_n^+$: The largest possible value of alternatives on a detailed criterion,

$x_n^-$: The smallest possible value of alternatives on a detailed criterion,

$x$: The value of an alternative on a detailed criterion.

With a fuzzy number, 1, 3, 5, 7 or 9, which is defined in Table 9.2, a fuzzy judgment vector can be built for each detailed quantitative criterion to represent the relative performance of each alternative on the detailed quantitative criterion. Since it is difficult to obtain data for many other detailed criteria, these data are evaluated by the experts instead. This chapter adopts five different levels of evaluation and their linguistic values can be found in Table 9.3. A vector can then be obtained for comparing relative performance of the alternatives by a detailed qualitative criterion. The matrix showing the relative performance of
Table 9.2  Characteristics function of the fuzzy numbers

<table>
<thead>
<tr>
<th>Fuzzy number</th>
<th>Membership function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(1, 1, 3)</td>
</tr>
<tr>
<td>(\tilde{x})</td>
<td>((x - 2, x, x + 2)) for (x = 3, 5, 7)</td>
</tr>
<tr>
<td>9</td>
<td>(7, 9, 9)</td>
</tr>
</tbody>
</table>

alternatives on detailed criteria, including both quantitative and qualitative detailed criteria, with respect to the same upper level criterion \(n\) is:

\[
\tilde{X}_{3m} = \begin{bmatrix}
\tilde{x}_{11} & \tilde{x}_{12} & \ldots & \tilde{x}_{1n(m)} \\
\tilde{x}_{21} & \tilde{x}_{22} & \ldots & \tilde{x}_{2n(m)} \\
\vdots & \vdots & \ddots & \vdots \\
\tilde{x}_{i1} & \tilde{x}_{i2} & \ldots & \tilde{x}_{in(m)} 
\end{bmatrix}
\]  

(10)

\(x_{in(m)}\) is the performance of alternative \(i\) on detailed criterion \(n\) under criterion \(m\).

(5) To determine the interdependence among the detailed criteria. The inner dependence among detailed criteria under the same criterion is estimated by analyzing the impact of each detailed criterion on other detailed criteria with the same upper level criterion. The interdependence weight matrix of detailed criteria with the same upper level criterion is:

\[
W_{4m} = D_{1(m)} \begin{bmatrix} D_{1(m)} & D_{2(m)} & \cdots & D_{n(m)} \\ k_{11(m)} & k_{12(m)} & \cdots & k_{1n(m)} \\ \vdots & \vdots & \ddots & \vdots \\ k_{n1(m)} & k_{n2(m)} & \cdots & k_{nn(m)} \end{bmatrix}
\]

(11)

Zeros are assigned for the detailed criteria that are independent.

(6) To obtain the interdependence priorities, \(w_{DC(m)}\), of the detailed criteria by combining the results in Step 3, Step 4, and Step 5.

\[
w_{DC(m)} = W_{4m} \times w_{2m} \text{ for each } m.
\]  

(12)
(7) To determine the priorities of alternatives, $\tilde{w}_{21(m)}$, with respect to each criterion by combining the results in Step 4 and Step 6 as the following:

$$\tilde{w}_{21(m)} = \tilde{X}_{5m} \times w_{DC(m)}$$ for each $m$. \hfill (13)

The matrix $\tilde{X}_{21}$ groups together the columns of $\tilde{w}_{21(m)}$ for all $m$’s:

$$\tilde{X}_{21} = [\tilde{w}_{21(1)}, \tilde{w}_{21(2)}, \ldots \tilde{w}_{21(m)}]$$ \hfill (14)

(8) The overall priorities for the alternatives are obtained by combining the results from Step 2 and Step 7; that is multiplying $\tilde{X}_{21}$ by $\tilde{w}_{1}$.

$$\tilde{r} = \tilde{X}_{21} \times \tilde{w}_{1}$$ \hfill (15)

(9) To use intuition ranking method to rank the alternatives by their fuzzy triangular numbers. Membership function curves are drawn, and the fuzzy number with a higher mean value and lower spread is the most suitable organization form.

(10) Establish the total fuzzy performance matrix with $\alpha$-cuts by performing fuzzy number multiplications and additions with the interval arithmetic and cuts. The degree of confidence $\alpha$ represents uncertain level from resources data, decision-makers’ understanding level about resources data, and controllability of evaluation results (Zsidisin, 2003). By defining the interval of confidence at level $\alpha$, the triangular fuzzy number can be characterized as:

$$\tilde{C}_\alpha = [(a - l)\alpha + l, -(r - a)\alpha + r],$$ \hfill (16)

where $l$, $a$, $r$ is the smallest, middle and biggest value of $\tilde{r}$ from Equation (15). From Equation (16), Equation (17) can be made as:

$$R_\alpha = \begin{bmatrix}
\begin{pmatrix} \alpha & \alpha \\ r_{11l} & r_{11r} \end{pmatrix} & \begin{pmatrix} \alpha & \alpha \\ r_{12l} & r_{12r} \end{pmatrix} & \cdots & \begin{pmatrix} \alpha & \alpha \\ r_{1ml} & r_{1mr} \end{pmatrix} \\
\vdots & \vdots & \ddots & \vdots \\
\begin{pmatrix} \alpha & \alpha \\ r_{n1l} & r_{n1r} \end{pmatrix} & \begin{pmatrix} \alpha & \alpha \\ r_{n2l} & r_{n2r} \end{pmatrix} & \cdots & \begin{pmatrix} \alpha & \alpha \\ r_{nm1} & r_{nmr} \end{pmatrix}
\end{bmatrix}$$ \hfill (17)

where $r_{ij\alpha} = x_{ijl}^\alpha \otimes w_{iil}^\alpha, r_{ijr}^\alpha = x_{ijr}^\alpha \otimes w_{iir}^\alpha$, and $\alpha$ is between 0 and 1.
(11) Establish the total fuzzy performance matrix with the degree of risk of the experts on judgment. Generally speaking, risk issues are always in the decision-making process. In this research, the risk \( \beta \) is related to the characteristics in the relevant market and technology. The technical complexity and market value are positively correlated with the degree of perceived risk (Zsidisin, 2003). To produce the final crisp number, de-fuzzy is made by joining the risk indicator. The total fuzzy performance matrix is calculated by Equations (18) and (19).

\[
 r_{i|\beta}^\alpha = \beta r_{ijl}^\alpha + (1 - \beta)r_{ijr}^\alpha, \quad 0 \leq \alpha \leq 1, \quad 0 \leq \beta \leq 1
\]  

\[
 R_\beta^\alpha = \begin{bmatrix}
 \alpha & \alpha & \ldots & \alpha \\
 r_{11\beta} & r_{12\beta} & \ldots & r_{1m\beta} \\
 \alpha & \alpha & \ldots & \alpha \\
 r_{12\beta} & r_{22\beta} & \ldots & r_{2m\beta} \\
 \vdots & \vdots & \ddots & \vdots \\
 \alpha & \alpha & \ldots & \alpha \\
 r_{n1\beta} & r_{n2\beta} & \ldots & r_{nm\beta}
\end{bmatrix}
\]  

where \( r_{i|\beta}^\alpha \) means the crisp performance score about each alternative \( i \) with respect to criterion \( j \) under \( \alpha \) degree of confidence and \( \beta \) risk indicator.

(12) To compute the relative closeness \( L_{i|\beta}^\alpha \) of alternative \( i \) by applying Equation (20) through (25). First, the crisp performance score \( R_\beta^\alpha \) of alternative \( i \) is normalized by Equation (20).

\[
P \equiv \begin{bmatrix}
 p_{11} & p_{12} & \ldots & p_{1m} \\
 p_{21} & p_{22} & \ldots & p_{2m} \\
 \vdots & \vdots & \ddots & \vdots \\
 p_{n1} & p_{n2} & \ldots & p_{nm}
\end{bmatrix}
\]

where \( p_{ij} \equiv \frac{r_{i|\beta}^\alpha}{v_i} \) and \( v_i \equiv \sum_{j=1}^{m} r_{i|\beta}^\alpha \)

By technique for order preference by similarity to ideal solution, the ideal positive solution \( (p_{ij}^{+}) \) is defined as the best crisp performance score from all alternatives on a criterion while the negative ideal solution \( (p_{ij}^{-}) \) is determined as the worst crisp performance score from all alternatives on a criterion (Chen and
Hsing Hung Chen

Hwang, 1992; Tsaur et al., 2002). Then, the positive ideal solution and the negative ideal solution for each criterion can be obtained by Equations (21) and (22) respectively.

\[ p_{ij}^{\alpha+} = \max\{ p_{ij}^{\alpha} \mid \text{for all } i, \text{ and } j \in J \} \]  

\[ p_{ij}^{\alpha-} = \min\{ p_{ij}^{\alpha} \mid \text{for all } i, \text{ and } j \in J \} \]  

By using Equations (23) and (24), the distance between positive ideal solution and negative ideal solution for each alternative can be obtained respectively.

\[ S_i^+ = \left( \sum_{j=1}^{m} \left( p_{ij}^{\alpha} - p_{ij}^{\alpha+} \right)^2 \right)^{1/2} \]  

\[ S_i^- = \left( \sum_{j=1}^{m} \left( p_{ij}^{\alpha} - p_{ij}^{\alpha-} \right)^2 \right)^{1/2} \]  

Consequently, the relative closeness to the ideal solution for each alternative can be represented by Equation (25).

\[ L_{i}^{\alpha} = \left( S_i^- \right) \div \left( S_i^+ + S_i^- \right) \]  

The relative closeness \( L_{i}^{\alpha} \) shows a final evaluation score for each alternative \( i \) under decision-makers’ \( \alpha \) degree of confidence and \( \beta \) level of risk.

**Selection of suitable organization forms for KM at different R&D functions**

To analyze and select the suitable organization forms for KM at different R&D functions, an anonymous high-technology manufacturer in China is taken as an example. To simplify the complexity of the environment for our analysis, this chapter uses the following assumptions: the company tries to select a suitable organization form for KM from five alternatives, A, B, C, D, and E; and the decentralized and cooperative R&D management structure can be categorized into three different functions: the input-oriented organization, the output-oriented organization, and the matrix organization. All five alternatives and three units are described in detail in Section 2.
A fuzzy simplified ANP approach, which is described in the fourth section, is used to select a suitable organization form for KM at the input-oriented organization, and the considered network is as shown in Figure 9.1. The procedures are as follows:

Step 1: To define the problem and decompose the problem into a network.

Based on the proposed network, a questionnaire to compare criteria in pair in their contribution toward achieving the goal of efficient performance was listed. Nine senior managers employed by the anonymous manufacturer, including project managers, R&D managers, manufacturing managers, marketing managers, and controllers, contributed their professional experiences. The results stated in Section 3 were used to verify the detailed criteria that influenced the decision.

Step 2: To determine the importance of each decision criterion in achieving the overall objective, which is the best performance of the company.

The comparison matrix for comparing the criteria in level 2 in terms of their contribution to achieving the overall objective was obtained. The nine senior managers were invited to contribute their professional experience by completing a questionnaire. The group’s opinions were synthesized by applying Equations (1) to (4), and a fuzzy weight vector \( \tilde{w}_1 \) was obtained by Equation (5).

Step 3: Assume there is no interdependence among detailed criteria.

The comparison matrices of detailed criteria (relational alignment, strategic alignment, resources, speed, costs, quality, technological alignment, design capabilities, and equipment) were obtained by their respective upper level criteria (integrated capability, services capability, skills capability), and their eigenvectors were then calculated. The relationships of detailed criteria were evaluated through Equations (6) and (7) by their respective upper level criteria and the group’s results were again obtained by Equation from (1) to (4). Eigenvectors for integrated capability, services capability and skills capability were \( w_{2I} \), \( w_{2B} \) and \( w_{2S} \), respectively.

Step 4: To obtain the evaluation results of alternatives.

Since there is no interdependence among alternatives, they were compared with each detailed criterion to yield the column eigenvectors. Quantitative data were transformed into values from zero to one because the unit of measurement of data ranged differently. Detailed
The best performance of the firm

integrated capability

service capability

skills capability

relational alignment

strategic alignment

resources

speed

costs

quality

technological alignment

design capabilities

equipments

Alternative A

Alternative B

Alternative C

Alternative D

Alternative E

Goal Detailed criteria Criteria Alternatives

Figure 9.1. The ANP hierarchical network of selection problem.
criteria including resources, speed, costs, and equipments could be quantitative. The concept of membership function in Equations (8) and (9) was applied to obtain the performance indicator of a factor under each priority. While only some calculation results were used to estimate the company’s performance, data for many factors were qualitative or very hard to obtain through calculation. Therefore, some detailed criteria including relational alignment, strategic alignment, quality, technological alignment, and design capabilities were evaluated by experts. Five different levels of evaluation shown in Table 9.3, namely extremely good, fine, average, bad and extremely bad, were used here. We also obtained utility indices by using the concept of utility function to show the relative performance of alternatives under each detailed quantitative criterion. By dividing each utility indicator to the total value of the indices of a detailed criterion, a vector for the relative performance of alternatives was generated, and the obtained values were summed up to one. By Equation (10), the results of utility weight matrices for integrated capability \((w_{31})\), service capability \((w_{3B})\), and skills capability \((w_{3S})\) were obtained.

Step 5: To analyze the interdependence among the detailed criteria.

The interdependence matrices for integrated capability, service capability, and skills capability were \(w_{4I}\), \(w_{4B}\), and \(w_{4S}\), respectively. The interdependence among the criteria was determined by analyzing the impact of each detailed criterion on the other detailed criteria with the same upper criterion by using pairwise comparisons. The group’s opinions were combined by applying Equations (1) to (4) and the results of eigenvectors obtained by pairwise comparisons formed the matrix.

Step 6: To obtain the interdependence priorities of the detailed criteria by synthesizing the results by Equation (12).
Step 7: To obtain the priorities of alternatives with regards to each criterion by synthesizing the results by Equation (13). Then, the matrix $\tilde{X}_{21}$ was obtained by Equation (14).

Step 8: The overall priorities for the alternatives (the most suitable organization form) were obtained by synthesizing the results from Step 2 and Step 7.

$$\tilde{r} = \tilde{X}_{21} \times \tilde{w} = \begin{bmatrix} I & B & S \\ A & 1 & 7 & 3 \\ B & \tilde{5} & \tilde{5} & \tilde{7} \\ C & \tilde{7} & \tilde{7} & \tilde{5} \\ D & \tilde{9} & \tilde{7} & 3 \\ E & \tilde{3} & \tilde{5} & \tilde{3} \end{bmatrix} \times \begin{bmatrix} I \\ B \\ S \end{bmatrix} \begin{bmatrix} 3 \\ \tilde{5} \end{bmatrix} = \begin{bmatrix} 1 \otimes \tilde{5} & 7 \otimes \tilde{3} & 3 \otimes \tilde{7} \\ 5 \otimes \tilde{5} & 5 \otimes \tilde{3} & 7 \otimes \tilde{7} \\ 7 \otimes \tilde{5} & 7 \otimes \tilde{3} & 3 \otimes \tilde{7} \\ 9 \otimes \tilde{5} & 7 \otimes \tilde{3} & 3 \otimes \tilde{7} \\ 3 \otimes \tilde{5} & 5 \otimes \tilde{3} & 7 \otimes \tilde{7} \end{bmatrix}$$

Step 9: Rank the organization forms by their fuzzy triangular numbers, confidence level, and risk indicator.

The fuzzy triangular numbers of the best three alternatives by intuition method were:

$$\tilde{r}_B = (37, 89, 165),$$
$$\tilde{r}_C = (35, 91, 171),$$
$$\tilde{r}_D = (33, 89, 151)$$

The leading group including $\tilde{r}_B$, $\tilde{r}_C$, and $\tilde{r}_D$ were further analyzed because the first ranking changed with different values of $\alpha$ and $\beta$. If $\alpha$ and $\beta$ were set with a value of 0.8 and 0.2 by the final decision of decision-makers, the performance of different organization forms was calculated by applying Steps 10 to 12 in Section 4:

$$\hat{e}_{0.8}^{0.2} = \begin{bmatrix} B & 0.693 \\ C & 0.547 \\ D & 0.318 \end{bmatrix}$$

Obviously, alternative B was the best organization form for KM when the values of $\alpha$ and $\beta$ were set at 0.8 and 0.2. After extensive calculation, we find that a central KM function (alternative B) was the best performance when confidence level $\alpha$ was larger than 0.75 and risk indicator $\beta$ was smaller than 0.25. When using the same method described in Section 5, we also obtained the suitable organization forms for the output-oriented organization, and the matrix organization. Thus, the suitable organization forms for KM at different R&D functions is obtained and shown in Table 9.4.
Table 9.4 The ranking with regards to different R&D functions ($\alpha = 0.8$ and $\beta = 0.2$)

<table>
<thead>
<tr>
<th>Rank</th>
<th>the input-oriented organization</th>
<th>the output-oriented organization</th>
<th>the matrix organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a central KM function</td>
<td>functionally located KM cells</td>
<td>a project-decentralized KM task force</td>
</tr>
<tr>
<td>2</td>
<td>a project-decentralized KM task force</td>
<td>a project-decentralized KM task force</td>
<td>a central KM function</td>
</tr>
<tr>
<td>3</td>
<td>functionally located KM cells</td>
<td>a central KM function</td>
<td>functionally located KM cells</td>
</tr>
</tbody>
</table>

In summary, normally, for example, if $\alpha = 0.8$ and $\beta = 0.2$, a central KM function with a value of 0.693 is the best organization form for the input-oriented organization, functionally located KM cells with a value of 0.637 is best for the output-oriented organization, and a project-decentralized KM task force with a value of 0.712 is best for the matrix organization.

Conclusion

In this chapter, we ranked suitable organization forms by their fuzzy triangular numbers with an intuition ranking method. This means that the fuzzy number with a higher mean value and lower spread should be selected as the most suitable one. However, further analysis is needed if the fuzzy number with a higher mean value and lower spread cannot be obtained simultaneously. Therefore, to select the best organization forms, the chapter developed a fuzzy ANP model associated with confidence level and risk level. Using theoretical and practical analysis, we found that different organization forms will drive the enterprise to optimize performance at different values of confidence level $\alpha$ and risk indicator $\beta$. This chapter only discussed the most frequent situation with high confidence level and low risk indicator as $\alpha = 0.8$ and $\beta = 0.2$.

Based on our analysis, we propose that adopting different organization forms for KM at different R&D functions is highly recommended. However, from a managerial point of view, the suitable organization forms for all R&D functions should be arranged as per the extended R&D matrix organization shown in Figure 9.2.
Figure 9.2. Suitable forms of organization for KM with regards to extended R&D matrix organization.

The overall R&D organization should be decided by considering the input-oriented organization, the output-oriented organization, and the matrix organization respectively. For clarifying the KM mission, a centralized KM structure provides the strongest alignment between R&D strategy and KM initiatives, the best communication and coordination of KM activities, and the clearest responsibilities of different participants involved. These factors drive participants to wholeheartedly commit themselves to KM initiatives and R&D strategies. Secondly, project-decentralized KM task forces will lead to different initiatives, with few cumulative effects and a failure to deliver a strong strategic alignment for each project. But a structure driven by operational needs requires rapid and practical contributions to foster emergence of KM initiatives. Thirdly, the structure of functionally located KM cells results in a vague KM vision and high uncertainty of KM mission, both at the strategic alignment and the project operation management levels. Its KM mission and vision are subordinate to the priorities of the specialized department. Accordingly, a central KM function has better application in an input-oriented organization to provide alignment with strategic targets and KM initiatives, while a project-decentralized KM task force has better applicability in the cascaded and temporary region within each function to effectively transfer knowledge; and the functionally located KM cells are applied at each phase. The centralized KM structure provides a good overview of network needs,
and is able to obtain quick knowledge diffusion in similar problem-solving activities from team to team, and from project to project. Moreover, project-decentralized KM task forces drive inter-functional knowledge-sharing, and provide the highest potential for supporting transfers and sharing of implicit and explicit knowledge. Lastly, functionally located KM cells focus on knowledge close to the specific expertise and provide strong knowledge transfer within engineering functions.

References


PART III

Management issues in offshoring and virtual teamwork
Introduction

Technological advances and economic changes have increasingly motivated and enabled distant collaboration between knowledge workers (Hinds and Kiesler, 2002). Offshoring of professional services (software development, financial services, radiology reads, R&D) to emerging countries provides a renowned example of this trend (Friedman, 2005; Levy, 2005; Venkatraman, 2004). Notwithstanding the alleged numerous advantages for Western organizations – including cost savings, reduction of time to market, access to worldwide expertise, easier penetration in local markets, increased codification of internal processes (e.g., Farrel, 2006; Gupta et al., 2007) – knowledge workers likely perceive offshoring as a cause of turmoil.

A first source of disruption stems from distance – both geographical and cultural – between knowledge workers. A geographically dispersed or globally distributed team (GDT) is defined as a group of individuals: (i) belonging to one or more organizations; (ii) interdependent and driven by a common purpose; (iii) using technology-supported communication more than face-to-face communication; and (iv) based in different countries (Lipnack and Stamps, 1997). Maznevski and Chudoba (2000) integrate this definition by observing that GDTs are also global in their tasks and are responsible “for making and/or implementing decisions important to the organization’s global strategy” (p. 473).

The literature on GDTs explores the challenges of distant collaboration between geographically and culturally distant members, such as compatibility with existing hierarchical structures (Mohrman, 1998), increased coordination costs (Boh et al., 2009), awareness of other team members’ activities (Dourish and Bellotti, 1992), trust (Paul and
Elisa Mattarelli and Maria Rita Tagliaventi

McDaniel, 2004), socialization processes (Ahuja and Galvin, 2003), and leadership (Weisband, 2002). On top of that, the cultural distance between the countries involved in a GDT influences team processes and members’ perceptions of heterogeneity (Earley and Mosakowski, 2000; Lau and Murnighan, 1998).

Changes in individual and team work practices are another source of disruption. Many types of work currently require individual cognitive activities and conventional collaborative activities with co-located colleagues as well as collaborative activities at a distance supported by technology (Perlow, 1999). However, little emphasis has been placed on investigating the disrupting effects of the introduction of distributed work in organizational settings, and its dynamic interplay with conventional work practices. The co-existence of distributed and co-located work brings in new interruptions and unsettling events for knowledge workers. Interruptions can disrupt the flow of work, even when they are not dramatic events. They can in fact be just small breaks in individual and team work processes (Okhuysen, 2001), such as unexpected messages on instant messaging systems or requests for help by mail or phone. Interruptions often bear a negative connotation, because they are expected to increase stress and mistakes and to reduce individual efficiency (McFarlane and Latorella, 2002). Alternatively, they may be deemed as an occasion for interacting and knowledge-sharing between individuals (e.g., Zellmer-Bruhn, 2003).

When virtual work changes workspaces, a third source of disruption to knowledge workers is added. Information and communication technologies contribute to the spatial reconfiguration of work, allowing a person to work from different locations, such as office, home, client’s site (relocation), and to rely on cyberspace to share work outputs (dislocation). Hybrid workspaces are work arrangements where “individuals are relocated and dislocated and continue to participate in more traditional workspaces” (Halford, 2005: 22). To date, we know little about the impact of multiple spatial locations (hybrid workspaces) on actual work practices (Barley and Orr, 1997; Halford, 2005), in spite of such hybrid workspaces being common features in organizations offshoring knowledge-intensive work. For example, software developers in Italy often simultaneously work on multiple projects, dividing their time between individual code development in their own office, face-to-face meetings with colleagues in the conference room, visits to clients’ sites, and coordination with distant co-workers.
Members of globally distributed teams typically experience different workspaces. How a worker interprets physical space has a significant impact on (and, at the same time, is impacted by) the way he or she interprets himself or herself as a professional, that is, his or her professional identity (Pratt et al., 2006). Professional identity is an individual’s self-categorization in terms of values, attributes, and expectations as a member of a professional group (Elsbach, 2003; Pratt et al., 2006). The salience and importance of the multiple self-categorizations that make up an individual’s identity can vary according to the characteristics of the physical context (Van Dick et al., 2005), so that “workspace can help affirm specific identity categorizations” (Elsbach, 2003: 624). For example, Elsbach (2003) shows that non-territorial work environments may threaten social distinctiveness if they require that workers shift offices on a daily basis.

In addition, in globally distributed teams, individuals from different countries tend to have different professional backgrounds and experiences (Gurung and Prater, 2006; Metiu, 2006; Oza and Hall, 2006). This results in heterogeneous, and potentially conflicting, professional identities. In particular, the way individuals interpret events like interruptions is significantly affected by the way they look at their work and define themselves as professionals. Research on professional identity shows that the way workers define themselves in terms of distinctiveness and status affects individual and relational outcomes, such as the sensemaking of organizational changes (Elsbach, 2003), the disposition to engage in cooperative or exclusion behaviors (Brickson, 2000), and resistance to organizational control (Kosmala and Herrbach, 2006). While the literature on distributed work recognizes the challenge of different identities and the positive effect of a shared team identity (Hinds and Mortensen, 2005; Mortensen and Hinds, 2001), the effects of different professional identities on members of GDTs have been largely overlooked so far.

The aim of this chapter is to investigate the effects of the increasing use of offshoring on hybrid workspace practices and its interplay with professional identity through the following research questions: how does the introduction of distributed work change the work of professionals, such as the way individuals share their time between different projects and activities in different locations? How do individuals in a globally distributed team interpret collaboration with offshore
members? How is collaboration influenced by professional identity and by the perception of offshore members’ professional identity?

To explore these issues, we conducted a qualitative research based on two case studies of GDTs belonging to IT organizations offshoring knowledge-intensive work. In the following sections, we introduce the methodology that we followed, present our empirical evidence, and offer a discussion of our results.

Methodology

Given how little is known about the issue that we investigate, we decided to conduct a qualitative study and build a grounded theory. A qualitative study, in fact, suits the exploratory nature of our research questions, and offers a unique opportunity for empirical and theoretical interpretation (Eisenhardt, 1989; Yin, 2003). We developed case studies about two globally distributed teams of engineers and developers belonging to Italian software companies offshoring their R&D to India and Tunisia. Software engineers and developers perform knowledge-intensive, demanding, and individually styled work (Barley and Orr, 1997). At the same time, to be successfully carried out, work needs a significant amount of interactions between team members (Perlow et al., 2004).

We refer to the two companies that we studied as follows: (1) Dream, with a globally distributed team composed of members located in Italy and India; (2) Core, with a globally distributed team composed of members located in Italy and Tunisia.

Common characteristics of the two globally distributed teams (GDTs)

We looked for teams that were comparable in terms of governance form, nature of work, performance, stage of offshoring, and context characteristics (see Table 10.1 for a summary). The two GDTs comprise members belonging to the same organization. Both Dream and Core, in fact, opened a foreign subsidiary or “captive center” (Sako, 2007) and opted for a local workforce and management. The activities performed by the two teams are similar in nature and relate to designing, developing, and maintaining proprietary software. In both
cases, software is modular and complex, and is the organization’s edge product. Both Dream and Core global R&D teams have a good level of performance. Managers, in fact, are satisfied with their outcomes, and the organization is evaluating the possibility of further expanding the scope of offshoring. In particular, Dream is allowing Indian engineers to own larger portion of the code (Metiu, 2006). Core is leveraging on Tunisian resources to start commercializing their main product in Northern Africa. Our cases are in line with the view of offshoring of knowledge-intensive work as a dynamic process whose content moves towards high-end, value-added activities (Carmel and Agarwal, 2002; Couto et al., 2006).

Finally, many elements of the local context affecting onsite and offshore members are similar. For onsite members, there are few job opportunities and turnover is low, while organizational and professional tenure is high (organizational: nine years for Dream and eight years for Core; professional: seventeen years for Dream and thirteen years for Core). On the offshore side, the job opportunities for software engineers and developers are very high in India (the “Global Services Location Index 2006” ranks India as the first-choice location for offshoring of IT professional services) and rapidly increasing in Tunisia (the same source places Tunisia at number twenty-six in 2006; in 2005 Tunisia was ranked thirtieth, while in 2004 it was not included at all: A.T. Kearney, 2004, 2005, 2006). Professional and organizational tenure are on average low (organizational: two years for Dream and four years for Core; professional: six years for Dream and six years for Core), with the exception of the local top managers. The selection criterion for local top managers in fact privileged significant previous experience in international collaboration.

Research sites

Dream
Dream is a medium-sized Italian company located in Italy, France, the US, and India, that develops and commercializes CAD (computer aided design) software worldwide. CAD development requires the collaboration and interaction of multiple knowledge professionals, such as software engineers, developers, and mechanical engineers.

Dream created a R&D affiliate in Bangalore in 2000, “with the initial objective of containing costs and offshoring those activities and
tasks that Indians could do well and that Italians were not happy to perform, such as debugging or routine maintenance” (Max, Vice President). After running operations for two years, Dream management realized that the involvement of Indians only in low-end activities and coordination by Italian management were not effective. In 2004, Dream put at the head of its Bangalore subsidiary Indian management that “turned the organizational form into a more hierarchical structure” (Max, Vice President). Local management pushed for the activities offshored to Bangalore to become more knowledge intensive. From the initial offshoring of “debugging,” Indian software engineers gradually moved toward the design and development of some CAD components. They also got involved in quality control. The Indian R&D group switched from four employees in 2004 to forty in 2007.

Indian and Italian engineers collaborate at distance for (1) the development of new components and (2) the release of updated versions of the product. Once an objective is defined (e.g., the need for updating a graphic tool to capture photo-images), a small team (ranging from two to ten people) is set, whose members can be geographically dispersed (some in Italy, some in India) or fully localized (either in India or in Italy). The initial development phases always call for multiple interactions (mainly through video conference, telephone calls, and email) between Italy and India. After an initial stage, team members work in parallel on individual tasks, sharing their work through a common ad hoc platform. Telephone call meetings are scheduled, too. Once a team delivers its output, it needs to be integrated into the overall CAD product through testing. Testing requires repeated sequential interactions between Italian and Indian engineers. The overall type of interdependence reflects what Kumar et al. (2009) call a “partially sticky form of integrated interdependence.”

Core
Core is a medium-sized Italian company located in Italy and Tunisia and belonging to an international group. Core develops and commercializes web-based second-generation Enterprise Resource Planning (ERP) for small and medium Italian firms. Developing ERP software calls for advanced technological software skills and a deep knowledge of the potential applications at the different clients’ sites.

Core has always invested in advanced technology development through international partnerships with US and European companies.
In 2000, Core opened a foreign affiliate in Tunisia. Giorgio, the head of the Italian R&D unit, told us: “Core began to offshore R&D because the national market was no longer receptive. It was the time of the Y2K, the new Euro currency, and a difficult financial situation for us. We needed to develop our new ERP, but in Italy we were lacking good resources at an accessible price.” Core chose Tunisia through a broker who highlighted that Tunis ecole Polytechnique provided competent and talented engineers and PhDs. The Tunisian R&D unit was composed, from the beginning, of fifteen people, and was appointed a local management. From 2000 to 05, Tunisian engineers contributed to the creation of the new Core ERP software. Due to their scarce application knowledge about the ERP product and its clients, Tunisians would receive detailed “use cases” from Italian analysts and be in charge only of coding. A use case is a document detailing the features of a program and the way the user is supposed to interact with it. In 2006, the development of the main modules (called “domains”) of Core ERP was over, and Tunisian engineers faced a reduced amount of work to perform. So, Tunisian members came up with the idea of making and commercializing a new version of ERP for Northern Africa.

Italian and Tunisian developers and engineers collaborate on (1) new domain development, and (2) maintenance of existing domains. Every domain is associated to a team composed of Italians only, Tunisians only, or both. Teams work on multiple projects at the same time. In GDTs, the phases of a project are sequentially divided between Italy and Tunisia (see Table 10.1). Italian management defines the workload. Then, Italian (and, still rarely, Tunisian) analysts set use cases as input for Tunisian engineers. Subsequently, a video conference is scheduled to discuss and modify the content of the document, and coding is performed offshore, with minimal interactions between the parts. In the final phase, work outcomes are subject to tests offshore and onsite. The overall type of interdependence resembles what Kumar et al. (2009) call a “partially sticky form of sequential interdependence.”

**Data sources**

We used multiple data sources to reinforce our theory-building process (Huberman and Miles, 1998; Remenyi et al., 1998), namely (1) semi-structured interviews; (2) observations; (3) archival data.
Table 10.1 *Characteristics of research sites and globally distributed teams*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Dream</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance form</td>
<td>Foreign subsidiary or “captive center”</td>
<td></td>
</tr>
<tr>
<td>Nature of work</td>
<td>Defining the characteristics of, developing, and maintaining proprietary software</td>
<td>Value-added activities</td>
</tr>
<tr>
<td>Stage of offshoring</td>
<td><a href="image">Diagram</a></td>
<td></td>
</tr>
<tr>
<td>Alternative job opportunities for software engineers and developers</td>
<td><a href="image">Diagram</a></td>
<td></td>
</tr>
<tr>
<td>Tenure (organizational and professional)</td>
<td><a href="image">Diagram</a></td>
<td></td>
</tr>
<tr>
<td>Location of the captive center</td>
<td>India</td>
<td>Tunisia</td>
</tr>
<tr>
<td>Main product</td>
<td>CAD software</td>
<td>ERP software</td>
</tr>
<tr>
<td>Initial rationale for offshoring</td>
<td>Reducing costs</td>
<td>Accessing a large pool of qualified resources</td>
</tr>
<tr>
<td>Evolution of offshoring activities</td>
<td>Towards “owning the code”</td>
<td>Towards new product development and local commercialization</td>
</tr>
<tr>
<td>Number of globally distributed team members</td>
<td>Onsite 52</td>
<td>Onsite 35</td>
</tr>
<tr>
<td></td>
<td>Offsite 40</td>
<td>Offsite 15</td>
</tr>
<tr>
<td>Distinct characteristics of interactions</td>
<td>Partially sticky form of integrated interdependence</td>
<td>Partially sticky form of sequential interdependence</td>
</tr>
<tr>
<td>Work enters team</td>
<td><a href="image">Diagram</a></td>
<td><a href="image">Diagram</a></td>
</tr>
<tr>
<td>Work leaves team</td>
<td><a href="image">Diagram</a></td>
<td><a href="image">Diagram</a></td>
</tr>
</tbody>
</table>
Semistructured interviews
To begin, we first conducted ten in-depth interviews with general managers and R&D managers, both onsite and offshore. At both companies, we interviewed one general manager and two R&D managers onsite; one general manager and two R&D managers offshore. The interviews were aimed at understanding the mission of the R&D units, the rationale for offshoring, the evolution of offshoring activities, and the characteristics of GDTs.

After the initial interviews, we asked managers to identify the projects carried out by GDTs. Based on the analysis of these projects, we selected thirty developers and engineers, both onsite and offshore. At Dream, we interviewed eight people on site and nine people offshore; at Core we interviewed eight people on site and five people offshore. We asked our informants about their work (i.e., to describe their tasks and activities, their interactions with distant and local team members, and criteria for allocating their time to different projects), the difficulties they face when working at distance, their professional identity (posing questions such as: “What is the professional community you feel you belong to? How would you describe what being a . . . is all about?”), their perceptions about organizational identity, and their perceptions about co-workers’ professional and organizational identity.

All the interviews at Dream were conducted face-to-face in Italy and India, while the interviews at Core were conducted face-to-face with onsite members and through video conference and Skype with offshore members. Each interview was tape-recorded and lasted between an hour and a half and two hours. We transcribed the interviews into text files, and then coded them (see the “Analysis” section below).

Observations
During our presence in the field we were invited to observe one video conference at Dream (lasting two hours) and one video conference at Core (lasting an hour and a half). The two video conferences were part of regular day-to-day work activities and had been scheduled in advance. We often took coffee breaks and lunch with our informants. These occasions were particularly helpful in creating an open communication climate with them, and sharing additional insights about their work experience.
Archival data
We looked up Dream and Core’s internal reports, newsletters, organizational charts, and quality manuals to gain a deeper and richer understanding of the setting under study.

Analysis
In analyzing our qualitative data, we followed the framework depicted by Locke (2001), Miles and Huberman (1994), and Strauss and Corbin (1998), to build a grounded theory. We adopted an iterative approach of comparison and contrast of the data. We continuously went back and forth between our field notes and the theoretical model that we were building to find support for our theorizing, and to detect any inconsistencies between new intuitions and our data. We also discussed our emerging results with some of our informants to ensure that our major conclusions were consistent with their interpretation of their work experience.

We started by disclosing statements and concepts regarding our informants’ point of view as well as recurrent behaviors through open coding. Drawing on similar statements, we identified some recurrent themes (such as “communication by top management on the strategic benefits of offshoring” and “communication by management on the difficulties of offshoring”). Subsequently, we grouped convergent themes at a higher level of abstraction (for example, the above-mentioned themes were grouped into the category “communication of offshoring rationale within the organization”). That is to say, we moved from open to axial coding (Locke, 2001; Strauss and Corbin, 1998). We then looked for aggregate theoretical dimensions in order to organize the emergent findings in a coherent framework. Overall, we identified the following aggregate theoretical categories: acceptance of virtual work, integration with regular workflow, making sense of offshoring activities, and perception of difference in competences and identities. Themes and categories are summarized in Table 10.2. Finally, following Strauss and Corbin’s (1998) instructions, we connected the above-mentioned theoretical categories into a grounded theory.

We came to recognize that, even though in both cases offshoring was considered successful and strategic by top managers, individuals’ perceptions about working in GDTs differed and we tried to explain
Table 10.2 *Themes and categories*

<table>
<thead>
<tr>
<th></th>
<th>Dream</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acceptance of virtual work</strong></td>
<td><em>High</em></td>
<td><em>Low</em></td>
</tr>
<tr>
<td><strong>Integration with regular workflow</strong></td>
<td><em>High</em></td>
<td><em>Low</em></td>
</tr>
<tr>
<td>Technologies</td>
<td>Common technologies (VC, VOIP phone, mail, IM, common platform)</td>
<td>Local technologies (VC, phone, mail)</td>
</tr>
<tr>
<td>Space of interaction</td>
<td>Mainly office</td>
<td>Mainly dedicated room</td>
</tr>
<tr>
<td>Different workplaces</td>
<td>Onsite: office, client, home</td>
<td>Onsite: client, office</td>
</tr>
<tr>
<td></td>
<td>Offshore: office, client, home</td>
<td>Offshore: office</td>
</tr>
<tr>
<td>Face-to-face visits</td>
<td>From India to Italy and vice versa, on a regular basis</td>
<td>From Tunisia to Italy, not on a regular basis</td>
</tr>
<tr>
<td>Adaptation of work practice</td>
<td>High (e.g., learning how to use CSCW technologies)</td>
<td>Low (e.g., adding offshoring-related practices to existing ones)</td>
</tr>
<tr>
<td>Sensemaking of offshoring activities</td>
<td><em>As part of regular work</em></td>
<td><em>As an interruption</em></td>
</tr>
<tr>
<td>Communication of offshoring</td>
<td>Communication of strategic benefits and difficulties of offshoring</td>
<td>None</td>
</tr>
<tr>
<td>Rationale within the organization</td>
<td>Only qualitative</td>
<td>None</td>
</tr>
<tr>
<td>Communication of offshoring results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural integration</td>
<td>Two-sided (e.g., joint social occasions)</td>
<td>One-sided (e.g., Tunisians learning Italian autonomously)</td>
</tr>
<tr>
<td>(language, workplace culture, national culture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of differences in competences and identities across locations</td>
<td><em>High</em></td>
<td><em>Mixed</em></td>
</tr>
</tbody>
</table>

*(cont.)*
Table 10.2 (cont.)

<table>
<thead>
<tr>
<th>Perceptions of competences of distant colleagues</th>
<th>Dream</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balanced</td>
<td></td>
<td>Onsite: Analysts vs. developers</td>
</tr>
<tr>
<td>Onsite: Masters and students</td>
<td></td>
<td>Offshore: Technology excellence, error-free delivery, creativity, problem-solving</td>
</tr>
<tr>
<td>Offshore: Technology excellence, managerial competence, competition</td>
<td></td>
<td>Offshore: Technology excellence</td>
</tr>
</tbody>
</table>

| Different professional values                    | Onsite: Technology excellence, occupational stability | Onsite: Technology excellence, error-free delivery, creativity, problem-solving |
| Offshore: Technology excellence, managerial competence, competition | | |

| Alignment of professional “values” and organizational goal | High: taking advantage of differences for a common goal | None: what is the common goal? |

the reasons for such discrepancy through our grounded theory. In the following sections we portray the themes that emerged from the field, we depict our grounded theory, and we discuss theoretical and practical implications.

Evidence from the field

Acceptance of virtual work

Notwithstanding the relevance and success of offshoring assessed by management in each case, the perceptions of individuals about working at distance in globally distributed teams vary greatly across Dream and Core. Dream members came to accept working with distant colleagues, while at Core a feeling of discomfort still prevails.

Dream

Both Italian and Indian members state the difficulties of working at distance. They acknowledge that, at the beginning of their experience, they had to work hard on addressing different issues, such as language,
cultural differences, ethical problems, and work-style incompatibilities. Giovanni, a R&D engineer and team manager, underlines how, for Italians, learning how to speak English in international collaborations was the first big challenge. The second was to handle cultural differences with Indian colleagues. However, over time, people at Dream Italy became confident with the new work arrangement and started looking at their Indian colleagues as an “opportunity for our country” (Giovanni). Simona, R&D manager, adds that “Working with India made me understand that we can share our knowledge and competence without fearing to lose our job.”

Offshore members share the same positive feeling about globally distributed teams. For example, Salil, an engineer and team manager, deems working in a globally distributed team as a precious experience that has taught him “a lot of things, such as cultural adaptability, helping people, as well as technical skills.”

Core
At Core also, the introduction of globally distributed teams was not smooth, but the initial difficulties and negative perceptions held by Italian engineers and developers did not fade out over time. Luca, the R&D manager, expresses his discomfort with managing people at distance:

When I was told that I should work with people located elsewhere, I had a very bad reaction. I had never worked with distant colleagues before. I still feel that I am not able to do that.

Other developers feel threatened by the decision of the organization to offshore software development and express their preference for working with local colleagues by saying that: “I am much more confident working with my colleagues here” (Pamela, developer).

Integration with regular workflow
Both at Dream and Core, the introduction of R&D globally distributed teams represented an important organizational change. At Dream, different mechanisms were set to integrate distant work practice with regular face-to-face work, thereby triggering a change in internal processes and workflow. On the other side, at Core, the work practice of Italian engineers and developers did not significantly change,
because distant work was simply “added” to the existing processes and workflow.

**Dream**

Dream invested significantly in formalizing work processes between Italy and India. In particular, Italian and Indian management jointly made sure that team members used the same technologies and procedures across countries. All developers and engineers are provided with webcams, instant messaging tools, and a VOIP telephone. A common technological platform guarantees that work is shared and accessed almost in real time. Team members run formal weekly conference calls from their individual desks to discuss work in progress. Interactions take place via email, instant messaging, and informal conference calls.

Engineers and developers created documents and templates as a tool of communication in addition to informal conversations and calls.

Engineers and developers at Dream work mainly at their own offices (separated offices in Italy, cubicles in an open space in India), but also have the opportunity of working at home when needed, for example on Saturday, and visiting the clients’ sites. Even though most of Dream’s clients are located in Europe, Indians may meet some of them. When Indians get hired, in fact, they spend about two months in Italy for training. Later on, they come back to Italy for a second training period. Traveling to Italy is deemed as very important, as Moses explains:

Meeting co-workers personally was very useful. I went to Italy twice . . . The first time was a tough experience, but then I became friends with people.

Recently, Italian team managers have started visiting India to meet their colleagues at least twice a year. Lata and other Indian engineers consider this practice as “a sign of interest and involvement” by Dream Italy. Overall, Italian engineers and developers perceive their work practices as significantly, and in the end positively, affected by offshoring. Michele, an engineer, stated that changes improved the interactions with co-localized colleagues, too, by promoting the use of information and communication technologies and a greater focus on information flows:

Before 2000, all my collaboration with colleagues was face-to-face. If I had a problem, I stood up from my desk and I went to talk. Now I use the same technologies even with my Italian colleagues.
Core
At Core, top management let employees organize their interactions with offshore colleagues according to their own preferences. Core software development is based upon a technological platform, called “Warmth,” of which both sides avail themselves. Two special meeting rooms in Italy and in Tunisia are equipped with video, telephone, and boards, for video conferences. Video conferences are scheduled at the beginning of each project. On this occasion, an Italian analyst explains to Tunisian engineers the use case, and gives instructions about the code to be developed offshore. For example, during a video conference, Elisabetta, the Italian analyst in charge of the new quality module, spent twenty minutes explaining a use case about the vendor management module to Amed, Moheb, and Rashida. After Elisabetta’s initial talk (in Italian), the three people offshore briefly discussed some issues between them (in Arabic and French), and, five minutes later, Amed gave suggestions back to Elisabetta and hints on how to modify and improve the use case from a technical standpoint, and he asked questions about the application of the program at the clients’ sites. Eventually, Elisabetta agreed to modify the use case and sent it back to the three Tunisian engineers by email.

Involvement of offshore members in the analysis phase remains quite difficult, though. According to Walter, an Italian analyst, “it’s necessary to get more out of our collaboration with Tunisia.”

Other interactions informally take place via email and phone. No other tools (e.g., instant messaging, VOIP phone, webcams) were given to developers and engineers. No formal procedures and documents were put into place. Pamela, an Italian developer, perceives the lack of “formalized means of communication” as a problem, since “collaboration cannot take the form of personal initiative only.”

Italians typically work at their desk in the open space and at the client site, when they demo new versions of the product. Getting to know the clients is considered as core in new product development, since they are a source of innovation and help to “fully grasp the application of ERP, for example know the organizational problems that the ERP addresses” (Piero, engineer).

Tunisians do not have the same workplace experience. They do not interact with clients and they spend their entire work day at their offices. Trips to Italy, more frequent at the beginning of the offshoring process, are now quite infrequent. When a Tunisian engineer comes to
visit the Italian unit, it is not easy to make his or her presence fit with the busy schedule of Italian colleagues, as Luca, the R&D manager, remarks:

Sometimes some of them [Tunisian engineers] are sent over here. This happens once a year or even less now... the point is, our meetings last 1–2 hours a day. What do they do after that, for the remaining six hours? We have other things to do, we cannot be after them all the time while they are here.

Italians did not integrate distant work practice into their local practices and co-located interactions. Indeed, they typically differ in the ways they interact with local and distant colleagues. While interactions with offshore members require codification effort, local interactions are mostly informal and do not need a detailed and always updated documentation, as Luca underlines:

When I work with people here I don’t need to be very formal... A post-it or a voice over the cubicle or a chat at coffee break will just do.

Sensemaking of offshoring activities

People at Dream and Core do not have the same perceptions about the impact of offshoring on their work. At Dream, engineers and developers appreciate and share the effort spent by top management in communicating offshoring rationale and results, and some of them actively sponsor cultural integration. On the other end, at Core, Italian engineers and developers feel that top management is excluding them from all important communications and decisions. Acting on this sense of exclusion, the limited cultural integration with offshore members at Core fuels the perception of offshoring as a disturbance to regular work.

Dream

The rationale, benefits, and difficulties of offshoring are openly and thoroughly communicated by Italian management to employees. In particular, the Italian management tries to convey the perception that offshoring does not reduce the local number of engineers, but is a strategic choice made to expand Dream’s operation range. At the same time, Indian management discusses Italian engineers and developers’
doubts with Indian employees. Moses, an Indian engineer, shared with us his point of view regarding the transparency of offshoring policies in their organization, which echoes that of many of their colleagues.

Italians were afraid that Indians may “steal” their jobs. Dream ruled out this wrong perception. Managers in Italy and in India were asked to raise the issue with their team members.

Effort to promote cultural integration was a major concern for Dream. Dream offered all Italians an English course, for example. Italians also tried to understand the different cultural nuances of Indian culture, as Giulia underlines:

We have gradually come to know and appreciate the cultural differences between us. For example, now it is common knowledge that Indians never say no, because it is considered rude, or that, to say “yes,” they move their head in a funny way. From the left to the right, as if they were singing.

Moreover, it is interesting for Italians to get an insight into the different workplace experiences of their Indian colleagues. In Dream India, social activities are deemed as very important and a part of everyday work life, as Stefania (Italian engineer) details in the following excerpt:

They [Indians] have different ways of socializing at work. For example, they have an area—the roof terrace—where they spend time together, talk, drink coffee, play table tennis... We didn’t understand all this in the beginning, but then we started participating in their activities when we go there.

To share experiences and points of view about how to interact, how to do business, and so on, with culturally different colleagues, both Italians and Indians created an on-line document meant to socialize new entrants, help in everyday work practice, and give suggestions when traveling. The document is updated every time an Italian flies to India, or an Indian flies to Italy.

Core
At Core, individuals perceive that management did not make any effort to communicate the rationale for and the performance of offshoring. This results in a diffused discomfort within the R&D unit, as Piero testifies:
Management doesn’t give us a vision about where we are heading for through offshoring. Communication and transparency are missing. If we don’t have a vision here, what do they do in Tunisia?

Elisabetta would like to get some feedback about offshoring, too:

I would definitely like to know more. For example: are we ok with Tunisia? Are we going to expand this collaboration? Everything is just mysterious.

Core set engineers and developers free to choose the means and modalities for interacting from a distance. Italian engineers did not feel at ease speaking in English. Accordingly, they continued communicating in Italian, both in formal documents (e.g., use cases) and informal interactions (emails and phone calls). Tunisians learnt how to speak Italian day by day. In the following field note, Amed (Tunisian R&D manager) describes the “natural process,” based on study and TV watching, through which Tunisians learnt Italian.

It wasn’t like: “From now on, let’s speak Italian.” It was more of a natural process . . . We really felt it was central to be able to understand each other. So, we slowly learnt Italian. We have some Italian cable TV channels here, too.

Overall, when asked if they perceived cultural differences as an issue for the proper functioning of globally distributed teams, Italians replied that they did not have any clue. In other words, at Core there was no pressure or need for cultural integration. This adds to the perception of distance between Italian and Tunisian members.

The lack of workflow integration combined with the lack of cultural integration accentuates Italians’ sensemaking that offshoring-related activities are a “burden” looming over regular work practice. Luca (R&D manager) notices that, when time is limited, working at distance is not convenient. It is, in fact, unpractical to waste time in codifying documents to be sent offshore – Giacomo (developer) remarks:

“when a client needs work to be done fast, I cannot wait as long as to get the work done overseas. It takes forever to explain any details.”

_Perception of differences in competences and identity_

At Dream, individuals think that competences of Italians and Indians are similar or aligned, although they perceive differences in
professional identity between sites. Nevertheless, a shared organizational identity makes GDT members feel as if they worked for a common goal. At Core, Italians show mixed opinions about their Tunisian colleagues’ professional competences. They also perceive some distance in their respective professional identities and do not share a common organization identity. Their strong identification with the local R&D unit replaces organizational identification, thus paving the way for further separation from distant team members.

Dream
When Dream decided to offshore R&D, top management chose India because it is a country offering talented and well-educated engineers. Expectations about the competence of Indian engineers have therefore been high since the beginning. Over time, expectations were confirmed. Italian engineers and developers, such as Simona, value the competence of their Indian colleagues, but always underline that Italians are not at all at a lower level: “There is no substantial difference between India and Italy. There are excellent people here and there.”

At the same time, Indians appreciate the competence and experience of their Italian colleagues, who have a higher professional and organizational tenure.

If no difference is perceived from a technical standpoint, Italians and Indians perceive each other as different in terms of their respective professional values. In particular, Italian and Indian engineers and developers do not share the same attitudes regarding work stability, learning opportunities, career perspectives, competition, and tolerance to ambiguity. Michele, an Italian engineer, observes that Italians typically search for workplace stability, while Indians do not. This is related to the job opportunities in the local markets, as he stresses:

Here, we are attracted by the possibility of having a stable occupation. It means that we wish to spend all our professional life in one company as programmers... Indians are not committed to their workplace as much as we are.

Conversely, Indian engineers deem learning opportunities to be of primary importance. Maan, the head of the Indian unit, showed us a CV of an engineer applying for a position at Dream and underlined that all learning experiences (bachelor’s degrees, technical courses, master’s degree) were listed at the beginning of the CV, which highlights the
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candidate’s high-level competences. Very important (more salient than for Italian engineers) is also the possibility of moving up in one’s own career to take on managerial and status-enhancing positions, as Kumar points out:

For us it is very important to learn new things, to have ownership, and to move on in our career . . . We all long for a managerial position.

Indians’ desire to hold a managerial position goes hand in hand with a higher acceptance of competition between colleagues. This is in contrast with the attitudes of Italian engineers and developers at Dream. Stefania explains this difference as follows:

With the people in my group here in Italy, we are very cohesive and feel like a family . . . I gather that people over there [in India] are much more competitive . . . Competition between individuals and groups is appreciated in India, but doesn’t work at all here.

Indians regard the absence of open competition at the Italian site as an excessive attachment to organizational tenure and experience, as Salil, an Indian engineer, states:

I see Italian team members as more experienced, but I notice that their interactions are both less competitive and less transparent. Here, we believe more in openness to various work experiences and in transparency.

Italian and Indian professionals differ in their tolerance toward ambiguity, too, as Stefania describes:

They [Indians] tend to do exactly what you ask them to do. You have always to be very clear in specifying what you expect of them . . . There is a very low tolerance to ambiguity on their part.

All members of the globally distributed teams see professional differences, which sometimes result in discrepancies and misunderstandings, but are typically overcome for the organization’s sake. For example, Lata told us that during conference calls, when different views emerge, “conflicts are solved in order for a good and innovative CAD to be developed.” When asked what the organizational characteristics of Dream were (their core, enduring, and distinct values: Albert and Whetten, 1985), Italian and Indian engineers came up with a similar definition. In particular, of the twenty-three people we interviewed at
Dream, twenty-one stated at least two of the following attributes as core values of their organization: “openness,” “trust,” “flexibility.” These attributes are written in a document, entitled “Some definitions . . . based on our values and beliefs,” which addresses Dream’s mission and values.

Core
At Core, there is a mismatch between Italian developers’ and analysts/R&D managers’ views about the work delivered by Tunisians. While analysts and R&D managers are typically satisfied with the coding carried out offshore, developers appear skeptical. This creates a conflict within the Italian R&D unit, as testified by the words of Elisabetta, an analyst, and Pamela, a developer:

Elisabetta: “Developers have no tolerance at all for Tunisian engineers’ errors and are always ready to criticize and to complain about their work . . . Actually, I think they work pretty well.”

Pamela: “Tunisians always make some mistakes in their programs, and I haven’t seen any improvements over time . . . They don’t make enough tests. They are not up to date about our ERP.”

Italian engineers and developers perceive the lack of application knowledge by Tunisian engineers as a substantial difference in their professional identity. In the words of Giacomo, a team manager:

We are all programmers, but here we are all also a little bit analysts too – we know how to frame and solve problems . . . they [Tunisians] are just techies.

Tunisians perceive a difference, too, and define themselves as “students,” as Moheb explains:

People like Luca and Walter have 20–25 years of experience with ERP. They have really helped us understand the philosophy behind this product. We feel like students in comparison with them.

Other important professional values held by some Italian engineers and developers are creativity (“we believe in our creative ideas,” Luca says) and problem-solving capabilities (“I feel like a firefighter,” Piero says). In their perception, these values are at odds with the need for codification, time management, and control that comes with offshoring. This is why Walter perceives Amed, the head of the Tunisian R&D
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unit, as “more German than we are” and Luca underlines the importance of working flexibly instead:

When we organize our work, we cannot always set the expected time of delivery. Our work is not routine-like . . . time frames have to be flexible.

Moreover, Italians tend to identify more with their work group than with their organization. Of the eleven people we talked to in Italy, only four (three of whom were managers) were able to tell what the distinctive, enduring, and core values of their organizations were, whereas almost all our informants in Italy described their strong attachment to their work group with evocative words and examples like Giacomo:

I can’t tell you what the distinctive characteristics of Core are. What I can tell you is that my group is like a family. We like working and spending time together outside the office. We hang out together every Friday night.

The identification with the work group turns into an open preference for working with local co-workers, as compared with distant colleagues, as Piero sums up by saying, “I definitely work faster and easier with my colleagues over here.”

Discussion

The results from our case studies of two globally distributed teams in organizations offshoring knowledge-intensive activities show that individuals have different work experiences and, accordingly, different levels of acceptance of virtual work. In particular, our evidence suggests that the acceptance of virtual work may be traced back to three distinct, but intertwined, causal conditions: integration with regular workflow, sensemaking of offshoring activities, and perception of differences in competences and identity. In particular, when (1) integration of conventional and virtual work practices is high; (2) offshoring activities are interpreted as part of the regular workflow (and not as a disturbance); and (3) professional identities and competences are perceived as different across locations, but team members share a common superordinate identity, then GDT members accept virtual work.

(1) Integration with regular workflow. The two cases that we studied represent examples of hybrid workspaces. Individuals, in fact, work at the same time on co-located projects (i.e., only with co-located
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(2) Sensemaking of offshoring activities. Our empirical evidence illustrates that communication by top management about offshoring rationale and performance, as well as the overall effort of cultural integration, varied greatly across the two case studies. In other words, the two globally distributed teams felt different levels of organizational connectedness. Baumeister and Leary (1995) define organization connectedness as the extent to which individuals perceive that they are central to, visible, and involved with the organizational community. Virtual workers who have low organizational connectedness face difficulties in adjusting to virtual work, because they lack insight into the desired behaviors that should be exhibited to obtain outcomes (Raghuram et al., 2001). At Dream, a high level of connectedness resulted in a smooth acceptance of virtual work. At Core, on the
contrary, the lack of organizational connectedness led to the perception of any activities related to offshoring as a disturbance to regular work practice.

(3) Perception of differences in competences and professional identity. Both at Dream and Core, differences in competences and professional identity perceived by members onsite and offshore resulted in task conflict among distributed team members. Task conflict is usually driven by functional background differences and by high job-related diversity (Pelled et al., 1999). In each of our cases, though, the functional and professional background of the members at the two locations is similar; what actually differs is the perception of themselves as professionals (i.e., their professional identity) and the perception of difference between one’s own and other team members’ professional values and beliefs. At Dream, unlike Core, task conflict typically gets solved, because individuals are aware of the overall organizational mission, and are ready to move a step back for the organization’s sake. The shared identity that our informants described to us is different from the shared team identity of Mortensen and Hinds (2001), and from the hybrid team culture of Earley and Mosakowski (2000). Both constructs, in fact, include a set of rules and actions, work capability expectations, and member perceptions that individuals within a team develop, share, and enact after mutual interactions. At Dream, instead, the shared identity enacted is the very organizational identity, that is, the core, distinctive, and enduring values characterizing their employing organization.

Conclusion

This qualitative exploratory research contributes to a better understanding of distributed work in hybrid workplaces. Our work compares two globally distributed teams in organizations with similar characteristics in terms of governance, nature of offshored work, stage of offshoring, and local context characteristics. While both globally distributed teams are considered successful by their respective management, the adjustment to virtual work was successful in one case and cumbersome in the other.

The insights provided by this study add to the literature on GDTs, in particular to the understanding of changing work practices in hybrid
workplaces. Previous literature has overlooked the interplay between fully co-located and virtual work that knowledge professionals experience, and its impact on their actual work practice. We have shown that a proper integration may enable the formation of new common work practices in which the boundaries between co-located and virtual work gradually fade away. If members of GDTs do not pursue integration of practices and if communication across and within sites is scarce, virtual work is likely interpreted as “something else” with respect to regular work practice. Consequently, working with distant members becomes just a disturbance to traditional work activities.

Our evidence also contributes to the debate about different professional identities in organizations. In our study, as in previous research (e.g., Pratt et al., 2006), we show how an individual’s professional identity influences his or her behaviors and actions as well as his or her interpretation of others’ behavior and actions. Additionally, we show that the appraisal of other individuals’ competences and identities affects the way individuals choose to interact or not in virtual teams. Cooperation between distant members seems to be rooted in processes of identity recognition (Milton and Westphal, 2005): when members of a globally distributed team mutually acknowledge their professional identity and needs, cooperation across countries is reinforced, and acceptance of offshoring more easily increased. This “socialized view” of identity and identification has been largely unexplored (Bertolotti et al., 2006).

Finally, this chapter contributes to the emerging literature on the offshoring of knowledge-intensive work. Although offshoring is becoming a part of our everyday social lexicon, there is still little sound empirical evidence on its implications for knowledge workers and on the disruptive forces that it may bring to local, day-to-day work practices. Moreover, most empirical evidence on virtual teams focuses on distributed work that remained onshore or on laboratory experiments. This chapter, on the other hand, discusses some of the micro-organizational processes pertaining to offshoring of knowledge-intensive work, namely: integration of work practices, perceptions of competences and identity, sensemaking, and acceptance of virtual work. Future work should expand the investigation of such variables in offshoring settings and integrate it with the theoretical frameworks provided by the literature on distributed work.
There are, of course, limitations to our study. First, it is made up of two case studies and no statistical generalization is applicable. More work is needed to understand if the categories and relations that we observed can be applied to other globally distributed teams. Second, we studied GDTs located in different countries (Italy-India, Italy-Tunisia). National cultural differences and specific local context characteristics may have influenced our findings. Third, in our second case study (Core) we interviewed fewer offshore engineers. This made us report mainly on the experience of onsite professionals.

Our work has practical implications for organizations that offshore professional work by adding GDT-based practice to conventional co-located work. First, when offshoring professional work, organizations should put into place procedures, techniques, and tools that enable individuals to integrate their different workspaces. For example, all team members should be given the same equipment and technologies to work both with co-located and distant team members; and bi-directional staff swaps and frequent face-to-face encounters should be promoted. In other words, offshoring requires a careful design of ad hoc managerial and technological solutions; it cannot be successfully performed without affecting the state of the art of the organizations involved. Second, offshoring rationale and results should be communicated to all GTD members, so as to favor a climate of participation in strategic decisions. Third, organizations should not overlook the different professional identities of knowledge workers, even if they possess similar educational backgrounds (for example, they are all software engineers) and should promote a super-ordinate identity able to make them feel that they are contributing to the same goal. This may be obtained through a clear communication of the objectives and values of the organization.

Offshoring of professional work is an unstoppable and worldwide phenomenon that not only brings in economic, strategic, technological, and ethical issues, but also profoundly changes everyday professional work. We hope that our reflection may stimulate more researchers and managers to investigate these new, complex dynamics.

Note

1 To guarantee the anonymity of our informants we use pseudonyms instead of real names.
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References


Introduction

As economies and firm competitive advantage are increasingly based on knowledge rather than materials, firms are moving away from traditional modes of organization in order to meet new demands for competitiveness, flexibility, speed, and novelty (Child and McGrath, 2001; Kellogg, Orlikowski, and Yates, 2006; Volberda, 1996). As part of this broader paradigm shift, an increasing number of firms have outsourced and offshored many of their in-house activities – located them to a wholly owned company or independent service provider in another country – both in order to save costs and, increasingly, to acquire new skills and capabilities not available in-house (e.g., Carmel, 1999; Lewin and Peeters, 2006). Its potential benefits notwithstanding, such disaggregation of the value chain adds an additional layer of management complexity because of the need to manage and coordinate a complex web of knowledge flows and interdependent tasks being performed by distributed teams, marked by differences in geography, skills, norms, language, culture, and interests.

Prior work has provided valuable insights into managing knowledge processes – the access, transfer, dissemination, sharing, and integration of knowledge among dispersed organizational teams (e.g., Argote et al., 2003; Gupta and Govindarajan, 2000). Scholars have emphasized the need for creating both technical compatibility (Ford et al., 2003; Montoya-Weiss et al., 2001; Oshri et al., 2008) and cultural compatibility (D’Adderio, 2001; Fiol and Connor, 2005; Tajfel, 1981) across boundaries in disaggregated value chains and dispersed
social architectures. There has been less emphasis, however, on the political aspects of managing knowledge processes or what Carlile (2004: 55) describes as a “political approach that acknowledges how different interests impede knowledge-sharing” and impact the willingness to share knowledge. For instance, while measures to establish technical or cultural compatibility can improve management of knowledge processes, managers also need to focus on whose interests are served and who stands to gain and lose as a result (Dörrenbächer and Geppert, 2006), and, what is “at stake” for organizational participants when members engage in cross-boundary knowledge exchange and coordination (Carlile, 2002; Kellogg et al., 2006; Levina, 2001).

Inquiry into organizational politics and its impact on firm performance has a long tradition in the organization and strategy literatures (Cyert and March, 1963; Eisenhardt and Zbaracki, 1992; Vredenburgh and Maurer, 1984; Zahra, 1987). Yet most contemporary studies of organizations lack a “systematic and in-depth discussion about the role of organizational power, politics, conflicts, and resistance” (Dörrenbächer and Geppert, 2006: 252; Doz and Prahalad, 1991; Hardy and Clegg, 1996). Indeed, few scholars have focused on the increasing importance of power, politics, and conflicts in newly emerging organizational forms and learning processes or systematically addressed how incompatible interests, power differentials, and political agendas impact knowledge flows in dispersed social architectures (Buchanan, 2008; Dörrenbächer and Geppert, 2006; Lawrence et al., 2005). In particular, issues pertaining to the effect of the dilemma between individual and collective (organizational) interests (Cabrera and Cabrera, 2002), power and status differentials among distributed team members, and various political agendas on knowledge processes have received limited scrutiny in the context of offshoring – a recent but increasingly prevalent form of organizing (see Metiu [2006] for an exception).

Yet, the possibility of political tensions, power struggles, and even outright conflicts impacting knowledge processes because of the emergence of local imperatives and interests is critical when organizational units that perform complementary and interdependent activities are situated in different locations. This is in line with Easterby-Smith et al.’s (2000: 793) observation that we need to view knowledge processes “in light of the inherent conflicts between shareholders’ goals, economic pressure, institutionalized professional interest, and political agendas.”
By articulating the critical part played by organizational politics in influencing knowledge flows across distributed (onshore and offshore) groups, we aspire to enrich the literature on managing globally distributed teams that are engaged in high-value activities (Carmel, 1999; Oshri et al., 2008; Sidhu and Volberda, 2010). More specifically, we argue how the antecedents and consequences of politics might differ in the context of different globally distributed teams; and on how spatial, temporal, and cultural separation of onshore and offshore personnel has the potential to spawn politics and influence knowledge flows because of coalitions forming round localized goals.

We suggest that the successful offshoring of high-value functions is likely to depend on the recognition and skilful management of political dynamics between onshore and offshore personnel and fostering political “alignment” – internal consistency in the logic of action or means-end behavior (Bacharach and Lawler, 1998) – to manage collaborative knowledge processes. This chapter also contributes to the broader scholarly debate on the exercise of power and politics in organizations. While some recent work has highlighted the negative and dysfunctional aspects of politics, in line with the view that political processes also serve a functional purpose in organizations (cf. Bouquet and Birkinshaw, 2008; Buchanan, 2008; Dörrenbächer and Geppert, 2006; Eisenhardt and Zbaracki, 1992), we argue that political contests between onshore and offshore teams may also foster cooperation and enhance decision quality. Finally, we aim to guide future research by providing suggestions for studying the antecedents and outcomes of organizational politics in globally distributed teams.

**Knowledge processes and organizational politics in distributed teams**

Scholars widely agree that in increasingly competitive and dynamic environments, effective management of knowledge processes across various organizational boundaries, both external and internal is what drives competitive advantage for many organizations (Davenport and Prusak, 1998; Gupta and Govindarajan, 2000; Kogut and Zander, 1992; Song, Almeida, and Wu, 2003). Knowledge management refers to processes and practices used by organizations to identify, create, represent, share, and distribute knowledge, skills, and expertise for improved performance, competitive advantage, innovation, and
productivity (Mudambi, 2002). While organizations need to span both types of boundaries to access and integrate knowledge, our focus here is on managing internal knowledge (Argote et al., 2003), in particular, among globally distributed teams, such as those that are located centrally (onshore) and remotely (offshore).

The underlying dynamics of distributed teams clearly differ from those of co-located teams (Hinds and Bailey, 2003; McDonough et al., 2001). Globally distributed teams represent a new organizational form that has emerged in conjunction with the globalization of socio-economic processes. Such teams have replaced the traditional single-site hierarchy for various reasons. For instance, due to competitive pressures that force them to focus on their core activities, companies in developed nations have outsourced or offshored parts of their IT services and business processes to developing nations for saving costs and/or acquiring new skills not locally available (e.g., Carmel and Agarwal, 2002). This has led to new challenges in managing knowledge processes among organizational members located at offshore and onshore sites during different stages of product and service lifecycles.

Given that knowledge has various attributes, such as context-specificity and observability (e.g., Contractor and Ra, 2002), research on globally distributed teams has identified several factors that make managing knowledge processes particularly challenging in the context of distributed teams performing interdependent tasks (Cramton and Hinds, 2005; Krishna et al., 2004; Watson et al., 1993). First, the diversity of local contexts and working groups (Jehn et al., 1999) may exacerbate the “stickiness” of knowledge (Szulanski, 1996), hampering the transfer of contextual or “mutual” knowledge – “knowledge that the communicating parties share in common and they know they share” (Cramton, 2001: 246). Second, remote counterparts often adopt unique local routines for working, training, and learning (Desouza and Evaristo, 2004) that may obstruct the development of shared understandings among remote teams. Third, differences in skills, expertise, and technical infrastructure and methodologies further raise the barriers for managing knowledge processes between remote sites. And finally, time-zone differences reduce the window for real time interactions (Boland and Citurs, 2001), thus limiting opportunities for remote team members to discuss, debate, and explain diverse opinions and perspectives.
The literature on addressing these challenges to managing knowledge processes across distributed teams can be understood in terms of three primary perspectives\(^1\) (Brown and Duguid, 1998; Carlile, 2004; Kellogg \textit{et al.}, 2006; Spender, 1996) that emphasize the importance of improving knowledge flows within and across three types of boundaries (Carlile, 2004). These perspectives have emphasized technical aspects as well as social or “people” aspects (Alvesson and Kärreman, 2001).

**Perspectives on cross-boundary knowledge coordination**

The first perspective, termed as “knowledge transfer” (Carlile, 2004) focuses on the technical aspects including the use and development of information artifacts that prescribe a means for sharing information – repositories, specifications, standards – that support communication across boundaries (e.g., Montoya-Weiss \textit{et al.}, 2001). This perspective has its basis in an information-processing orientation (Galbraith, 1973; Lawrence and Lorsch, 1967), where knowledge is posited as “objective” and a “thing to store and retrieve,” and where the primary concern is that of transferring and processing explicit and easily codifiable knowledge across people, contexts, and organizational boundaries. The challenges in coordination are a result of breakdowns in knowledge transfer due to incompatible codes, routines, or protocols – what Carlile (2004) refers to as a problem of syntax in transferring knowledge across a “syntactic or information processing boundary.” Knowledge-sharing in these circumstances is enabled by the development of information artifacts – repositories, specifications, standards – that support communication across boundaries (Hansen, 1999; Leonard-Barton, 1992; Nonaka, 1994), creation and use of a common lexicon that specifies the differences and dependencies at the boundary (Carlile, 2004), or standard operating procedures that prescribe a means for sharing information (Grant, 1996; Nelson and Winter, 1982).

The second perspective, termed as “knowledge translation” (Carlile, 2004) emphasizes the social aspects including establishing trust (Staples and Webster, 2008), a “common meaning to share knowledge between actors” (Carlile, 2004: 55), a shared language (Newell \textit{et al.}, 2006), and using collective stories (Wenger, 1998) as a way to address interpretive differences across boundaries (Kellogg \textit{et al.}, 2006). This
perspective is rooted in an interpretive approach (Dougherty, 1992),
that emphasizes the importance of establishing a “common meaning
to share knowledge between actors” (Carlile, 2004: 55), and where
the primary concern is that of translating tacit, context-specific, expe-
riential, complex, and not easily articulated knowledge across organi-
zational participants (Kogut and Zander, 1992; Lam, 1997; Nonaka,
1994; Winter, 1987). This perspective highlights how interpretive dif-
fferences limit the effective management of knowledge between actors,
as knowledge transfer in this case is not simply about rational cal-
culations of efficiency but reflects the conventions, norms, and values
of the actors and communities engaged in knowledge management
(Brown and Duguid, 1991; Dougherty, 1992; Lave and Wenger, 1991;
Wenger, 1998). Coordination challenges arise because of differences
in meanings, assumptions, and contexts – a problem characterized by
Carlile (2004) as one of semantics in translating knowledge across
a “semantic or interpretive boundary.” Knowledge-sharing in these
circumstances may be facilitated by developing common meaning
that highlights the equivalence between different sets of knowledge,
a shared language (Newell et al., 2006), collective stories (Wenger,
1998), common artifacts (Levina, 2001), use of cross-functional teams
(Ancona and Caldwell, 1992), shared methodologies and boundary
objects (Star and Griesemer, 1989), translators (Yanow, 2000), bro-
kers (Hargadon and Sutton, 1997), or mediators (Orlikowski et al.,
1995), as a way of addressing interpretive differences across bound-
daries (Kellogg et al., 2006).

The third perspective, termed as “knowledge transformation”
(Carlile, 2004), and one that has received relatively less attention,
has its origins in a political approach that primarily concerns the polit-
ical aspects of knowledge and people’s interests and agendas, when
they engage in cross-boundary knowledge coordination. If, after a
translation effort, organizations determine that their language or mea-
sures are different, then they will have to transform some of their
language or measures in order to continue to work together. As peo-
ple’s knowledge, know-how, and accumulated experience is seen to
be inseparable from people’s interests and actions in specific contexts,
this perspective highlights how in some cases, coordinating knowledge
across boundaries is not just a matter of transferring or translating but
also of negotiating interests, settling political differences, compromis-
ing, and making trade-offs (Brown and Duguid, 1998; Wenger, 1998).
Coordination problems arise because of different interests and the
political consequences of sharing knowledge – what Carlile (2004) refers to as a problem of “pragmatics” and translating knowledge across a “pragmatic or political boundary.” Differences in interests may be negotiated through a political process of negotiating and defining common interests and transforming localized knowledge into jointly produced knowledge that transcends the participants’ local interests and creates a shared body of knowledge or “common knowledge” (Carlile, 2002, 2004).

In short, the three perspectives suggest facilitating cross-boundary coordination in a distributed knowledge system through establishing a shared syntax for representing differences and dependencies at the boundary, use of various mechanisms that allow participants to develop shared meanings to understand those differences and dependencies, resolving conflicts through negotiation and compromise and using various boundary-bridging means (e.g., shared protocols, procedures, routines, methodologies, stories, models) and use of “transactional memory system” or corporate knowledge repositories within an organization (Wegner, 1986).

While there is a rich body of work on the first two perspectives, in particular the challenges of transferring and translating different types of knowledge – explicit or tacit – and developing shared understanding by making tacit knowledge explicit (e.g., Nonaka, 1994), the third perspective has received relatively far less attention. In this case, the challenge of cross-boundary knowledge coordination involves not just the differences in the forms of knowledge, but also the positions, interests, and agendas of the organizational participants (Empson, 2001). Consequently, we need to learn more about the challenges of managing cross-boundary coordination in the presence of divergent interests and political differences, as is often the case in a disaggregated value chain such as an offshoring context. As peoples’ knowledge, know-how, and accumulated experience is often inseparable from peoples’ interests and actions in specific contexts, managing knowledge processes is also a matter of managing organizational politics, such as negotiating and defining participants’ local interests, settling political differences, aligning means-end behavior (Bacharach and Lawler, 1998), and compromising and making trade-offs between actors (Brown and Duguid, 1998).

Organizational politics here refers to the competition between competing interest groups or individuals for power, authority, and leadership (Drory and Romm, 1990; Mayes and Allen, 1977), with political
behavior seen as “the exercise of tactical influence which is strategically goal directed, rational, conscious, and intended to promote self-interest, either at the expense of or in support of others’ interests” (Valle and Perrewe, 2000: 361). Drory and Romm (1990) further elaborated the means and ends of organizational politics. Means include influence attempts, power tactics, informal behavior, and concealing one’s motives, while outcomes include self-serving behavior, acting against the interests of the organization, securing valuable resources, and attaining power.

The role of organizational politics in knowledge processes

Discussions about organizational politics are nothing new in organizational and management literatures. In a recent work, Bouquet and Birkinshaw (2008) provide a conceptual integration and synthesis of the literature on power and influence in MNCs for achieving legitimacy, controlling resources, and gaining centrality. Indeed, complex organizations are seen as endemic sites of power and politics (Blackler, 2000; Cyert and March, 1963; Eisenhardt and Zbaracki, 1992) and are often fertile arenas for political strategizing and power plays, as various factions, coalitions, and cliques try to advance their interests or those of their members (Bouquet and Birkinshaw, 2008; Drory, 1993; Ibarra, 1993). Power and politics have been argued to be “fundamental concepts for understanding behavior in organizations” (Pfeffer, 1981: 1) and we would note, also for managing knowledge processes among globally distributed teams. For example, Hardy and Phillips (1998) analyze power relations in inter-organizational collaborations and highlight three important aspects – formal authority, critical resources, and discursive legitimacy – that may also be relevant in various types of organizational relationships in globally distributed settings.

Complex organizations such as MNCs are seen as contested terrains, where members’ activities may often reflect political considerations rather than only functional or economic ones. Several scholars have examined power dynamics and political processes between headquarters and geographically dispersed subsidiaries (Birkinshaw and Fry, 1998; see Bouquet and Birkinshaw, 2008 for a detailed review). As Morgan and Kristensen (2006: 1473) note: “MNC as a totality may be seen as a highly complex configuration of ongoing micro
political power conflicts at different levels in which strategizing social actors/groups inside and outside the firm interact with each other and create temporary balances of power that shape how formal organizational relationships and processes actually work in practice.”

Despite recent scholarly interest in addressing the role of organizational politics in organizational life in complex companies (Bouquet and Birkinshaw, 2008; Dörrenbächer and Geppert, 2006), conflicting viewpoints persist (see Buchanan, [2008] for a detailed review). Often subject to managerial ambivalence, views on organizational politics range from politics being considered dysfunctional and Machiavellian to being seen as useful and desirable in organizational life (Buchanan, 2008). The metaphor of “office politics” (Pettigrew, 1973) has often invoked negative connotations – something to be avoided or actively resisted. As Knights and McCabe, (1998: 795) note: “politics remains as the discourse that ‘dare not speak its name.’” Political behavior is seen as illegitimate, devious, and unsanctioned (Mayes and Allen, 1977), Machiavellian and dysfunctional (Voyer, 1994), “pathological” (Coopey and Burgoyne, 2000), “a walk on the dark side” (Ferris and King, 1991), a “social disease” (Chanlat, 1997), and associated with lack of transparency and poor performance (Eisenhardt and Bourgeois, 1988). Environments perceived to be political are seen to encourage behaviors that are designed to promote or protect the self-interests of the actor, including taking credit for the accomplishments of others and furthering one’s own agenda at the expense of others. This leads to suspicion and a breakdown of trust, since an environment fraught with political activity tends to blur the relationship between performance and reward and raises questions regarding the fairness of decision-making. Reducing and even eradicating organization politics has thus been argued to be a management duty (Stone, 1997).

However, many have cast doubt on the claim that “politics is always bad” (Provis, 2004: 233). Politics is an inevitable organizational reality, necessary in many settings and even a desirable facet of organizational change (Mintzberg, 1985; Pettigrew, 1985; Pichault, 1995), which can be functional in terms of careers and power-building (Gandz and Murray, 1980), and that can be used to fight “battles over just causes” (Butcher and Clarke, 1999). Politics and open political activity provide the “social energy” that fuels organizational learning (Lawrence et al., 2005), creates “psychic space” to nurture self-identity
and learning (Coopey and Burgoyne, 2000), develops and maintains social order (Knights and McCabe, 1998), is used to resist the use of legitimate tactics to achieve undesirable ends, and is employed to enable the integration of new ideas and the implementation of decisions reached by legitimate means (Harrison, 1987; Lawrence et al., 2005).

While the role of organizational politics has been subject to much debate, there is much less work on how politics impact the management of knowledge processes. One important contribution is the ethnographic account by Metiu (2006) who describes how intergroup status differentials between the US-based front-office staff and Indian-based back-office staff impacted knowledge-sharing and cooperation in the context of software development.

**Insights from organizational economics**

While the knowledge management literature has paid only limited attention to the issue of organizational politics, work in organizational economics (Alchian and Demsetz, 1972), agency theory (Fama and Jensen, 1983), and transaction cost economics (Williamson, 1996), draws attention to various problems arising from political conflicts, moral hazard, opportunism, asymmetric information, measurement difficulties, and various organizational actions to address these problems (Foss and Mahnke, 2005). For instance, knowledge-sharing has been argued to be facilitated by the use of incentives (Cabrera and Cabrera, 2002) that can influence both the willingness and ability of people to engage in collaborative knowledge processes (Minbaeva et al., 2003). However, this is not to discount the argument that at times, people may act in the best interest of the organization, not purely from an instrumental concern with rewards, sanctions, and incentives but by a sense of sheer organizational citizenship, identification with company goals, and intrinsic satisfaction from work (e.g., Kunda, 1992).

Organizational economics has been centrally concerned with what scholars in knowledge management have only recently argued “that social relations and learning processes do not happen in a political vacuum and, on the contrary take place in a landscape of interests and differential power positions and relations” (Easterby-Smith et al., 2000: 793). As an unavoidable social reality and a natural mechanism of social interactions in organizations (Dörrenbächer and Geppert,
2006), organization politics significantly influences cross-boundary knowledge processes. But what are the origins of organizational politics and what are some of the factors that generate political behavior particularly in globally distributed teams? We discuss some of these factors below.

**Incorporating organizational politics into knowledge management**

**Antecedents of organizational politics**

Organizational politics may be particularly potent in globally distributed teams, where with the dispersion of people the time that they spend together is a scarce resource, and people may not have the opportunity to “clear the air.” The emergence of localized interests and preferences may thus make such situations potentially more susceptible to political manipulation. If people feel that they are getting the “short end of the stick,” physical separation may make it more difficult to clear misgivings that may lead to adverse attitudes and political behavior. While “a dual strategy” of improving the technical elements (information and communication infrastructure) and cultural compatibilities (cultural training programs [David et al., 2008]) may contribute to reducing the adverse impact of physical separation, it only addresses a part of the equation for achieving integrated and sustained collaboration.

Such problems may be exacerbated when the project involves high-value or core functions where knowledge is more tacit, embedded, complex, and highly context-specific and co-dependent on the unidentified aspects of a specific temporal, spatial, cultural, and social context (Szulanski and Jensen, 2004). This entails higher stakes and consequences from opportunism and may generate self-interested and political behavior. Prior work has provided rich insights into why such knowledge remains elusive and thus difficult to transfer and share and translate across boundaries, people, and contexts (Carlile, 2004).

In examining the lack of political alignment, we argue that incompatible interests and divergent agendas are likely to foster organizational politics and impede knowledge flows. One type of problem among remote teams may arise from different incentive structures that create ambiguity and blur the relationship between performance and desired
outcomes for teams. Incompatible incentive structures can contribute to creating a context, wherein onshore and offshore units may come to view themselves as separate blocks or coalitions within the same company (David et al., 2008). Understandably, members of the two groups may then tend to privilege their own interests, even when, on occasion, these are at odds with that of the other group and the organization. This can generate organizational politics as people privilege and pursue divergent individual or factional interests rather than organizational interests. Stated as a proposition:

Proposition 1: Inconsistent or misaligned incentive systems are more likely to lead to organizational politics in globally distributed teams than when these systems are consistent and aligned.

While misaligned incentives can spawn organizational politics in any organization, including ones that involve globally distributed teams, political behavior is more likely to arise in teams that are part of the same organization – captives or affiliates – rather than when they belong to different organizations – contracting or third-party relationships. While being part of the same organization may mitigate the threat of possible opportunism and misappropriation of intellectual property that may occur in contracting or third-party relationships, it may also generate horizontal hierarchies and status differentials within distributed organizational members such as those working in core “front” and peripheral “back” offices.

Status differentials and different forms of knowledge among members of globally distributed teams may shape political processes and interests. For instance, status differentials may lead to remote location (e.g., back-office) knowledge to be seen as “peripheral” knowledge that may typically get neglected and regarded as less legitimate than knowledge possessed by hierarchically more senior and physically more central teams and their members. Even brilliant ideas from “second class” citizens may not get the recognition they deserve and the organization may lose out on an important source of innovative ideas (David et al., 2008). Such knowledge “censorship” and “discrimination” among members of globally distributed teams may translate into power struggles and organizational politics and impede knowledge flows within the organization. Remote employees may for example refuse to share knowledge or withhold information due to perceptions of being “used,” considered lower status, less valued or
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unfairly treated (McKinlay, 2002). This is in line with Metiu’s (2006) discussion of “high status” FO staff using informal means to exclude “low-status” BO groups from involvement in highly valued projects and “low status” staff then creating impediments in the smooth flow of knowledge. While these processes occur in all types of organizations in the context of globally distributed teams, they may be even more acute for organizations with affiliates than for organizations engaged in contracting or third-party relationships. This is because belonging to the same organization lends itself to more direct comparisons among members of distributed teams than belonging to different organizations. Summarizing our arguments in the form of a proposition:

Proposition 2: Status differentials among organizational members of globally distributed teams may lead affiliates to experience a higher degree of organizational politics in globally distributed teams, than in the case where organizations have contracting relationships.

While status differentials can spawn organizational politics in distributed teams that are part of the same organization, not involving remote teams in sensitive forms of knowledge in the context of high-value activities, such as client negotiations, may also breed a culture of mistrust and impede knowledge flows. Due to perceived fears that BO staff would take over the tasks of expensive FO staff and make them redundant, involvement of BO employees and their direct engagement with clients may raise concern among FO staff. FO staff may then strategize to keep BO staff from interacting directly with clients. Such non-inclusive behavior of centrally located team members towards remotely located team members needs to be seen in the context of the larger dynamics of offshoring that at times can involve cost-cutting, downsizing, and job losses, and create a highly stressful environment of uncertainty, fear, and distrust for the FO staff who may then engage in strategic behavior (Empson, 2001).

Centrally located (and usually more highly paid) members may thus be less open in sharing knowledge and expertise for the fear of becoming less critical for the organization. As David et al. (2008) found in the context of a US-based firm with offshore sites in India and Ireland, workers at periphery sites are not typically included in direction setting that may impede their ability to visualize the “big picture.” Similarly, excluding BO employees from decisions concerning new technology selection and not providing them the opportunity to directly interact
with the customers may also hamper their ability to develop domain knowledge that is held by core sites. On the other hand, BO employees may refuse to share knowledge or withhold information due to perceptions of being unjustly treated. Such knowledge discrimination may create impediments towards developing a feeling of “being in the same boat” and may reduce their ability to develop good relationships and collaborate with onshore workers.

As we observed in a number of multinational organizations with front offices in Netherlands and back offices in India, limited involvement of the back-office staff in key architectural and financial discussions about high-value projects created a “client-vendor” or an “ingroup-outgroup” mentality within the same organization (cf. David et al., 2008) that generated political tensions and power struggles and thus was not conducive towards fostering a sense of commitment to the organization. As we noted earlier, this problem may be more acute in organizations that have outsourced or offshored their high-value functions to remote locations and where organizational employees are in direct “competition,” and more prone to direct comparisons, than those organizations that perform these function onsite or have contracted them to third parties and where organizational employees are not in direct competition. Summarizing our arguments:

**Proposition 3**: Knowledge discrimination and censorship among organizational members of globally distributed teams may lead affiliates to experience a higher degree of organizational politics in globally distributed teams than in the case where organizations have contracting relationships.

The different factors that may lead to organizational politics especially in globally distributed teams, poses strong challenges for managers at the helm of managing these teams. But what are the possible steps that managers can take to manage organizational politics and improve knowledge management in globally distributed teams? Following an analysis of the issues related to organizational politics in managing knowledge processes, we offer three key arguments.

**Managing organizational politics**

First, we argue that efforts geared towards diminishing the dysfunctional consequences of politics must take into account human behavior that is based on the situatedness characterizing everyday interactions
in organizational life (David et al., 2008; Empson, 2001). Rather than view organizational politics only as an aberration in the management of knowledge processes in an offshoring context, we argue for some of its positive effects. As against the common belief that managers should aim at reducing or eradicating organizational politics to improve knowledge flows and organizational performance, we suggest that managers need to focus on activities that create a healthy political environment, where diverse people are able to speak out and expose troublesome issues, vent their frustrations and engage with others in an open and transparent manner. Furthermore, alongside cultural managers (e.g., Director of Competence and Culture at Sony-Ericsson), organizations can consider appointing “alignment managers” – people with political competencies and connections – who can be put in charge to push ideas forward, steer organizational change initiatives and enrol wider support without triggering resistance (cf. Ferris et al., 2000; Lawrence et al., 2005).

In light of the literature that suggests that politics is not always “bad” and that exclusively adopting a negative stance towards organizational politics may exacerbate the problems for the organization, we argue for organizational efforts aimed at channelling organizational politics in a positive manner. Indeed, in some cases, organizational politics can even lead to management interventions and decisions that may benefit the organization. In one multinational organization we studied, the back office exercised power over onshore teams (David et al., 2008) by withholding vital information from their remote counterparts and management responded to back-office actions despite its less central position in offshore projects. Political behavior is thus central to organizational processes, and represents the principle way in which people get things done. It can be used to subtly convey grievances and problems and bring them to the fore without engaging in direct confrontation. Thus, we do not argue for the reduction or elimination of organizational politics – an inevitable and intrinsic organizational reality that permeates the very fabric of organizational life (e.g., Knights and McCabe, 1998). Rather, we advocate organizational effort to leverage politics for the organization’s benefit and to mitigate some of the negative ramifications of organizational politics.

Such actions may help mitigate the negative aspects of organizational politics, such as the intentional lack of collaboration that may arise among distributed teams, as Metiu (2006) found in the ethnographic
study of a team of software developers located in the US and India where perceived status differentials hampered intergroup cooperation. However, this is not to imply that management are in some way above and separate from issues of politics. Arguably, all organizational staff, including management, is embedded in political processes, which is especially true if it is assumed that issues of power and knowledge are an intrinsic element of all political processes. Yet managers may engage in activities that mitigates some of the dysfunctional consequences of political processes. Rephrasing our arguments in the form of a summary statement:

**Summary Statement 1**: Instead of effort aimed only at reducing or eradicating organizational politics, managers need to focus on activities that create a healthy political environment in order to improve knowledge flows and organizational performance.

Second, we argue for bringing in insights from organizational economics into knowledge management (Foss and Mahnke, 2005), and emphasize the need for appropriate incentive systems for aligning political interests and motivating people to share knowledge in globally distributed teams. Such tangible measures may contribute to developing a sense of mutual dependence and oneness and complement programs aimed at technical and cultural alignment to improve the management of knowledge processes. As David et al. (2008) noted in the context of remotely located onshore and offshore teams, the hurdles to coordination and collaboration could not be explained by divergent nationally based cultural attributes, language barriers, and the limitations of information and communication technologies. Rather, impediments to developing positive social relations to facilitate collaboration among globally distributed sites were overcome through aligning interests and creating joint responsibilities to mitigate a core-periphery mentality and develop positive social relations among distributed organizational members. To align interests, goals, and responsibilities and incentivise collaboration in globally distributed teams, we advocate the need for generating “political alignment” or consistencies in the logics of action (Bacharach and Lawler, 1998) underpinning behavior that can increase participants’ motivation to share knowledge. Managing distributed teams effectively entails not just the challenge of removing technical or social barriers to knowledge flows, but also the challenge of aligning incongruous positions, divergent interests,
and incompatible agendas of organizational participants. Articulating these arguments as a summary statement:

**Summary Statement 2**: Managers need to generate consistencies in the logics of action underpinning behavior and align interests, goals, and responsibilities among members of globally distributed teams in order to increase their motivation to share and disseminate knowledge.

Third, we argue that globally distributed teams should engage in actions to diffuse tensions and power struggles not as a “one-off” but on an ongoing basis over time. We argue that many distributed teams tend to invest in creating a “common ground” to work together only at the beginning of the project. During our study of several offshored projects in different locations, we observed that organizations tend to devise elaborate training programs and invest in creating cultural and technical compatibility among dispersed teams at the inception and during the early stages of an offshored or an outsourced project. However, as the project progresses, enthusiasm for such pressures may wane and dispersed counterparts then tend to shift their attention to local interests and priorities while paying less attention to the globally collaborative mode of work.

Such a scenario often results in growing tensions and power struggles among remote counterparts about the allocation of resources and key project priorities. This may then lead to some of the negative aspects of organizational politics. We thus propose that global teams need to continually “renew” and “renegotiate” their commitment on an ongoing basis in order to diffuse tensions and reduce some of the negative dynamics of power struggles and organizational politics within the project. Expressed formally as a summary statement:

**Summary Statement 3**: Global teams need to continually renew and renegotiate norms and work habits on an ongoing basis over time and not only at the beginning of the project.

**Empirical and methodological considerations**

A central aspect of our perspective is that globally distributed teams, in particular those that are part of the same organization, are more prone to organizational politics, and require organizational efforts to mitigate some of the negative impact of political behaviors that may impede knowledge flows. Previous research has focused more
on organizational efforts meant to foster technical and cultural alignment but less on efforts geared towards reducing some of the dysfunctional effects of organizational politics. We recognize that this is partly due to the methodological difficulties of measuring organizational politics and its impact. The shift in emphasis we have advocated merits some discussion regarding questions of operationalization and measurement.

Our approach encourages studies combining qualitative and quantitative methods that could more clearly identify the antecedents of organizational politics. While qualitative studies seem a natural choice for studying the richness of these dynamics, quantitative studies are usually more adept at showing how patterns of organizational politics emerge across an organizational population over time. Fortunately, there is considerable precedent regarding the operationalization of some of the constructs we have discussed here. Scholars can use both existing scales or develop new ones for gauging the antecedents and presence of organizational politics (see Kacmar and Baron, 1999 for a review). Du Brin (1978) developed a scale consisting of 100 items that Biberman (1985) expanded to test hypotheses about the propensity of individuals to engage in office politics. Another way of operationalizing organizational politics is through critical incident vignettes (Drory and Romm, 1990). Furthermore, Kacmar and Ferris (1991) developed a measure called the Perception of Organizational Politics (POPS), while Anderson (1994) published two versions of Dysfunctional Office and Organizational Politics (DOOP). Finally, scholars have examined organizational politics as both an individual level process as well as an organizational level process (Kacmar and Baron, 1999). Regarding the use of various individual and organizational actions to manage organizational politics, Farrell and Peterson (1982) offered a typology of political tactics by combining three dimensions of political behavior: internal–external (inside or outside the organization), vertical–lateral (at different hierarchical levels or at the same horizontal level in an organization), and legitimate–illegitimate (within or outside the bounds of law).

While some researchers have also explored variables that could influence organizational politics, others have examined what variables organizational politics influences. Examples include job satisfaction, job involvement, job anxiety, absenteeism, and turnover as well as organizational commitment and identification with the organization.
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(Kacmar and Baron, 1999), as well as moderator variables such as understanding and perceived control of organizational politics. These arguments merit further attention. While some of these measures might involve new and creative ways to operationalize the relevant constructs, we believe that there are no insurmountable difficulties in developing them. Finally, there is a rich body of literature on the measurement of knowledge management processes both within and among organizations that can be employed in conjunction with measures of organizational politics to inform how politics impact knowledge-management processes. In particular, these measures can be used to gauge how politics influences the transfer, sharing, and integration of knowledge across “political” organizational boundaries in teams distributed across time and space, and what organizations can do in order to channel organizational politics in a positive manner.

Future research directions

Our research suggests several fruitful avenues for future research. Scholars may investigate how knowledge-related practices are constituted by and through political relations in different organizational contexts and industries, both stable and dynamic and the extent to which political behavior can be channelled for the organization’s benefit. We also suggest more studies that examine the extent of people’s understanding and perceived control of organizational politics. For instance, it has been argued that when people recognize that politics exists in their organization but perceive relatively little control over or understanding of these processes, then politics is likely to be seen as a threat and can lead to negative outcomes. On the other hand, if they believe they understand the political climate and have some control over it, they are likely to view politics as an opportunity and “work” the system to curry favor and increase the benefits they receive in the organization (Kacmar and Baron, 1999). But what are some of the factors that lead to these differences in the way people perceive and experience organizational politics? This issue merits further attention. We also suggest studies aimed at identifying additional motives behind organizational politics, and developing strategies for channelling organizational politics in a manner that is beneficial to the organization. This can include the use of skills and tactics of influence such as persuasion, inspirational appeals to a person’s core values and ideals,
inclusive consultation, ingratiation, and personal appeals to feelings of loyalty and friendship. We suggest that these are useful avenues for further research that carry important implications for both theory and practice.

Note
1 Effective management of knowledge processes comes at a cost. Indeed, scholars have drawn attention to the “costs” of improving the management of knowledge processes (e.g., Haas and Hansen, 2007).

References
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PART IV

Empirical analyses and case studies of outsourcing and offshoring
Introduction

The offshoring industry in the developing world is rapidly moving into a higher gear. It started with relatively low-end works such as back-office support, customer service, and data entry. In recent years, developed-world-based firms are increasingly outsourcing more sophisticated work such as computer coding, insurance underwriting, claims processing, and medical transcription to developing economies (Reich, 2005). An estimate suggested that “high-value” business process outsourcing (BPO), such as accounting, paralegal, medical, research, and banking will reach $50 billion by 2010 (Mehta et al., 2006).

Although reflective pieces from the popular press and some academic articles have provided insights into the rapidly growing offshoring industry, there is a dearth of theoretically oriented research on the evolution of a “high-value” BPO industry in emerging economies. To improve our understanding of the development of a “high-value” BPO industry in emerging economies, this chapter focuses on the offshoring of medical transcription services by industrialized-world-based healthcare providers to developing economies. In specific terms, we examine the US–India trade in medical transcription services.

Before proceeding, we offer some clarifying definitions. Business process outsourcing (BPO) is defined as long-term contracting of a firm’s non-core business processes to an external contract provider (Romberg, 1998). These are non-IT business processes but in most cases are IT-intensive or are facilitated by IT (Kshetri, 2007).
examples include customer service call centers, tax preparation, medical transcription, finance and accounting, human resources, design and engineering, etc. (The Economist, 2005a). The performance metrics are defined and measurable (Stone, 2004). In offshore BPO, the outsourcing firm and the client firm are located in different nations. High-value BPO involves offshoring of sophisticated tasks requiring high skills. Medical transcription is an ITES, which involves converting medical notes dictated by a physician into editable electronic documents to be added to patient records (Ghodeswar and Vaidyanathan, 2008; Thomson Financial News, 2007).

The degree of offshoring in an industry from a developed economy to a developing economy

Degree of labor-intensiveness and outsourceability of functions in a service industry

Cost-based as well as non-cost-based factors influence the outsourceability of a business function. Previous researchers have recognized that cost reduction has been a major motivation behind outsourcing (Allnoch, 1997; Cottrill, 1997; Gourley, 1998; Hicks et al., 2000; Magretta and Dell, 1998; Power and Simon, 2004). Pressure to remain competitive has forced firms to reduce costs and emphasize on productivity by becoming lean and efficient and to focus on core businesses (Moore, 1998). Outsourcing helps firms streamline the internal processes (Avery, 2002) and conserve corporate resources for the most effective use (Morgan, 2000). For supply chain management activities, outsourcing has been a common strategy used by companies to enhance competitive advantage (Allnoch, 1997; Cottrill, 1997; Gourley, 1998; Hicks et al., 2000; Magretta and Dell, 1998; Power and Simon, 2004). Fierce world competition has also forced firms to internationalize their outsourcing operations (Aquilon, 1997).

An important point to bear in mind is that cost-saving potential and hence the degree of outsourceability varies across industries (Garner and Schwartz, 2004). The degree of labor-intensiveness, an indicator of the cost saving potential, is positively related to the degree of outsourceability jobs in the industry.
Factors affecting the flow of offshoring of functions in an industry between two economies

Consider two economies – the offshoring origin country (O) (a developed country) and the offshoring destination country (D) (a developing country). A natural question is how the destination country (D) improves labor productivity and comparative factor endowments from the standpoint of the development of a high-value BPO industry. To address this question, we begin by considering Ricardian theory, which explains comparative advantage as a function of technological differences that vary across economic sectors (Xu, 1993). Ricardian models assume that only labor is used to produce goods and services. The theory predicts that a country will export products in which its labor productivity is high relative to its labor productivity in other products (Helpman, 1999).

An important point to bear in mind, however, is that there are many functions that are labor intensive and many developing countries are endowed with labor. Prior to discussing mechanisms associated with the inflows of jobs and investments in the medical transcription industry, it is necessary to create a theoretical framework about the internationalization of an economic sector of a developing country. In a rich body of theory and empirical research, scholars have made the case that two interrelated factors – productivity and international linkages – explain the internationalization of an economic sector of a developing country.

Productivity of a function in an industry

Wages of skilled as well as unskilled labors tend to be higher in developed countries (O) than in developing countries (D). This is not because technologies in developed countries are superior but because “enough different sectors have such superiority in a portion of the activities that they encompass” (Deardorff, 2005). Outsourcing thus combines the low-wage labor of developing countries with the high technology achieved in developed countries (van Marrewijk et al., 1997). From a developing country’s perspective, related to explanations based on the productivity–offshoring nexus, it can be argued that productivity is positively related to the amount of offshoring of services the country
receives. Deardorff (2005) notes that business activities that are more productive in developed countries than in developing countries are not likely to be outsourced unless there is a substantial cost saving. He also observes that activities that have been bundled within developed-world-based firms in a certain way but lack “superior technology” are more likely to be outsourced to developing countries.

More generally, the probability of a function being offshored to a developing country increases in proportion to the developing country’s increase in productivity in the function. In prior literature researchers have compared offshoring with the osmosis process (Kshetri and Williamson, 2004). According to the Osmosis Model of offshoring, the above processes lead to an increased “osmotic pressure” of offshoring in the industry between the two economies (Kshetri and Williamson, 2004). This leads to a higher rate of offshoring of the function from (O) to (D).

**International linkages**

For developing-country-based firms, success in offshoring is about developing and simplifying linkages with partners (Levy, 2005). “Relational proximity” or degree of linkages between the two economies in a particular industry plays an important role in the knowledge flows needed for the outsourcing of functions related to the industry (Coenen et al., 2004). Previous researchers have noted the important role of learning by exporting in developing channels of international linkages (Bigsten et al., 2002; Castellani, 2001; Clerides et al., 1998; Girma et al., 2003; Kraay, 1997; Yasar and Morrison Paul, 2007). Exporting also helps enhance productivity by augmenting inputs, such as labor force and managerial skills, as well as by exposing firms to cutting-edge technology from their partners (Nelson and Phelps, 1966; Yasar and Morrison Paul, 2007).

**Factors associated with productivity and international linkages in the medical transcription industry**

A developing economy’s ability to attract jobs related to offshoring of high-value functions such as medical transcriptions depends on “the construction and protection of unique assets and capabilities” (Levy, 2005). This is especially important as services often need to be tailored
to the requirements of the buyer. A supplier’s capability to provide different varieties is thus crucial to success (van Marrewijk et al., 1997). The development of assets and capabilities and other inputs required in the offshoring of medical transcriptions is associated with, and facilitated by, the development of related economic sectors (Yasar and Morrison Paul, 2007). To put things in context, the knowledge of medical terminology and the ability to dictate medical and health-related reports is crucial for the development of the medical transcription industry (Buban, 2007). In the US, employers prefer to hire medical transcriptionists (MTs) with at least post-secondary training in medical transcription. Knowledge of anatomy, and medical-legal issues is also necessary (Chowdhury, 2002). Up to 99.8 percent accuracy is needed in medical transcriptions (Indo-Asian News Service, 2007).

Offshoring experience, typically in a low-value BPO, is likely to enhance the productivity and international linkages required for the success of high-value BPO such as medical transcription. Consider India: the country’s management style is highly traditional (Heller, 1995) and “process-driven and detail-oriented” approaches are virtually absent in the Indian work culture (Piramal, 2004). In the same vein, Indians have a more flexible approach to deadlines (Slater, 2003).

The development of the BPO industry has led to the evolution of a number of professionally run companies in India. These companies are well versed in the use of new management techniques, software, and communications systems (Quinn, 2000). In an attempt to address their clients’ fear that customer data will be stolen and even sold to criminals (Lucas, 2004), a number of Indian firms have started instilling the culture of modern management. For instance, call center employees have to undergo security checks that are considered to be “undignified” (The Economist, 2005b). Firms have established biometric authentication controls for workers and banned cell phones, pens, paper, and internet/email access for employees (Fest, 2005). Similarly, computer terminals at some BPO companies (e.g., Mphasis) lack hard drives, email, CD-ROM drives, or other ways to store, copy, or forward data (Engardio et al., 2004). Likewise, Indian outsourcing firms extensively monitor and analyze employee logs (Fest, 2005).

The normative institutions (e.g., the medical center’s obligation to maintain patients’ privacy in the US) and regulative institutions (e.g., a potential threat of lawsuit for failing to protect patients’ information) make it extremely important to protect patients’ health-related
information in the US (Kshetri, 2005). In 2003, a Pakistani medical transcriber working for a US-based medical center threatened to post confidential voice files and patient records on the Internet if her pay was not increased. This incident created awareness of potential security breaches in call centers and drew closer scrutiny of medical transcription services supplied by foreign vendors (GAO, 2006).

**Strength of network-based linkages**

To understand developing-world-based firms’ export of medical transcription services, it may be helpful to consider the network theory, which focuses on interpersonal and social relationships. According to the network perspective, internationalization is a result of interaction and the development of a multitude of relationships. Such relationships enhance the proximity of partners involved in businesses. Cuningham and Calligan (1991) argue that networking creates relationships that have the potential to benefit complementarily all parties involved and harnesses the synergistic potential of the net in pursuit of the common goal.

Bathelt (2005: 209) notes: “when firms establish production linkages in a new country, they are faced with a heterogeneous cultural and institutional environment. Firms have to bridge these differences, establish efficient communication between agents with various cultural backgrounds and adjust their organizational practices in the host country.” Chun (2007) documents the emergence of the inflows of network-based IT investment from Taiwan to China starting in the late 1990s. Examining cross-border investment in Dongguan, China, others have noted that Taiwan-based firms capitalize on their social network resources, which has helped to overcome their shortage of internationalization experiences and assets (Chen and Chen, 1998; Chen, 2003). It is also suggested that a network of contacts may serve as “reputational intermediaries” (Arora and Gambardella, 2005), which increases the degree of linkages between the two economies in the industry.

**A case study of US–India trade in medical transcription services**

Compared to activities such as back-office transaction processing, which belong to the low end spectrum of BPO, medical transcription is considered to be a high-value BPO (Benner, 2006; McKinsey
Global Institute, 2003; Reich, 2005). Note, too, that medical transcription is very complex work, which needs “specialized” knowledge and is not normally offered by “generic” BPOs (Business Wire, 2006; The Statesman, 2006). One estimate suggested that average revenue per employee per hour in India in the early 2000s was $15 in medical transcription compared to $7 for BPO (Express Computer, 2003a, b).

Medical transcription is information-based. Technological advances have reduced the cost and increased the feasibility of producing medical transcription services offshore. At the same time, new management techniques, software, and communications systems have enabled better coordination and made it possible to monitor quality. External contract providers, such as Spectramind, MsourcE, and First Ring are enabling American clients to monitor remotely the external contract providers’ operations in India (Read, 2003).

They have also been employing sophisticated encryption technologies to communicate. Third, medical transcription is codifiable – that is, it can be reduced to a routine set of instructions that can be conducted easily offshore and requires low levels of experience or training. Beyond all that, technological advances combined with the nature of this industry provide high transparency. For instance, quality in medical transcription is easy to measure and verify.

A constellation of factors has led to a rapid rise of ITES in India. The cost of transmitting one billion bits of data from New York to Bombay in 1996 was about one ten-thousandth of that in 1976. Likewise, in the medical transcription industry, the cost of receiving audio files and sending the corresponding transcribed electronic documents between the US and India fell by two-thirds during 1996–2000 (Chowdhury, 2002). On the policy front, in India, call centers and medical transcription centers are service-tax-exempted (Mukherjee and Gupta, 2007).

Capital cost to create a MT job in India is estimated in the $400–$750 range (Chowdhury, 2002). Medical transcription units are thus rapidly rising in India (see Table 12.1). A 2006 survey found that all large and some smaller US-based medical transcription service organizations (MTSOs) had plans to set up or build on and expand offshore centers in India (FinancialWire, 2006).

India is the largest supplier of medical transcription services to the US (see Table 12.1). In 2005, India was the most popular destination country for offshore outsourcing of services involving health information for federal contractors and state medicaid agencies in the US (GAO,
Table 12.1  A comparison of the medical transcription industry in India and the Philippines

<table>
<thead>
<tr>
<th>Country</th>
<th>Revenue from offshore services</th>
<th>Employment generated by offshore services</th>
<th>Medical transcription revenue (year)</th>
<th>No. of medical transcription companies</th>
<th>No. of MTs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1.6 million (2007)(^j)</td>
<td>US$70 million (1999)(^h)</td>
<td>300 (2004)(^k)</td>
<td>6,100 (1999)(^f)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>US$80 million (2003)(^b)</td>
<td></td>
<td>10,000 (2004)(^k)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>US$110 million (2004)(^a)</td>
<td></td>
<td>18,000 (2006)(^n)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>US$195 million (2006)(^n)</td>
<td></td>
<td>20,000 (2007)(^p)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Estimate: US$2.6 billion (2008)(^h)</td>
<td>Estimate: 160,000 (2008)(^e)</td>
<td></td>
</tr>
<tr>
<td>The Philippines</td>
<td>$1.7 billion (2003)(^l)</td>
<td>112,000 (2005)(^s)</td>
<td>US$7 million (2005)(^d)</td>
<td>16 (2003)(^g)</td>
<td>1,200 (2005)(^d)</td>
</tr>
<tr>
<td></td>
<td>$2.1 billion (2005)(^q)</td>
<td>235,000 (2006)(^e)</td>
<td>Estimate: US$110 million (2008)(^m)</td>
<td>20 (2004)(^c, d)</td>
<td>10,000 (2008)(^m)</td>
</tr>
<tr>
<td></td>
<td>$5 billion (2007)</td>
<td>320,000 (2008)(^f)</td>
<td></td>
<td>22 (October 2004)(^j)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40 (December 2006)(^\circ)</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Hussain (2005), \(^b\) chennaionline.com (2003), \(^c\) Tan (2004), \(^d\) http://outsource2philippines.com/health.asp, \(^e\) NASSCOM estimates, See “Future of medical transcription” at www.technicaforts.com/tp.shtml (accessed: December 11, 2005). The numbers indicate medical transcription and insurance claim processing jobs; \(^f\) India Today (2001); \(^g\) Computerworld Philippines (2002); \(^h\) Chand (2000); \(^i\) Calimag (2002); \(^j\) Valdez (2004); \(^k\) Estimate by The Hindu Businessline, www.thehindubusinessline.com/2004/08/07/stories/2004080702540300.htm; \(^l\) Beshouri \textit{et al.} (2005); \(^m\) Estimate of the Medical Transcription Industry Association of the Philippines (MTIAPI) (Casiraya, 2008); \(^n\) Business Wire, May 25, 2006; \(^\circ\) Hindustan Times, December 3, 2007; \(^p\) McKinsey and Co. (1999) cited in Chowdhury (2002); \(^q\) sourcingnotes.com (2006); \(^\circ\) Bacason (2008); \(^\circ\) prwebdirect.com (2006); \(^\circ\) Ribeiro (2007).
In 2006, India accounted for 78 percent of the offshore medical transcription market (FinancialWire, 2006). Other destinations for outsourcing of medical transcription services include Ireland, Canada, the Caribbean, Pakistan, Sri Lanka, Singapore, China, Mexico, and Brazil (The Hindu Businessline, 2006; Buban, 2007).

About 80 percent of medical transcription jobs in India come from the US (Hallinan, 2006). In 2003, US–India trade medical transcription and billing was estimated at $340 million (McLean, 2006). One estimate suggests that about 47 percent of US hospitals outsourced medical transcription to India in 2006 (The Hindu Businessline, 2006).

In 2003, the global healthcare industry exceeded US$2 trillion. After experiencing several years of high growth rates, US healthcare spending2 climbed to US$1.4 trillion in 2001 and is expected to reach US$2.2 trillion by 2007. The concept of requiring accurate medical transcription is rapidly taking off in the US, and other countries with high-level health expenditures may realize the importance of medical transcription soon (Indiainfoline.com, 2003).

A legal factor affecting outsourcing of medical transcription is the Health Insurance Portability and Accountability Act (HIPAA) of 1996. HIPAA has created stringent regulations for the privacy of information about individuals, and the security of information systems used by healthcare professionals and organizations. In addition to satisfying HIPAA requirements, digitization and better documentation also provide a better defense for the company. According to International Data Corporation (IDC), the US is expected to spend $4.2 billion in medical transcription outsourcing in 2008 (Buban, 2007).

The US has, thus, become a major source of demand for medical-transcription-related services. Estimates suggest that the medical transcription business in the US is worth between US$10 and 25 billion annually3 and is expected to grow at 21–35 percent per year during 2002–12 (Computerworld Philippines, 2002; Conn, 2005). These rapid growth rates are expected to boost the demand for MTs. The US Bureau of Labor Statistics predicts a 51 percent increase in demand for MTs by 2008. In the US, 47 percent of medical transcription work is outsourced while the rest is done in-house. A large proportion is outsourced to domestic firms. It is estimated that US-based MTSOs will increase their share from 40 percent in 2006 to over 50 percent of the overall demand by 2008 (FinancialWire, 2006). An estimate by the American Association of Medical Transcriptionists (AAMT)
suggested that 4–5 percent of total US transcription is done offshore. Estimates from other sources suggest that 8–10 percent of US medical transcription took place abroad in 2004 (Piotrowski, 2005).

Medical transcriptionists held about 102,000 jobs in 2000 in the US. About 40 percent worked in hospitals and another 40 percent in physicians’ offices and clinics; with the remainder in laboratories, colleges and universities, and temporary help agencies (Bureau of Labor Statistics, 2003).

**Labor-intensiveness and the degree of outsourceability of medical transcription**

Medical transcription has many characteristics of a job with a high degree of outsourceability. According to an Association for Computing Machinery Report, medical billing and medical transcription are among works that are often offshored. First, with regard to the degree of labor-intensiveness (Garner and Schwartz, 2004), it is important to note that medical transcription entails labor-intensive tasks (Ghodeswar and Vaidyanathan, 2008). Indeed, over 70 percent of US hospital costs are labor related (Mattoo and Rathindran, 2005). A high degree of labor-intensiveness results in a high cost-saving potential. Note, too, that medical costs have been a major national policy issue. In a survey of A.T. Kearney, 93 percent of respondents indicated cost reduction as a major motivation for offshoring. US hospitals thus realize a substantial cost saving by outsourcing to India. As in the case of other industries, US hospitals’ outsourcing of medical transcriptions to developing countries has thus stemmed from their desire to cut costs (Quammen, 1996).

Some estimates suggest that cost savings by outsourcing business processes to India can amount up to 75 percent (Gupta, 2002). For instance, in India, call center weekly wages ranged from $16 to $20, which was less than 10 percent of Ireland’s (Chowdhury, 2002) and about a fifth of Canada’s (Kshetri and Williamson, 2004). A McKinsey study indicated that a 400-person outsourcing center in India translates into a US$20–40 million annual saving for a US corporation. For instance, the average salary of service delivery agents in India is US$2,000–3,000 per year compared to US$23,000–35,000 in the United States. Medical transcriptionists (MTs) in the
Offshoring of high-value functions

Table 12.2a A comparison of manufacturing, medical transcription, and R&D industries in India and the US

<table>
<thead>
<tr>
<th>Industry</th>
<th>The US</th>
<th>India</th>
<th>US–India ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturing industry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP ($ million)</td>
<td>1,741,185</td>
<td>80,236</td>
<td></td>
</tr>
<tr>
<td>Paid employment (‘000)</td>
<td>15,356.9</td>
<td>6451.54</td>
<td></td>
</tr>
<tr>
<td>Output per worker ($)</td>
<td>113,381</td>
<td>12,436</td>
<td>9.1</td>
</tr>
<tr>
<td>Output per worker (purchasing power parity [PPP], $)</td>
<td>113,381</td>
<td>63,768</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Medical transcription industry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP ($ million)</td>
<td>15,000</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Paid employment (‘000)</td>
<td>101,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Output per worker ($)</td>
<td>148,500</td>
<td>11,000</td>
<td>13.5</td>
</tr>
<tr>
<td>Output per worker (purchasing power parity [PPP], $)</td>
<td>148,500</td>
<td>56,404</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>R&amp;D industry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researchers in R&amp;D per million people (1990–2003)</td>
<td>4526</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Receipts of royalties and license fees ($, million 2003)</td>
<td>48922.72</td>
<td>~0</td>
<td></td>
</tr>
<tr>
<td>Royalties and license fees per R&amp;D worker ($)</td>
<td>36942.11</td>
<td>~0</td>
<td>→∞</td>
</tr>
</tbody>
</table>


US earn US$24,000–38,000 per year at the entry level and as high as US$60,000–80,000 with some experience.

A preliminary analysis indicates that production per worker in medical transcription may be higher than most traditional economic sectors in India. India’s relative inefficiency in the medical transcription industry vis-à-vis the US is slightly higher than in manufacturing and much lower than in the R&D industry, as seen in Tables 12.2a and 12.2b. Combining this with India’s factor endowment in the potential labor force needed for medical transcription, we can expect further growth in the outsourcing of this industry. Moreover, India is a global
Table 12.2b *A comparison of cost of employing a Medical Transcriptionist (MT) and other selected occupations in India and the US*

<table>
<thead>
<tr>
<th>Occupation</th>
<th>India</th>
<th>The US</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>US$2,000–3,000</td>
<td>US$24,000–38,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>US$60,000–80,000</td>
<td>(entry level)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US$60,000–80,000</td>
<td>(some experience)</td>
</tr>
<tr>
<td>Chip design engineer</td>
<td>US$30,000</td>
<td>US$300,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The figures include salary, benefits, equipment, office space and other infrastructures.</td>
</tr>
</tbody>
</table>

* Ernst (2005).

software leader and accounts for the lion’s share of the global BP and IT outsourcing.

The shift in the labor market in the US medical transcription industry powerfully illustrates the declining attractiveness of jobs in the country in this industry. An estimate by the US Department of Labor suggests that the US healthcare industry will need 90,000 additional medical records professionals by 2012 (Lillis, 2004; Oliva, 2006). The fall in the supply of US transcribers and the growth of the medical transcription market has further increased “osmotic pressure” of offshoring of medical transcription services from the US to India (Kshetri and Williamson, 2004). This has clearly enhanced the attractiveness of using transcribers in developing countries such as India. High costs and manpower constraints in the US have triggered the growth of offshoring of medical transcription (FinancialWire, 2006).

**India’s success in lower-value BPOs and its impact on the offshoring of medical transcription**

The revenue generated by ITES jumped from US$224 million in 1998 (Chand, 2000) to US$1.5 billion in 2002 (The Hindu Businessline, 2002). An estimate of the National Association of Software and Service Companies (NASSCOM) suggested that India’s software and services exports crossed US$7 billion in the fiscal year 2004–05, representing
44 percent of the world market for such services (Cady, 2005). Indian IT industry’s revenue grew to $47.8 billion in 2006–07 (Indo-Asian News Service, 2007). In the fiscal year 2004–05 alone, ITES added an estimated 150,000 jobs in India (The Hindu Businessline, 2005). This industry was estimated to employ 1.6 million people in early 2007 (Ribeiro, 2007).

India is a global power in the software sector as well as in ITES. One estimate suggests that India has captured two-thirds of the global market for offshored IT services and about half of the global market for offshored BPO (Chakrabarty et al., 2006). India thus seems to have a high level of factor endowments needed for medical transcription services. This industry only needs graduates who have the ability to listen to, read, and write English with reasonable comprehension abilities.

While medical transcriptionists in the US attend three to four months of training, in India, they require about six months of full-time training (Chowdhury, 2002). They are also familiarized with specialized medical vocabulary and language. What is more, firms in developing countries are taking several measures to maintain the quality of services (Iwinski, 2004). First, whereas US MTs typically have high-school-level education, most Indian MTs have college degrees, often with training in medical sciences. Second, Indian MTs are provided with on-the-job training “to decipher American medical jargon” (Quammen, 1996).

Medical transcription firms in India run three shifts a day and employ MTs with various skill levels such as general transcriptionists, proof-readers, and “super-proofers” (Chowdhury, 2002).

Firms in the offshoring sector seem to make efforts to improve the work ethic of the workforce. To take an example, in India, turning up at work on time is not considered to be important and Indians have a more flexible approach to deadlines (Slater, 2003; The Economist, 2006). Indian companies provide training on the Western approach to time and other concepts related to culture. For instance, OfficeTiger, an Indian outsourcing firm, explains to its employees that “five minutes really means five minutes” (Slater, 2003). Unlike in the traditional economy, in the offshoring sector, employees cannot skip work for religious or family functions (Kalita, 2005).

The offshoring experiences of Indian firms have helped the development of the medical transcription industry. Note, too, that medical transcription has more stringent requirements regarding service quality compared to other outsourced businesses such as call centers. Such
requirements often include a turnaround time of eight hours (two hours for emergency “stat” procedures) and imposition of stiff penalties if the accuracy and time factor clauses are not met (Dev, 2001). Likewise, Indian firms have also employed sophisticated encryption technologies in communication processes.

In sum, Indian firms in the medical transcription industry have been able to build unique assets and capabilities (Levy, 2005) required for the development of this industry. As noted above, these are especially important for services (van Marrewijk et al., 1997).

Economic sectors related to medical transcription in India and the impact on the inflow of medical transcription-related jobs to India

India’s economic sectors related to medical transcription are also developing rapidly. Telemedical technology has already allowed India to capture 2 percent of the US healthcare market (McLean, 2006). For instance, in 2005, India’s world-class medical centers attracted 120,000 overseas patients, mainly from industrialized countries, and the number is rising at 30 percent annually. One estimate suggests that the clinical research outsourcing market in India will exceed $10 billion by 2010.

Looking at the medical transcription industry in the US and India, it is apparent that this industry is more attractive relative to other sectors in India. It is important to note that an MT in the US earns 80 percent as much as the median production worker (Chowdhury, 2002). Entry-level salaries in call centers, which reached about Rs. 10,000 ($230) a month in 2005, are much higher than most other jobs (The Economist, 2005b). Since medical transcription is a high-value BPO4 (Benner, 2006; McKinsey Global Institute, 2003; Reich, 2005), complex work, and requiring highly trained and skilled employees (Indo-Asian News Service, 2006; The Statesman, 2006), MTs are likely to be paid higher salaries than most call center employees.

The strength of network-based linkages between India and the US in the medical industry

In India, while there are some large MTSOs (e.g., CBay, Spheris, Spryance, Acusis, and Heartland), a large proportion of MTSOs are
mid-sized (<500 employees) and smaller players (<50 employees). Mid-sized MTSOs tend to work as franchisees or vendors of larger players and have limited marketing presence in the West. Smaller players, on the other hand, are mainly subcontractors to large and mid-sized MTSOs. The large players account for about 70 percent of Indian medical transcription offshoring revenues (Business Wire, 2006).

Previous researchers have noted that especially managers of SMEs extensively rely on networks at the early phase of the internationalization process (Lindqvist, 1997; Spence and Crick, 2006). Thus network theory is of special interest to explain the US–India trade in medical transcription services, especially for mid-sized and smaller MTSOs. Business and personal networks have provided Indian medical transcription firms with various competitive advantages in the form of social capital.

In 1992, non-resident Indian physicians established one of the first MTSOs in the US to capitalize on offshore labor for medical transcription (Chowdhury, 2002). Indeed, social networks created in Silicon Valley have been an important factor in the geographic diversification of the internationalization of the Indian IT industry to other destinations such as Taiwan (Saxenian, 2002).

Various networks associated with physicians of Indian origin working in the industrialized world have created relationships that are harnessing synergistic potential (Cuningham and Calligan, 1991). Among foreign-born physicians practicing in the US and the UK, the highest proportion is from India. Indian physicians accounted for 4.9 percent and 10.9 percent of the workforce in the US and the UK respectively. The number of Indian doctors practicing in the US was estimated at 50,000 in 2002 (Chowdhury, 2002). These doctors have created a network of contacts for India-based medical transcription services and served as “reputational intermediaries” (Arora and Gambardella, 2005). One MT can transcribe between one and two doctors’ dictations (Chowdhury, 2002). On that basis it is estimated that US-based physicians of Indian origin alone could support about 30,000 Indian MTs.

Indian medical transcription has benefited from networks of various shapes and sizes. For instance, Mahabharat (2001) reports that an elderly couple in India learned to use the Internet to keep in touch with their son in the US. Their correspondence turned into a business venture of transcribing medical records in Hyderabad, a South Indian city.
A number of US-based healthcare BPOs have also established operations in India (see Box 12.1). For instance, Healthscribe India, which started its operations at Bangalore in 1992, is a fully owned subsidiary of US-based Healthscribe, Inc. Similarly, Ohio-based Heartland Information Service (HIS), in association with Indian partners, has expanded its services to five centers across South Asia, employing 3,000 people by 2002.

Discussion, conclusion, and implications

This chapter provided insights into the cost-based and non-cost-based drivers of outsourcing a high-value BPO from a developed economy to a developing economy. In addition to low costs, non-cost-based factors such as the improved work ethic of the Indian workforce, network-based linkages, and positive externalities created by other economic sectors have been key drivers of the offshoring of medical transcription services in India.

This chapter provided important evidence about the significance of networks in the internationalization process. In addition, our findings indicated that the development of assets and capabilities related to new economic sectors such as offshoring are associated with and facilitated by the development of related economic sectors (e.g., ITES).

Based on the above analysis, we can draw a number of conclusions. First, ICT infrastructures needed for outsourcing require much less investment compared to leading capital-intensive industries of the past such as steel, chemicals, and heavy machinery (Steinmueller, 2001). As noted above, Indian medical transcription firms are employing state-of-the-art technologies and the fact that many of them have been established by US-based firms indicates that the technologies used in transcription in India and the US are essentially on par. The development patterns of the Indian medical and offshoring industries indicate that India may attract higher skilled medical functions in the future. The Indian offshoring industry is shifting its focus from BPO to knowledge-process outsourcing (KPO).5

Second, as noted above, one reason medical transcription is being outsourced to India is because of a high degree of labor intensiveness. The increasing sophistication of speech recognition and spelling and grammar checking software, however, offers stronger future capital-for-labor factor substitution prospects in medical transcription
Table 12.3 *Phases of the medical transcription process and their factor substitution prospects*

<table>
<thead>
<tr>
<th>Medical transcription phase</th>
<th>Explanation</th>
<th>Factor profile</th>
<th>Factor substitution prospects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw transcription</td>
<td>Medical records transcribed from audio to text format</td>
<td>Currently labor and skill intensive, offering advantages to selected developing nations</td>
<td>Automation likely, as speech recognition improves (IBM, 2002)</td>
</tr>
<tr>
<td>Proofreading</td>
<td>Checking for and rectifying spelling mistakes and grammatical errors</td>
<td>Currently labor and skill intensive, offering advantages to selected developing nations</td>
<td>Partial automation likely, as spelling and grammar checking software improves</td>
</tr>
<tr>
<td>Editing</td>
<td>Checking the text for inaccurate medical terminologies or other inconsistencies</td>
<td>Currently labor and skill intensive, offering advantages to selected developing nations</td>
<td>Likely to remain labor and skill intensive, offering advantages to nations with skilled editing workforce</td>
</tr>
</tbody>
</table>


services. Different phases of medical transcription services, however, differ in terms of the elasticity of substitution of labor with respect to capital – *raw transcription* having the highest elasticity and *editing* the lowest (Table 12.3). Declining labor intensiveness – due to voice recognition technology, for instance – of medical transcription services is, thus, likely to erode the strategic positioning of developing countries as determined by the factor endowment structure. Countries such as India and the Philippines may have to shift to greater automation and
greater levels of skill training to retain and reinforce their comparative advantages. Projections by analysts of the offshore BPO market indicate a slippage in India’s comparative advantage and thus its share of IT enabled services, fueled by increasing competition from other low-wage countries as well as increasing automation and rising wages in India (Ribeiro, 2004).

Finally, Ricardian theories predict further growth in the export of medical transcription services from India. Using the Ricardian approach, “relative inefficiency” (Xu, 1993) is relatively low for the Indian medical transcription industry. As Table 12.2a indicates, compared to the US, relative inefficiency of the Indian medical transcription industry is slightly higher than the manufacturing industry and much lower than the R&D industry. Medical transcription services are, however, characterized by a higher degree of outsourceability than manufacturing.

Box 12.1: CBay’s Healthcare BPO venture

CBay Systems is an Annapolis-US based Healthcare BPO Company established in 1998 (Health & Medicine Week, 2004). In the same year, it formed CBay India, a fully owned Indian subsidiary (Business India Intelligence, 2000). CBay India’s headquarters are located in Mumbai and had over thirty centers across India as of early 2006.6 In 2005, the company was recognized by Anne Arundel Tech Council as Tech Company of the year for being the largest global provider of medical transcription services in the US (The Washington Post, 2005).


CBay employed about 4,500 medical professionals in early 2006 and plans to increase the number to about 10,000 by 2008 (The Hindu Businessline, 2006). The firm employed about 130 MT professionals in the US in 2003 (Fiske, 2003). CBay has its own team of trainers that includes doctors, senior medical transcriptionists, and
English-language trainers. As of 2000, there were seventy trainers in India (Business India Intelligence, 2000). CBay handles about a million documents a day (The Hindu Businessline, 2006). The company uses encryption and compression in its communications via the Internet (Business India Intelligence, 2000). All production centers have closed local area networks and the computers have no disk drives. Only people who have signed confidentiality agreement have access to a document (Fiske, 2003). In 2007, CBay was developing a new technology-enabled service – CbayPraxis, which in a single desktop application, brings together a variety of management technology offerings and combines them with transcription, electronic medical records, ePrescription and billing services (PR Newswire, 2007).

CBay (India) identifies potential entrepreneurs with managerial capability to set up and finance production centers (Business India Intelligence, 2000). This model is markedly different from its competitors who directly employ their MTs. For instance, in 2004, CBay acquired Godrej Remote Services and renamed Godrej’s medical transcription (MT) outfit as CBay Remote Services (CRSL) (Kulkarni, 2004). In the same year, it acquired Emergency Dictation Software Systems of Hyderabad (The Hindu Businessline, 2004). It also formed a strategic alliance with iLIANT Corporation, a leading provider of software, business outsourcing, and consulting services for physician practices (The Hindu, 2004).

High telecommunications costs in India and inadequate bandwidth remained a major bottleneck in the early years of its operations (Business India Intelligence, 2000). Nonetheless, India has overcome these problems in recent years.

Notes
1 India was followed by Ghana, Mexico, Canada, Jamaica, Bermuda, and the Philippines.
2 Health spending per capita in the US was $4,631 in 2000, 44 percent higher than Switzerland’s (the country with the next-highest expenditure per capita), 83 percent higher than neighboring Canada; and 134 percent higher than the OECD median (Anderson et al. 2003).
3 The estimates of the size of the US medical transcription industry vary widely. One source estimates it at US$15 billion with an annual growth of 15% – 20% in 2003 (Future MT, 2003). Another source estimates...

4 Some other examples of higher value-added work include radiology, software development, portfolio analysis and risk management, and even complex R&D functions (Benner, 2006; McKinsey Global Institute, 2003).


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Offshoring of IT and business, professional, and technical services
The recent experience of the United States

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University of Minnesota

Introduction

The virtualization of work has increased the opportunities for global organizational collaboration several fold. Organizations today rely on supply chains that criss-cross the globe in the creation of both manufactured goods and services. Several large emerging countries such as China, India, and Russia, have embraced open trade and investment policies adding billions of workers to the global talent pool with implications for employment in both developed and developing nations. Global outsourcing and offshoring have exploded, enabled by new technologies in information processing, communication, and transportation. As Blinder (1988) noted, it is important to consider the dynamics of employment resulting from changes in international trade policies. For just as in the 1980s, when blue-collar workers began to see jobs shift to locations in Mexico and South Korea, today, white-collar service jobs are moving to countries like the Philippines and Poland. Moreover, changes in trade policies do not have the same effect on all occupations and sectors (Cohen and Zaidi, 2002). Some view these changes in the labor market as more harmful to national economies than manufacturing offshoring, because of the high-value jobs involved.

This chapter examines business, professional, and technical service (BPTS) and information technology (IT) service exports to the United States from a group of twenty-nine countries in a search for the country-level determinants of trade in these high value-added services. Panel regression analysis shows that significant relationships
exist between both BPTS and IT exports to the US and the following independent variables: geographic distance, use of English as a primary language, level of Internet access, and labor costs.

**Trade in services**

In developed countries, the importance of the manufacturing sector has waned while the service sector has waxed. Liberalization of trade in goods over this period fueled this transition, allowing developed countries to consume an increasing amount of manufactured goods, amidst a dramatic loss of manufacturing jobs. Accompanying the explosion in trade was the increase in manufacturing offshoring, which began in the 1960s and slowly increased allowing the economies of North America and Europe a few decades to adjust. Until the commercialization of the Internet, many services were untradeable across distances because of the inability to separate the production and delivery of services. While improved transportation and diminishing barriers to trade allowed for goods production to be relocated overseas, most business services remained insulated from trade by the required proximity to customers. However, in an era of electronic delivery, services offshoring typically requires less costly infrastructure and less time to execute than the relocation of manufacturing operations and is being adopted at a faster rate.

Measuring the growth of services offshoring is challenging. The lack of data related to services offshoring and outsourcing has been widely noted and international organizations have been working to standardize data collection to reduce this problem. Members of the World Trade Organization (WTO) adopted the General Agreement on Trade in Services (GATS) in 1995 to improve the comparability and completeness of international data. The WTO provides measures of services trade in three categories: transportation, travel, and other commercial services. As Table 13.1 shows, the category “other commercial services” includes communication, construction, insurance, financial, computer and information services, royalties and license fees, other business services, and personal, cultural, and recreational services. Table 13.1 shows the growth in the share of other commercial services trade for the US which rose from 40 percent in 1995 to 54 percent in 2003. During this period the share of financial services doubled and other business services increased by more than 50 percent.
Table 13.1 *Trade in commercial services of the United States*

<table>
<thead>
<tr>
<th>Services</th>
<th>Exports Value $ billions</th>
<th>Exports Share %</th>
<th>Imports Value $ billions</th>
<th>Imports Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transportation</td>
<td>47.5</td>
<td>22.7</td>
<td>65.7</td>
<td>32.3</td>
</tr>
<tr>
<td>2. Travel</td>
<td>84.1</td>
<td>37.7</td>
<td>59.7</td>
<td>35.8</td>
</tr>
<tr>
<td>3. Other commercial services</td>
<td>156.0</td>
<td>39.7</td>
<td>103.1</td>
<td>31.9</td>
</tr>
<tr>
<td>Communication services</td>
<td>5.7</td>
<td>1.8</td>
<td>5.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Construction services*</td>
<td>2.7</td>
<td>1.3</td>
<td>0.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Insurance services*</td>
<td>4.9</td>
<td>0.6</td>
<td>26.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Financial services*</td>
<td>17.6</td>
<td>3.5</td>
<td>4.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Computer and information services*</td>
<td>5.4</td>
<td>1.2</td>
<td>1.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Royalties and license fees</td>
<td>48.2</td>
<td>15.3</td>
<td>20.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Other business services</td>
<td>64.1</td>
<td>14.6</td>
<td>44.2</td>
<td>14.0</td>
</tr>
<tr>
<td>Personal, cultural, &amp; recreational</td>
<td>7.4</td>
<td>1.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total commercial services</strong></td>
<td><strong>287.7</strong></td>
<td><strong>100.0</strong></td>
<td><strong>228.5</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

* Excludes transactions between affiliates, which are recorded under “Other business services”.


Other commercial services represent about half of the total services in the US and while overall services account for around 60 percent of world production, they only represent 20 percent of the trade volume (Freund and Weinhold, 2002: 1). As recently as 2003, WTO data showed that ten countries led by the US accounted for 63 percent of all services exports and 59 percent of imports of other commercial services. More recent data in Table 13.2 shows that in 2006 twenty-five European Union members (EU 25) accounted for half of world trade in other commercial services and the US accounted for 15 percent of exports and 11 percent of imports.
Table 13.2 *Leading exporters and importers of other commercial services*

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Exporters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European Union (25)</td>
<td>683.7</td>
<td>45.7</td>
<td>49.6</td>
<td>14</td>
<td>20</td>
<td>10</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Extra-EU (25) exports</td>
<td>317.9</td>
<td>...</td>
<td>23.1</td>
<td>...</td>
<td>16</td>
<td>11</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>211.9</td>
<td>19.5</td>
<td>15.4</td>
<td>9</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>69.0</td>
<td>5.9</td>
<td>5.0</td>
<td>10</td>
<td>27</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>58.3</td>
<td>...</td>
<td>4.2</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>39.0</td>
<td>3.3</td>
<td>2.8</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>36.5</td>
<td>1.5</td>
<td>2.6</td>
<td>24</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>34.0</td>
<td>2.4</td>
<td>2.5</td>
<td>13</td>
<td>31</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>32.4</td>
<td>3.1</td>
<td>2.3</td>
<td>8</td>
<td>7</td>
<td>12</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>31.0</td>
<td>1.7</td>
<td>2.3</td>
<td>19</td>
<td>30</td>
<td>12</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>19.2</td>
<td>1.4</td>
<td>1.4</td>
<td>13</td>
<td>29</td>
<td>18</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Taipei, Chinese</td>
<td>17.5</td>
<td>1.8</td>
<td>1.3</td>
<td>6</td>
<td>3</td>
<td>–9</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>13.9</td>
<td>0.9</td>
<td>1.0</td>
<td>15</td>
<td>22</td>
<td>29</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Russian Federation</td>
<td>13.0</td>
<td>0.4</td>
<td>0.9</td>
<td>31</td>
<td>31</td>
<td>37</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>12.7</td>
<td>1.3</td>
<td>0.9</td>
<td>7</td>
<td>20</td>
<td>5</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>10.2</td>
<td>0.9</td>
<td>0.7</td>
<td>10</td>
<td>12</td>
<td>33</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Sum of above 15</td>
<td>1280.0</td>
<td>89.8</td>
<td>93.1</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>Importers</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European Union (25)</td>
<td>579.7</td>
<td>46.8</td>
<td>48.2</td>
<td>12</td>
<td>16</td>
<td>9</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Extra-EU (25) imports</td>
<td>237.8</td>
<td>...</td>
<td>19.8</td>
<td>...</td>
<td>16</td>
<td>9</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>136.7</td>
<td>12.2</td>
<td>11.4</td>
<td>10</td>
<td>15</td>
<td>8</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>64.2</td>
<td>7.9</td>
<td>5.3</td>
<td>5</td>
<td>13</td>
<td>3</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>41.6</td>
<td>2.0</td>
<td>3.5</td>
<td>22</td>
<td>30</td>
<td>18</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>34.3</td>
<td>3.5</td>
<td>2.8</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>31.4</td>
<td>...</td>
<td>2.6</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>
The combination of increased freedom to conduct business across borders and lower costs of conducting business internationally has changed the operations and sourcing decisions of multinational organizations. Corporate production of goods and services has been expanding internationally in four major forms: trade in goods, direct investment, hiring of labor services directly (work permits and offshore insourcing), and trade in labor services (outsourcing). These four forms can often be substituted for one another. For example, a computer manufacturer could decide to outsource assembly of the basic components of a personal computer to a Chinese firm. This involves shipping parts to a company and receiving a finished product in return, ownership of the parts remains with the computer manufacturer throughout the transaction. Alternatively, the computer manufacturer could simply give an order for a personal computer to the same company with specifications for the parts needed. In this case ownership is transferred until the personal computer is complete. Both scenarios require the same expertise of the Chinese company and the amount paid to

<table>
<thead>
<tr>
<th>Share of world exports/imports</th>
<th>Annual percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value $ billions</td>
<td>2000</td>
</tr>
<tr>
<td>Singapore 28.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Korea, Republic of 28.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Russian Federation 18.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Brazil 14.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Taipei, Chinese 14.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Indonesia 14.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Switzerland 12.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Mexico 11.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Thailand 11.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Sum of above 15 1045.0</td>
<td>84.8</td>
</tr>
</tbody>
</table>

outsourcing the production should approximate the profit made by buying the components and then selling the finished computers to the computer manufacturer for final distribution. If the company simply set up a manufacturing plant in the foreign location, then the activities would be accounted for as foreign direct investment with additional trade among affiliated organizations. The case of hiring labor from one country and relocating it to another for the purpose of assembling computers is rare, but in the areas of research and design is common.

**Impact of trade in services on the labor force**

As labor is a derived demand, one of the implications of the growth in the offshoring of services for workers in the service sector is increased competition in the global labor market. Workers in manufacturing have faced significant global competition for a half century. Their experience shows that workers in developed countries need to remain skilled and adaptable to remain competitive. An Information Technology Association of America (ITAA, 2003) survey of hiring managers found that 12 percent of IT companies had opened outsourcing operations overseas. Most foreign outsourcing from the US is conducted by large IT companies and programming and software engineering positions are the ones most likely to be outsourced. The rapid rise of services offshoring has challenged developed economies’ ability to realign their production capabilities and create new jobs for displaced workers. During the 1990s, over 97 percent of jobs created were in services (Goodman and Steadman, 2002: 3). Business-related services have grown to 36 percent of total employment from 2001 while consumer-related services fell to 52 percent the same year (Goodman and Steadman, 2002: 8).

Just as reduced shipping costs and improved delivery speeds made the sourcing of goods from remote areas commonplace in the 1980s, the instantaneous speed of the Internet is driving global sourcing of an increasing number of services. Unaccustomed to foreign competition, many service workers are concerned about the increasing supply of labor in their fields. For example, Cooper (2004) cites the example of Mass General Hospital in Boston offshoring radiologist work to India due to wage differences of $50,000 in India compared to $450,000 in
Boston. Ashok and Kroll (2003) report the following significant differences in hourly wages for the US and India in 2002 and 2003: telephone operator ($12.57 versus less than $1.00), payroll clerk ($15.17 versus $2.00), legal assistant ($17.88 versus $8.00), and accountant ($23.35 versus $15.00). Clearly, the cost savings are significant in several developing countries, provided the level of productivity is roughly the same.

Forrester Research (McCarthy et al., 2002) estimated that 3.3 million US service jobs will be relocated abroad over the next fifteen years, accounting for $136 billion in wages. Approximately 400,000 of these jobs would be IT-related with the greatest outsourcing expected in software development, customer service, and call centers. This estimate was revised upward in 2004 to 3.4 million as the near term use of offshore resources grew 40 percent faster than expected, from around 590,000 jobs to about 830,000 jobs by the end of 2005 (Mears, 2004). However, the Forrester estimates reflect gross job losses and are relatively small compared to the overall number of jobs lost and created annually in the US which is typically greater than 100 million. Cost savings and higher profits will drive offshoring in the short term, but over time, competition will erode the cost savings. In the end, Forrester contends that increased offshoring would reduce labor demand, raise imports, and place downward pressure on the value of the dollar (Tilton, 2003). Gartner Inc. expected one in ten jobs at IT services firms to be moved offshore by the end of 2004 and that many of the job losses would be structural (Morello, 2003).

Mann (2003) argues that the projections which predict millions of jobs being lost to offshore workers ignore the fact that the globalization of software and IT services, in conjunction with diffusion of IT may create even stronger job demand in the developed countries for IT-proficient workers. Price reductions on the hardware-side of IT, coupled with increased productivity, resulted in an additional $230 billion in Gross Domestic Product (GDP) for the US between 1995 and 2002 (Mann, 2003). Also note that between 1993 and 2001, the increase in IT hardware spending was 6.7 percent; while growth in software and services was nearly double that at 12.5 percent. While the precise impact on professional, business, and IT jobs is unclear, it is likely that most skilled service jobs are both complements to and substitutes for similar jobs.
Determinants of offshoring BPTS and IT services

Abraham and Taylor (1993) distinguish three reasons for outsourcing: lower employee costs achieved by lower wages and/or benefits, transfer of demand risk to the contractor, and access to human capital. Wage savings may be due to the presence of trade unions or efficiency wage considerations that do not affect the outside contractor. In their study based on data for manufacturing firms, Abraham and Taylor (1993) provide evidence that differences in labor costs and the comparative advantage of outsourcers due to scale and specialization are crucial in explaining the decision for firms to outsource manufacturing work. This logic should apply to jobs in the service sector, as well.

Thondavadi and Albert (2004) list six factors driving offshoring: cost reduction, focus on core operations, improving quality, access to deeper pool of talent, more rapid product development, and product and process innovation. Labor savings are consistently cited as a reason for global outsourcing. A survey by Deloitte (2005) found 70 percent of managers surveyed cited cost savings as the reason for global outsourcing, while 57 percent sought quality, innovation, or industry best practice. Technology can enable outsourcing decisions by providing the ability to work in ways not previously possible, though it does not determine them directly. For example, collaborative software enables teams located half a world away to work on tasks simultaneously or in time-zone determined shifts. Lowering the transaction costs of managing a dispersed workforce increases global outsourcing. Examining how country differences vary should indicate the qualities of a destination country that make it attractive as a global sourcing location.

Measuring offshoring of business and IT services

Comparing trade in services between countries is problematic due to the different definitions and methods used by national governments and organizations such as the WTO. Accounting for low-value transactions, smaller providers, and purchasers is difficult. An OECD (2004) report estimates a discrepancy of $20.6 billion in India’s reported services exports and imports by the major non-Asian economies. This speaks to considerable problems with the current measures available. The data used in this chapter comes primarily from the US Bureau of

Service exports are used as the proxy variable to examine the offshoring level of business, professional, and technical services global outsourcing. This data does not include affiliate transactions, so it cannot be said to represent the offshoring levels of these activities, as offshoring includes intra-company trade across borders. Unfortunately, the data on intra-company trade in services is not available. Therefore, this analysis does not capture the BPTS and IT work moving to other countries within organizations.

The model used as the basis for this analysis is a modification of the gravity model of trade (Isard, 1954). The gravity model predicts that the size of each country’s economy and the distance between them will be the major predictors of their aggregate trade. For this reason, size is dealt with as a left-hand variable and the dependent variable used is a share variable. The calculation of the dependent variable was performed as follows: the level of BPTS or IT imports from a given country to the US for the given year was divided by the exporting country’s GDP. It is obvious that the absolute level service exports will be highly associated with the size of the exporting country’s economy and using a share variable has some other econometric advantages. The technique of using a share variable as the dependent variable was taken by Bognanno, Keane, and Yang (2005) in a study examining the effect of tariff reductions and US multinational activities which found host country market size to be the primary determinant of production location decision for US multinationals using firm-level data. Going forward, the dependent variables will be referred to as “BPTS export share” and “IT services export share.”

Four possible determinants of BPTS and IT services offshoring

Several possible correlates between the United States and the BPTS and IT services and attributes of offshoring destinations were considered: labor costs, communication infrastructure, human capital quality, and travel costs are commonly cited factors in selecting an offshoring destination (neoIT, 2004). These factors can be categorized into four macroeconomic variables around cost of labor, availability of Internet
access, knowledge of English, and geographic distance from the US. Better measures of human capital quality were desired, but measures of education were not used due to paucity of good international measures of educational levels for the countries examined. Literacy levels were explored as a proxy for educational level relevant to performing professional services, but not found to be significant in the models. Measures of governance, corruption, and cultural distance were also entered into some preliminary models, but were not found to be helpful in predicting levels of offshoring in these services.

**Distance**

Despite the claims that distance was dead as a consideration in the creation of knowledge work during the dotcom boom, time zones and long overseas flights do impose transaction costs. Geographic distance increases the cost of exchanging services, though to a lesser degree than for physical goods. See Krugman (2009) for an excellent overview of the importance of economic geography. Services offshoring still requires travel costs for inspection, negotiations and planning meetings, training, and oftentimes for the provision of the service. As a result, it is hypothesized that BPTS and IT service exports to the US will be lower for countries that are geographically further from the US. The measure of distance used is the Great Circle distance between capital cities cited in much of the gravity literature (Feenstra et al., 2001). This leads to the first hypothesis:

(H1) Distance will be negatively related to BPTS and IT services export share.

**Labor costs**

Labor costs are the most commonly cited reason for selecting an offshoring destination (Mann, 2003; neoIT, 2004; Yourdon, 2004). Labor arbitrage is a reason given by many outsourcing consultants to shift production to lower-wage countries; therefore lower-wage countries should see more offshoring of services work. The data used to represent national labor costs is wage data taken primarily from the US Bureau of Labor Statistics *Foreign Labor Statistics*, which is one of the few sources of internationally comparable wage information. This
source contains specific labor costs for thirty countries (Freeman and Oostendorp, 2000).

This labor cost data comes from the manufacturing sector and while we acknowledge a better measure would be directly from business and IT services, it is believed that, at the country level, this proxy measure will function reasonably well. There is typically a correlation between the average manufacturing wage and service wage in a country. Also, these measures of wages ignore benefit costs and employment taxes, thereby understating the true cost. Wage data for China and India was not available for some of the years between 1990 and 2000. Countries with lower labor costs are expected to have greater levels of BPTS and IT service exports to the US. The second hypothesis addresses the cost of labor:

\[(H2)\] Labor costs will be negatively associated with BPTS and IT services export share.

**Technological infrastructure**

Technological infrastructure is expected to have been a driver in the shifting of work in many professional and technical occupations. Using the number of households with Internet access per hundred people may be a good proxy for both computer literacy and the level of technological infrastructure of a country. Technological changes are cited as a primary driver of the increase in offshoring (Friedman, 2005; Yourdon, 2004). Countries with higher levels of households with Internet connections are predicted to have greater levels of BPTS and IT service exports to the US leading to the third hypothesis:

\[(H3)\] Technological infrastructure will be positively associated with BPTS and IT services export share.

**English as an official language**

The development of the personal computer and the Internet in North America has solidified the status of English as the language of international business. Given that much of Europe uses English for international commerce, those countries that are more proficient in English are better able to trade services with the largest consumers of services. India’s success in attracting services jobs is often attributed to its large
Table 13.3 Variable descriptions and sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description and source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
</tr>
<tr>
<td>BPTS exports as a share of GDP</td>
<td>Information Technology exports from country X to US divided by exporting country’s GDP from Bureau of Economic Analysis, Bureau of Labor Statistics</td>
</tr>
<tr>
<td>IT exports as a share of GDP</td>
<td>Business, Professional and Technical exports from country X divided by exporting country’s GDP from Bureau of Economic Analysis, Bureau of Labor Statistics</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
</tr>
<tr>
<td>Distance in kilometers</td>
<td>Great Circle distances between capital cities</td>
</tr>
<tr>
<td>English language</td>
<td>CIA World Factbook. A dummy variable is used to denote if English is an official language.</td>
</tr>
<tr>
<td>Internet use per 100 households</td>
<td>Taken from World Development Indicators data. <a href="http://devdata.worldbank.org/data-query/">http://devdata.worldbank.org/data-query/</a></td>
</tr>
<tr>
<td>Hourly labor costs</td>
<td>Hourly labor costs for manufacturing workers standardized to be internationally comparable. Bureau of Economic Analysis, Bureau of Labor Statistics. Some data for China and India was also obtained from other sources.</td>
</tr>
</tbody>
</table>

pool of English-speaking employees. As a result, it is expected that the offshoring level of BPTS and IT service exports will be higher in those countries for which English is an official language. Thus:

(H4) Countries that use English as an official language will have higher levels of BPTS and IT services export share.

**Description of the data**

In order to test whether each of the four attributes above determine offshoring levels, proxy variables were identified for each of the independent variables. Table 13.3 describes the measure used as a proxy for each attribute and lists the source of the measure.
Table 13.4 Trade partners included in dataset ranked by exports to the US

<table>
<thead>
<tr>
<th>Country</th>
<th>2003 BPTS exports in millions USD</th>
<th>2003 GDP PPP in billions USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>2,786</td>
<td>970.3</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,834</td>
<td>1,610.5</td>
</tr>
<tr>
<td>Japan</td>
<td>519</td>
<td>3,567.8</td>
</tr>
<tr>
<td>Germany</td>
<td>494</td>
<td>2,291.1</td>
</tr>
<tr>
<td>India</td>
<td>420</td>
<td>3,120.3</td>
</tr>
<tr>
<td>France</td>
<td>373</td>
<td>1,654.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>260</td>
<td>937.8</td>
</tr>
<tr>
<td>Australia</td>
<td>230</td>
<td>589.1</td>
</tr>
<tr>
<td>Switzerland</td>
<td>193</td>
<td>224.5</td>
</tr>
<tr>
<td>Netherlands</td>
<td>185</td>
<td>476.5</td>
</tr>
<tr>
<td>Singapore</td>
<td>167</td>
<td>104.0</td>
</tr>
<tr>
<td>Brazil</td>
<td>166</td>
<td>1,375.8</td>
</tr>
<tr>
<td>Italy</td>
<td>164</td>
<td>1,563.4</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>154</td>
<td>185.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>144</td>
<td>239.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>142</td>
<td>861.0</td>
</tr>
<tr>
<td>Spain</td>
<td>142</td>
<td>920.3</td>
</tr>
<tr>
<td>China (PRC)</td>
<td>137</td>
<td>6,446.0</td>
</tr>
<tr>
<td>Israel</td>
<td>113</td>
<td>134.0</td>
</tr>
<tr>
<td>Argentina</td>
<td>90</td>
<td>445.1</td>
</tr>
<tr>
<td>South Africa</td>
<td>81</td>
<td>474.1</td>
</tr>
<tr>
<td>Philippines</td>
<td>65</td>
<td>352.9</td>
</tr>
<tr>
<td>Norway</td>
<td>63</td>
<td>171.9</td>
</tr>
<tr>
<td>Thailand</td>
<td>44</td>
<td>471.0</td>
</tr>
<tr>
<td>New Zealand</td>
<td>37</td>
<td>90.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>29</td>
<td>235.7</td>
</tr>
<tr>
<td>Chile</td>
<td>14</td>
<td>162.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7,043</td>
<td>29,674.7</td>
</tr>
</tbody>
</table>

The creation of the dataset used to test the four hypotheses started with the identification of those countries for which the dependent variables (share of BPTS and share of IT exports to the US) were available. Table 13.4 lists the countries for which this data was available from the Bureau of Economic Analysis. The countries included in this dataset represent the vast majority of both world trade and
world output. One may note that the largest exporters of these services share a common language with the US. As previously noted, wage data for India and China is particularly hard to find, especially for earlier time periods. This resulted in an unbalanced panel regression equation, which omitted country observations for some years.

Table 13.5 lists the descriptive statistics for each of the measures obtained from government records as an aid to interpreting the results of the regression analysis which follows. One will note that the average distance from the US capital is 9,300 kilometers, the average wage was about $19.35 an hour, and the average percentage of households with Internet connections was 20 percent. Roughly 30 percent of these trading partners use English as an official language. In the regression analysis, the natural logarithms of both labor costs and distance were used as the independent variables.

Table 13.5 *Descriptive statistics*

<table>
<thead>
<tr>
<th></th>
<th>Observations</th>
<th>Standard deviation</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BPTS exports as a share of GDP</td>
<td>395</td>
<td>503.9949</td>
<td>1262.807</td>
<td>0 12232</td>
</tr>
<tr>
<td>Log BPTS exports as a share of GDP</td>
<td>294</td>
<td>.0452041</td>
<td>.053369</td>
<td>0 .38</td>
</tr>
<tr>
<td>IT exports as a share of GDP</td>
<td>375</td>
<td>104.8453</td>
<td>387.302</td>
<td>0 4070</td>
</tr>
<tr>
<td>Log IT exports as a share of GDP</td>
<td>274</td>
<td>.0054745</td>
<td>.0235486</td>
<td>0 .18</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance in kilometers</td>
<td>392</td>
<td>9299.377</td>
<td>4220.694</td>
<td>733.894 16370.82</td>
</tr>
<tr>
<td>English an official language</td>
<td>395</td>
<td>.2936709</td>
<td>.4560206</td>
<td>0 1</td>
</tr>
<tr>
<td>Internet users per 100 people</td>
<td>315</td>
<td>19.81905</td>
<td>19.81319</td>
<td>1 76</td>
</tr>
<tr>
<td>Hourly labor cost in USD</td>
<td>295</td>
<td>19.34634</td>
<td>53.42626</td>
<td>1.02 919</td>
</tr>
</tbody>
</table>
Results

Panel regression techniques were used to predict share of BPTS and IT services exports to the US over a 16-year period from 1990 to 2005. The results, reported in Table 13.6, support each of the first three hypotheses. The support is weakest for the proxy variable used for labor costs. The coefficient on labor costs is significant at the .05 level for the model regressing on BPTS exports. However, the level of statistical significance is .10 for the model regressing labor costs on IT exports. These results provide strong evidence that distance has a negative effect. Table 13.6 also suggests that the use of English and the number of Internet users per household are positively associated with BPTS and IT service exports to the US as predicted. Both models are highly significant as revealed by the high Wald statistics and the regression equation accounts for a majority of the variance with $R^2$ values of 57 and 52 percent, respectively.

Table 13.7 shows the results of regression analysis using panel estimation techniques on BPTS over three 5- or 6-year periods from 1990 to 2005. Distance remains highly significant and negative in all time periods, a finding which is consistent with gravity theory. The coefficients for English language are highly significant and positive as predicted in all time periods. The latter two time periods show that this model provided mixed support for the hypothesis about labor costs, though support for labor costs weakens in the second period with only a .10 level of significance. However, in the 1990 to 1994 period labor costs were actually positively associated with offshoring levels, which is contrary to the prediction. Some factors may diminish with time, such as the measure of the number of Internet users per household, which loses significance in the last period. The regression equations for all three time periods are highly statistically significant. With overall $R^2$ values ranging from 59 to 77 percent, these models explain most of the variation in the dependent variable, which is good for a simple model with only four predictors.

The results for IT service exports were also divided into the same three time periods, and the results are provided in Table 13.8. Reviewing the results, one finds strong support for the hypothesis on distance, but little evidence for the hypotheses on labor costs and Internet usage. However, no relationship between labor costs and IT service exports
Table 13.6 *Share of BPTS and IT exports to United States 1990 to 2005 – generalized least squares unbalanced panel estimation*

<table>
<thead>
<tr>
<th></th>
<th>Total BPTS exports</th>
<th>Total IT exports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Standard error</td>
</tr>
<tr>
<td>(1) Log distance (in thousands kilometers)</td>
<td>−.0425082**</td>
<td>.0075282</td>
</tr>
<tr>
<td>(2) Log labor cost (USD per hour)</td>
<td>−.0086515*</td>
<td>.0043047</td>
</tr>
<tr>
<td>(3) Internet users per 100</td>
<td>.0008411**</td>
<td>.0001226</td>
</tr>
<tr>
<td>(4) English</td>
<td>.0548018**</td>
<td>.0109225</td>
</tr>
<tr>
<td>constant</td>
<td>.4148824**</td>
<td>.0702748</td>
</tr>
<tr>
<td>sigma u</td>
<td>.02176556</td>
<td></td>
</tr>
<tr>
<td>sigma e</td>
<td>.0321076</td>
<td></td>
</tr>
<tr>
<td>rho</td>
<td>.3148529</td>
<td></td>
</tr>
<tr>
<td>R² within</td>
<td>0.1794</td>
<td></td>
</tr>
<tr>
<td>R² between</td>
<td>0.7068</td>
<td></td>
</tr>
<tr>
<td>R² overall</td>
<td>0.5732</td>
<td></td>
</tr>
<tr>
<td>Wald Chi²</td>
<td>102.98**</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

+ p < .10, * p < .05, ** p < .01 NS not significant at p < .10
Table 13.7 *Share of BPTS exports to United States – three time periods from 1990 to 2005 – generalized least squares unbalanced panel estimation*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Log distance (in thousands kilometers)</td>
<td>−.009971</td>
<td>.003626**</td>
<td></td>
<td>−.046512</td>
<td>.007769**</td>
<td></td>
<td>−.064124**</td>
<td>.011626</td>
<td></td>
</tr>
<tr>
<td>(2) Log labor cost (USD per hour)</td>
<td>.009379</td>
<td>.002881**</td>
<td></td>
<td>−.010557</td>
<td>.006302+</td>
<td></td>
<td>−.014144+</td>
<td>.008623</td>
<td></td>
</tr>
<tr>
<td>(3) Internet users per 100</td>
<td>.004018</td>
<td>.001696*</td>
<td></td>
<td>.000990</td>
<td>.000285**</td>
<td></td>
<td>.000399NS</td>
<td>.000352</td>
<td></td>
</tr>
<tr>
<td>(4) English</td>
<td>.039559</td>
<td>.006549**</td>
<td></td>
<td>.055523</td>
<td>.011062**</td>
<td></td>
<td>.076711**</td>
<td>.017062</td>
<td></td>
</tr>
<tr>
<td>constant</td>
<td>.068420</td>
<td>.035016*</td>
<td></td>
<td>.457416</td>
<td>.074760**</td>
<td></td>
<td>.628440**</td>
<td>1.09348</td>
<td></td>
</tr>
<tr>
<td>sigma u</td>
<td>.0088851</td>
<td></td>
<td>.018937</td>
<td>.0318334</td>
<td></td>
<td>.01645305</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sigma e</td>
<td>.0067640</td>
<td>.031304</td>
<td></td>
<td>.2613906</td>
<td></td>
<td>.82493239</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rho</td>
<td>.6330946</td>
<td>.2613906</td>
<td></td>
<td>.82493239</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² within</td>
<td>0.3525</td>
<td>0.1150</td>
<td></td>
<td>0.0350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² between</td>
<td>0.7963</td>
<td>0.7594</td>
<td></td>
<td>0.7027</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² overall</td>
<td>0.7743</td>
<td>0.5902</td>
<td></td>
<td>0.7017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wald Chi²</td>
<td>49.97**</td>
<td>76.92**</td>
<td></td>
<td>52.07**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>31</td>
<td>116</td>
<td></td>
<td>92</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Groups</td>
<td>14</td>
<td>23</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p < .10, * p < .05, ** p < .01, NS not significant at p < .10
Table 13.8  *Share of IT exports to United States – three time periods from 1990 to 2005 – generalized least squares unbalanced panel estimation*

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>Coefficient</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990–1994</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Log distance (in thousands kilometers)</td>
<td>−.001085*</td>
<td>.000534</td>
<td>−.02290**</td>
<td>.002557</td>
<td>−.032521**</td>
<td>.005188</td>
</tr>
<tr>
<td>(2) Log labor cost (USD per hour)</td>
<td>.000278NS</td>
<td>.000573</td>
<td>−.00330NS</td>
<td>.002476</td>
<td>−.004114NS</td>
<td>.003456</td>
</tr>
<tr>
<td>(3) Internet users per 100</td>
<td>.00013NS</td>
<td>.000493</td>
<td>.000462**</td>
<td>.000146</td>
<td>.00007NS</td>
<td>.000131</td>
</tr>
<tr>
<td>(4) English</td>
<td>.001757+</td>
<td>.00106</td>
<td>.015122**</td>
<td>.003764</td>
<td>.027169**</td>
<td>.007635</td>
</tr>
<tr>
<td>constant</td>
<td>.008447NS</td>
<td>.005579</td>
<td>.208323**</td>
<td>.024858</td>
<td>.299273**</td>
<td>.048445</td>
</tr>
<tr>
<td>sigma u</td>
<td>0.0</td>
<td></td>
<td>0.025075</td>
<td></td>
<td>0.016230</td>
<td></td>
</tr>
<tr>
<td>sigma e</td>
<td>.002738</td>
<td></td>
<td>.0167253</td>
<td></td>
<td>.005313</td>
<td></td>
</tr>
<tr>
<td>rho</td>
<td>0.0</td>
<td></td>
<td>0.0219832</td>
<td></td>
<td>.903230</td>
<td></td>
</tr>
<tr>
<td>R² within</td>
<td>0.0188</td>
<td></td>
<td>0.0963</td>
<td></td>
<td>0.0018</td>
<td></td>
</tr>
<tr>
<td>R² between</td>
<td>0.5557</td>
<td></td>
<td>0.7707</td>
<td></td>
<td>0.7058</td>
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<tr>
<td>R² overall</td>
<td>0.2351</td>
<td></td>
<td>0.5474</td>
<td></td>
<td>0.7257</td>
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</tr>
<tr>
<td>Wald Chi²</td>
<td>7.99+</td>
<td></td>
<td>113.25**</td>
<td></td>
<td>51.21**</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>31</td>
<td></td>
<td>108</td>
<td></td>
<td>82</td>
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</tr>
<tr>
<td>Groups</td>
<td>14</td>
<td></td>
<td>23</td>
<td></td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

+ p < .10, * p < .05, ** p < .01, NS not significant at p < .10
exists possibly due to the lack of statistical power resulting from dividing the dataset into three parts. The relationship between the number of Internet users per household and IT service exports is significant only in the 1995 to 2000 time period.

These results should be treated with caution due to problems with the number of observations due to missing data for several countries. The model produces highly significant results for the overall regression equation for the latter two time periods and the overall $R^2$ increases from 55 percent to 73 percent in the latter period suggesting a change in the importance of these variables around the cut point. However, when only the subset of data for the period of time prior to 1994 is entered into the regression, there is no support for the overall model.

Limitations and future directions

The results above analyze the sourcing decisions of US multinationals ex post facto and do not capture the success of offshoring decisions. Even if the relative success rate of offshoring to each country was known, it would be difficult to attribute the causality to either the country level variables used in this study or to company-specific management issues. Some of the variables used may be poor measures of the constructs included in the regression equation. Adding measures of education and human capital more generally might help explain whether skilled and unskilled labor are sources of comparative advantage. However, such data is difficult to come by in a format that permits international comparisons.

Replicating this study for particular industries and occupations is likely to provide more specific information for businesses and policy makers. Finally, it should be noted that several variables were added to this model to see if they added to the explanatory power of the model. These included literacy rates, educational attainment data, Hofstede’s (2001) cultural dimensions, measures of political stability, and corruption. None of these country-level attributes were found to be significant for the service exports examined. A similar analysis of determinants of BPTS exports to Canada, Australia, France, and the United Kingdom found use of English and distance to be the most important factors in explaining service exports to these countries.
Conclusions and implications

The newspapers have for a decade been filled with reports of lower-skilled jobs in business, professional, and technical services migrating to India and Eastern Europe. More recently, the process has been moving up the value chain to occupations, such as accountants, financial analysts, and software engineers that previously had been insulated from such wage pressures. The inevitability of further offshoring of commercial services is likely to invigorate both its proponents and critics. A nation that embraces free trade should be open to offshoring. Efficient markets may render offshoring as an inevitable form of trade; however, governments may chose to protect high-value service jobs through intervention. Understanding the determinants of offshoring will help governments seeking increased attractiveness as an offshoring location to invest in appropriate areas such as computer literacy and English language skills.

The lack of detailed data and analysis has resulted in most offshoring decisions being made on qualitative factors. The value of services being offshored is increasing dramatically and countries are providing incentives such as tax free or reduced tax zones to influence companies’ offshoring decisions. Countries attempting to attract offshoring should consider the factors that influence their relative attractiveness and take measures to improve where needed.

This chapter suggests that along with geographic distance, linguistic distance matters when it comes to importing services. English is currently the most important language for trade in services and may become the global standard. For example, China is mobilizing to compete with India for a greater share of service offshoring and a key initiative is working to increase the level of English proficiency by increasing the focus on teaching English in elementary and secondary schools. Labor costs appear to matter, but work needs to be done in collecting data that better accounts for productivity differences that is currently available. The importance of having state-of-the-art technology such as Internet penetration appears to convey advantages, but these advantages may not be permanent.
References


Introduction

At the end of 1999, a start-up company, Exult, signed a $600 million, seven-year contract to provide nearly all human resource (HR) services for British Petroleum (BP) in the United States and United Kingdom (Lawler et al., 2004). Six years later, a cover story in Business Week noted that human resource outsourcing (HRO) had become the fastest-growing segment of business process outsourcing (BPO) with $13 billion in global spending (Engardio et al., 2006). A newer offshoot of the BPO movement, HRO has received less attention and, with the exception of work done by Lawler et al. (2004, 2006), there has been little academic analysis of the levels and effects of the phenomenon. Most of the information on HRO comes from consultancies (Everest Research Institute, 2006; Giacomelli, 2007; Towers Perrin, 2008). This chapter examines the impact of the HRO decision on organizations empirically and builds upon the prescriptive advice found in earlier works on the topic (Beamon, 2004; Cook, 1999). The following analysis explores the link between levels of outsourcing HR activities and employee retention, employee satisfaction, and customer satisfaction using data collected from organizations in 2007 and 2008.

The decision to outsource redraws the boundaries between an organization and its suppliers. Innovations in information technology and the standardization of business processes have increased the types of services considered to be candidates for outsourcing thereby driving the explosive growth in BPO. This transformation has in turn attracted a great deal of attention from the management community inside and outside of academia. Outsourcing any business process involves both direct and indirect costs and benefits. Some of the more obvious direct costs of outsourcing human resource activities include: the cost of time spent identifying the business processes to be outsourced, selecting a vendor or vendors and managing the vendor relationship. Outsourcing
HR activities may also entail indirect costs such as increases in material and supply costs, training, travel, new equipment and software.

Direct benefits of outsourcing HR processes include staff time and labor costs saved and savings from additional operating efficiencies, such as lower material, equipment, and software costs. A source of indirect or hidden costs of an outsourcing agreement for HR includes increased legal, security, and technology risks faced by the organization. Another potential indirect disadvantage or cost of outsourcing an HR activity is a reduction in employee satisfaction and engagement due to changes in the service quality or attitudes towards the provider of the HR activity. Outsourcing HR activities not well suited to outsourcing may lead to reductions in quality that are difficult to measure in the monitoring of a contract, but are still felt by employees or managers. Many HRO providers rely on their clients embracing a single standardized delivery model to achieve the returns to scale needed to deliver cost reductions. Replacing a well-functioning internal HR process with a new standardized process may be detrimental to the organization and employees in ways difficult to predict and measure post outsourcing transition.

Dissatisfaction with having to seek HR services in a new manner may be temporary, as most change results in initial resistance. Outsourcing aspects of HR may lead to more lasting declines in employee satisfaction due to the reduced availability or quality of HR service and an employees changed perception of the employer and employment relationship. HRO may also affect organization’s reputation in the labor market thereby affecting recruiting activities. Any reductions in employee engagement may negatively affect the customer experience and organizational productivity (Becker and Gerhart, 1996; Capelli and Neumark, 1999).

Early conversations on HRO with executives revealed the notion that HR activities could be described as relational or transactional. Transactional activities are strong candidates for outsourcing as they tend to be routine and add little value to the organization. Relational activities are high-touch involving the creation of a type of social capital for the employee and/or organization during their provision. This is the result of a social exchange that takes place between the service provider and the employee (e.g., management training) or due to the provider’s position within the firm’s hierarchy (e.g., performance review, mentoring).
Much of the strategic HR literature (Barney, 1991; Ulrich, 1997) suggests that HR practices can be a source of sustained competitive advantage. The implication of this is that outsourcing any strategic HR activities should be detrimental to aspects of organizational performance. Employee turnover is costly and has been related to declining organizational performance for decades (Hirschman, 1970). It is natural to expect that a reduction in employee satisfaction with core business processes affecting their work and personal lives, such as HR, would lead to lower employee performance due to reduced engagement, higher voluntary turnover (Shaw et al., 1998) and lower customer satisfaction (Angle and Perry, 1981; Arthur, 1994). The following hypotheses assume that HR activities have a strategic component and add to overall employee satisfaction and engagement which augment organizational productivity. Replacing the customized fit of an internal group of HR professionals with a cookie-cutter approach of an HRO provider is predicted to have negative consequences. These theoretical considerations lead to three hypotheses about the use of HRO and organizational outcomes:

(H1): HRO will be negatively associated with employee retention (lower voluntary employee turnover).
(H2): HRO will be negatively associated with employee satisfaction.
(H3): HRO will be negatively associated with customer satisfaction.

The following types of HR activities are commonly outsourced: recruitment and selection, training and development, pay and benefits, mergers and outplacement, performance appraisal systems, HR planning, and organizational climate and culture (Galanaki and Papachristou, 2005; Mahoney and Brewster, 2002). In order to measure the level of HRO in 2007 a questionnaire was developed listing these activities and several others suggested during interviews with dozens of HR and finance executives at a variety of large organizations in nine major industries. These organizations included major retailers, manufacturers, high-tech firms, an airline, financial service companies, and larger local governments. The goal of these initial interviews was to select a set of activities covering the entire domain of HR and to include activities thought to be both well suited to HRO and poorly suited to obtain
contrast measures. The questionnaire was refined and expanded to measure thirty-four distinct HR activities. Each of these activities is labeled in the second column of Table 14.2 (see p. 386).

Research design

The data used in this study was collected through a series of online and paper survey deployments. The data collected provides a cross-sectional study of organizations in several industries for 2007. Concerns about the size of the effect size led to a power analysis (Buchner et al., 2001; Erdfelder et al., 1996) prior to data collection which suggested that at least 200 organizations should complete the questionnaire. The majority of the data analyzed was collected from three online deployments of the survey questionnaire. Two market research firms were engaged to reach a national cross-section of HR professionals. Both Market Tools and Greenfield Online are market research firms that have a panel of professionals who have indicated a willingness to complete surveys on business topics. Market Tools sent invitations to participate for the first online deployment of the survey in 2007 as well as for the final deployment in early 2008. Greenfield Online distributed electronic mail invitations to its panel of HR and finance professionals in the fall of 2007.

Voluntary employee turnover was measured by asking each organization’s respondent to refer to its data archives for the most recent year available. The voluntary turnover figure was defined as “employee initiated turnover” and excluded planned retirements. The reason for excluding planned retirements is that a planned retirement is not expected to signal employee dissatisfaction with the organization and is not expected to be influenced by the decision to increase HRO. Overall employee turnover was also collected for comparison and was defined as “employee initiated and employer initiated turnover.” Planned retirements were included in the overall turnover category.

Measures of employee satisfaction have been validated in numerous studies with the most common items listed in Fields (2002). The design of the organizational questionnaire assumed that the overall employee satisfaction measure collected by most organizations would be similar enough to compare with other overall employee satisfaction measures. Overall employee satisfaction was measured by asking four questions relating to: overall organizational employee satisfaction score, total
possible points for the score, creator of the survey used and the year in which the data was collected. This data was transformed to a percentage of the maximum score possible to create a variable with a possible value ranging from 0 to 100. The variable was included only for organizations with employee satisfaction data from the past two years 2005 through 2007.

The level of overall customer satisfaction was estimated by asking each respondent to provide the organization’s most recent overall customer satisfaction score, the total possible points, the year the customer satisfaction survey was conducted, and the creator of the survey used. This data collected was transformed to a percentage of the maximum score possible to create a variable with a possible value ranging from 0 to 100. The variable was included only for those organizations with customer satisfaction data from the past two years 2005 through 2007.

Three of the most commonly used control variables in the analysis of organizational outcomes were included in the regression model to account for effects due to size, industry, and location. Size was measured both in terms of employees and 2007 annual revenues. In the case of publicly traded and most privately held companies, 2007 revenues and employee levels were verified using the Hoover’s database. In the case of most organizations in the public administration category, using 2007 revenues as a measure of size did not make sense and therefore this measure of size was not used. In most cases, employment levels could be verified for accuracy using publicly available data.

The organization’s primary industry was coded using the North American Industrial Classification (NAIC) system at the two digit level. Some of these categories were combined due to small numbers of respondents in industries such as agriculture and mining. Each responding organization was coded by the state or country in which its headquarters was located. For the organizations headquartered in the United States one of four regional codes was assigned (Northeast, Midwest, South, and West) with non-US representing the omitted category.

Descriptive statistics

Data was collected on the 2007 outsourcing levels from more than 400 organizations. Of these, 294 organizations provided data on
the primary dependent variables and met the aforementioned stringent standards of verification for accuracy. The current dataset is a representative sample of organizations doing business in the United States. This sample is very representative of the United States economy in terms of industry and geographic location. The participating organizations represent nineteen different industry groups. A comparison of the percentage of respondents by industry to the share of that industry group as a percentage of the gross domestic product revealed very good coverage by primary industry type.

An analysis of the participants by industry reveals that the largest number of responses (18 percent) came from manufacturing, followed by health care (12 percent), accommodation and food services (10 percent), and professional and business services (9 percent). The most underweighted sector is public administration (5 percent). The majority (85 percent) of the organizations included represent the private sector. Of the private sector organizations, 35 percent were publicly traded companies. The non-profit and public sectors each make up about 8 percent of the sample.

An analysis of the geographic distribution of respondents reveals that this sample comes from organizations from around the United States and a comparison of the states included with each state’s share of national GDP reveals fairly representative coverage. This sample is overweighted for Minnesota and underweighted for New York and Texas. No observations were collected from Alabama, Alaska, Montana, North Dakota, New Hampshire, Oklahoma, South Dakota, Wyoming, and Vermont.

The sample analyzed includes small to very large organizations measured in terms of total employment. The distribution is as follows: organizations with fewer than 100 employees (18 percent), organizations with 100–499 employees (40 percent), organizations with 500–999 employees (8.5 percent), organizations with 1,000–4,999 employees (15 percent), organizations with 5,000–9,999 employees (6 percent), organizations with 10,000–49,000 employees (6.5 percent), and 50,000 or more employees (6 percent). The sample includes 30 of the 2007 Fortune 500 companies.

Revenue information was requested of organizations participating in the later survey waves, as the number of smaller organizations participating was not anticipated in the first survey deployment. Financial
databases were used to obtain 2007 revenues for companies that did not report this number, as well as to verify the number supplied. Revenue information was obtained for 240 organizations (82 percent) of the sample and is biased towards larger companies. Organizations with revenues less than $10 million comprise 21 percent of the sample. Another 22 percent of the sample had 2007 revenues between $10 and $100 million. About 12 percent were between $100 million and $1 billion and 26 percent were larger than $1 billion. These percentages are calculated from the total number of 294 participants of which 2007 revenue data was not available for 18 percent.

Table 14.1 reports the descriptive statistics for the dependent variables and overall employee turnover. Voluntary employee turnover data was collected from 271 organizations, which is 92 percent of the sample. The mean value was 16 percent and the median value was 15 percent. Some organizations reported no voluntary turnover and the highest level reported was 200 percent. Such high levels are not uncommon for retailers, hotels, and restaurants. Overall employee turnover was collected from 288 organizations, which is 98 percent of the sample. The mean value was 25 percent, but the median value was 10 percent. This level is certainly affected by economic factors and was expected to be larger and have higher variation. The standard deviation was 34 for overall turnover compared to 22 for voluntary turnover.

Employee satisfaction scores were collected from 96 organizations, which is 33 percent of the sample. Customer satisfaction scores were received from 69 organizations, which is 24 percent of the sample. Companies were more guarded with these last two organizational performance measures than data on their outsourcing

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>n</th>
<th>Mean</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall turnover</td>
<td>288</td>
<td>25</td>
<td>1</td>
<td>10</td>
<td>296</td>
<td>34.0</td>
</tr>
<tr>
<td>Voluntary turnover</td>
<td>271</td>
<td>16</td>
<td>0</td>
<td>15</td>
<td>200</td>
<td>22.0</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>96</td>
<td>78</td>
<td>20</td>
<td>80</td>
<td>96</td>
<td>15.0</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>69</td>
<td>84</td>
<td>50</td>
<td>85</td>
<td>100</td>
<td>11.0</td>
</tr>
</tbody>
</table>
levels. At these levels, the statistical power is not adequate to recommend hypothesis testing using multiple regressions on these dependent variables.

The level of HRO measure is based on the answer to the thirty-four items asking “Estimate the percentage of work measured in terms of time or effort spent on each of the following HR activities by external parties/vendors (i.e., consultants, independent contractors, service providers).” Each responding organization provided an estimate of their 2007 level of outsourcing of thirty-four HR activities. The responses received for each HR activity are divided into four columns in Table 14.2. The first column lists the number of organizations for which 2007 HRO estimates for the activity were available. The second column lists the percentage of organizations reporting no outsourcing of the HR activity. The third column gives the average percentage of the activity outsourced by the entire group of responding organizations and the fourth column provides the standard deviation. The number of responses for the six categories added after the pilot survey is substantially lower than the majority of the HR activities. In addition, several organizations did not have union employees or foreign employees which decreased the number of responses for the union and expatriate HR activity items.

As would be expected for a new phenomenon, the mean values for many individual activities tended to be low with half of the HR activities averaging 7 percent or lower. The most common response for every category of HR was zero. Similarly, the median value for every HR activity except pre-employment testing and employee assistance programs (EAP) was zero. By this measure, the ten most heavily outsourced HR activities in order of reported percentage outsourced are: EAP, pre-employment testing, technical and computer training delivery, management training delivery, salary surveys, employee attitude surveys, annual benefit enrollment, development of customized training programs, relocation assistance, resumé screening, and executive recruiting.

Analysis of column two in Table 14.2, which reports the organizations outsourcing an HR activity, shows that EAP is the most commonly outsourced HR activity followed by pre-employment testing, training delivery, executive recruiting, employee surveys, customized training development, and salary surveys. This compares to the findings reported in Lawler et al. (2006) that EAP and benefits were the most
Table 14.2 Reported outsourcing levels of 34 HR activities – overall dataset organization reporting no outsourcing

<table>
<thead>
<tr>
<th>Item</th>
<th>Description of HR activity</th>
<th>Percent reporting zero outsourcing</th>
<th>Mean percent of outsourcing</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Addressing employee</td>
<td>294</td>
<td>66.3</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>complaints about</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>co-workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Addressing employee</td>
<td>293</td>
<td>66.9</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>complaints about mgmt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Communicating</td>
<td>292</td>
<td>72.3</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>performance results to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Communicating culture</td>
<td>290</td>
<td>73.8</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>and vision to employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Design of organization</td>
<td>288</td>
<td>71.9</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Union/labor relations</td>
<td>273</td>
<td>71.8</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Conducting employee</td>
<td>287</td>
<td>58.5</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>attitude/opinion surveys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Pre-employment testing</td>
<td>293</td>
<td>44.4</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>and assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Job analysis and</td>
<td>294</td>
<td>67.0</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>developing job descriptions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Relocation assistance and</td>
<td>285</td>
<td>68.8</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>reimbursement</td>
<td></td>
<td></td>
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<tr>
<td>11.</td>
<td>Employee assistance</td>
<td>289</td>
<td>43.6</td>
<td>31.3</td>
</tr>
<tr>
<td></td>
<td>program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Resumé screening</td>
<td>288</td>
<td>66.0</td>
<td>10.5</td>
</tr>
<tr>
<td>13.</td>
<td>Interviewing for</td>
<td>286</td>
<td>72.7</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>non-exempt positions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Annual employee benefit</td>
<td>293</td>
<td>51.2</td>
<td>15.4</td>
</tr>
<tr>
<td></td>
<td>enrollment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>HRIS/HRIT and employee</td>
<td>198</td>
<td>63.6</td>
<td>9.7</td>
</tr>
<tr>
<td></td>
<td>data management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Salary surveys</td>
<td>285</td>
<td>60.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Item</td>
<td>Description of HR activity</td>
<td>Level of outsourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------</td>
<td>----------------------</td>
<td>---</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Percent reporting zero outsourcing</td>
<td>Mean percent of outsourcing</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>17.</td>
<td>Delivery of employee performance reviews</td>
<td>287 79.1</td>
<td>4.8</td>
<td>14.0</td>
</tr>
<tr>
<td>18.</td>
<td>Design of group level bonus programs</td>
<td>283 76.0</td>
<td>5.8</td>
<td>16.5</td>
</tr>
<tr>
<td>19.</td>
<td>Merit pay increase planning &amp; implementation</td>
<td>282 79.8</td>
<td>3.9</td>
<td>12.8</td>
</tr>
<tr>
<td>20.</td>
<td>Employee recognition programs</td>
<td>282 70.2</td>
<td>7.5</td>
<td>18.7</td>
</tr>
<tr>
<td>21.</td>
<td>Responding to questions about pay and benefits</td>
<td>281 65.8</td>
<td>7.7</td>
<td>17.3</td>
</tr>
<tr>
<td>22.</td>
<td>Tracking employee training and competencies</td>
<td>287 74.2</td>
<td>6.6</td>
<td>18.3</td>
</tr>
<tr>
<td>23.</td>
<td>Development of customized training programs</td>
<td>280 59.3</td>
<td>13.0</td>
<td>24.2</td>
</tr>
<tr>
<td>24.</td>
<td>Delivery of technical and computer training</td>
<td>286 56.6</td>
<td>17.5</td>
<td>29.2</td>
</tr>
<tr>
<td>25.</td>
<td>Delivery of management training</td>
<td>280 52.1</td>
<td>16.6</td>
<td>27.2</td>
</tr>
<tr>
<td>26.</td>
<td>New employee orientation sessions and training</td>
<td>281 74.0</td>
<td>4.7</td>
<td>12.3</td>
</tr>
<tr>
<td>27.</td>
<td>Tuition reimbursement</td>
<td>281 83.6</td>
<td>5.4</td>
<td>18.8</td>
</tr>
<tr>
<td>28.</td>
<td>Mentoring</td>
<td>282 78.0</td>
<td>4.6</td>
<td>14.0</td>
</tr>
<tr>
<td>29.</td>
<td>Coaching</td>
<td>201 72.6</td>
<td>5.0</td>
<td>13.5</td>
</tr>
<tr>
<td>30.</td>
<td>Succession planning</td>
<td>190 74.2</td>
<td>3.7</td>
<td>9.4</td>
</tr>
<tr>
<td>31.</td>
<td>Expatriate selection and assignment</td>
<td>189 84.1</td>
<td>4.1</td>
<td>15.1</td>
</tr>
<tr>
<td>32.</td>
<td>Expatriate training and preparation</td>
<td>187 79.7</td>
<td>4.4</td>
<td>14.1</td>
</tr>
<tr>
<td>33.</td>
<td>Interviewing for exempt positions</td>
<td>158 61.4</td>
<td>7.7</td>
<td>16.7</td>
</tr>
<tr>
<td>34.</td>
<td>Executive recruiting</td>
<td>179 58.1</td>
<td>9.8</td>
<td>20.2</td>
</tr>
</tbody>
</table>
frequently completely outsourced HR activities. While not reported in Table 14.2, the HR activities most frequently found in the moderately outsourced category are: management training, benefits enrollment, and computer and technical training. Lawler et al. (2006) reported that benefits and employee training were the HR activities most frequently partially outsourced.

Examining the role of HRO on organizational outcomes

The first step to examining our hypothesis is to perform the regression analysis with only the control variables. Tables 14.3 and 14.4 show the base model used to test the hypotheses. The results were generated by using OLS regression using standard errors clustered by region using the most current version of the statistical analysis program, Stata 10.0. The base model includes three typical control variables used in organizational analysis: size, industry, and location. The dependent variable is the voluntary employee turnover percentage in 2007 for the participating organizations. The first run of the base model includes two variables that control for size of the organization: 2007 annual revenues measured in millions of dollars and number of employees measured as FTEs. The second run of the base model drops revenues to permit the inclusion of organizations for which revenue is not appropriate, such as governmental entities. The primary industry classification of the organization is also controlled for at the two-digit NAIC level by using fourteen dummy variables for those industries representing organizations consisting of at least 2 percent of the sample. Finally, the region in which the responding organization’s headquarters was located was controlled for by using a dummy variable for each of the four regions defined by the US Census Bureau (Northeast, Midwest, South, and West) and those organizations located outside the US served the comparison group.

The regression model used is:

\[ Y_{it} = X_{it} \beta + u_i + e_{it} \]

In the regression model \( Y \) is the dependent variable, \( X \) represents the matrix of independent variables, \( u_i \) represents individual fixed effects, and \( e_{it} \) represents errors that are assumed to meet the independently and identically distributed assumption.
Table 14.3  Base model: control variables only (includes revenue) 2007 voluntary employee turnover (percent per year) clustered standard errors (44 states)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>8.242765</td>
<td>5.223438</td>
<td>0.122</td>
</tr>
<tr>
<td>Control variables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Annual revenues (millions USD)</td>
<td>.000031</td>
<td>.000053</td>
<td>0.58</td>
</tr>
<tr>
<td>2007 Number of employees (FTEs)</td>
<td>.0000251</td>
<td>.0000491</td>
<td>0.612</td>
</tr>
<tr>
<td>Primary industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture/Mining</td>
<td>.0000251</td>
<td>.0000491</td>
<td>0.612</td>
</tr>
<tr>
<td>Utilities</td>
<td>−7.833623</td>
<td>4.39032</td>
<td>0.081*</td>
</tr>
<tr>
<td>Construction</td>
<td>−10.8135</td>
<td>4.217111</td>
<td>0.014**</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>−2.689649</td>
<td>7.497993</td>
<td>0.722</td>
</tr>
<tr>
<td>Wholesale/Retail trade</td>
<td>1.951201</td>
<td>4.31723</td>
<td>0.654</td>
</tr>
<tr>
<td>Transportation</td>
<td>−6.690282</td>
<td>5.73325</td>
<td>0.250</td>
</tr>
<tr>
<td>Information</td>
<td>.3793655</td>
<td>7.38585</td>
<td>0.959</td>
</tr>
<tr>
<td>Finance/Insurance/Real estate</td>
<td>−1.366507</td>
<td>6.688042</td>
<td>0.839</td>
</tr>
<tr>
<td>Business and professional services</td>
<td>3.625266</td>
<td>5.282428</td>
<td>0.496</td>
</tr>
<tr>
<td>Education</td>
<td>−5.797824</td>
<td>5.606153</td>
<td>0.307</td>
</tr>
<tr>
<td>Health care</td>
<td>−2.9011</td>
<td>5.046629</td>
<td>0.568</td>
</tr>
<tr>
<td>Arts/Entertainment</td>
<td>−4.517812</td>
<td>5.000816</td>
<td>0.371</td>
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<tr>
<td>Accommodation</td>
<td>28.68723</td>
<td>32.73811</td>
<td>0.386</td>
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<tr>
<td>Public administration</td>
<td>7.052695</td>
<td>6.700666</td>
<td>0.298</td>
</tr>
<tr>
<td>Geographic location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>4.627087</td>
<td>3.063334</td>
<td>0.138</td>
</tr>
<tr>
<td>Midwest</td>
<td>8.098702</td>
<td>2.998107</td>
<td>0.010***</td>
</tr>
<tr>
<td>South</td>
<td>12.40537</td>
<td>4.063465</td>
<td>0.004***</td>
</tr>
<tr>
<td>West (non-US omitted)</td>
<td>9.972758</td>
<td>4.546657</td>
<td>0.034**</td>
</tr>
<tr>
<td>Model statistics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.1318</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0454</td>
<td></td>
<td></td>
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<tr>
<td>F (20, 43) Clustered standard errors</td>
<td>4.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability &gt; F</td>
<td>0.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>222</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < .10, ** P < .05, *** P < .01
Table 14.4 Base model: control variables only (omits revenue) 2007 voluntary employee turnover (percent per year) clustered standard errors (46 states)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>15.31225</td>
<td>6.292134</td>
<td>0.019***</td>
</tr>
<tr>
<td>Control variables:</td>
<td></td>
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<td></td>
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<tr>
<td>Organizational size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Number of employees (FTEs)</td>
<td>.0000267</td>
<td>.0000464</td>
<td>0.567</td>
</tr>
<tr>
<td>Primary industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture/Mining</td>
<td>−15.17442</td>
<td>6.871341</td>
<td>0.032**</td>
</tr>
<tr>
<td>Utilities</td>
<td>−18.91196</td>
<td>6.591541</td>
<td>0.006***</td>
</tr>
<tr>
<td>Construction</td>
<td>−12.40966</td>
<td>9.460624</td>
<td>0.196</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.282274</td>
<td>3.60223</td>
<td>0.724</td>
</tr>
<tr>
<td>Wholesale/Retail trade</td>
<td>−14.37592</td>
<td>7.390217</td>
<td>0.058*</td>
</tr>
<tr>
<td>Transportation</td>
<td>−8.009214</td>
<td>7.825197</td>
<td>0.312</td>
</tr>
<tr>
<td>Information</td>
<td>−10.77433</td>
<td>8.452524</td>
<td>0.209</td>
</tr>
<tr>
<td>Finance/Insurance/Real estate</td>
<td>−5.628383</td>
<td>7.484657</td>
<td>0.456</td>
</tr>
<tr>
<td>Business and professional services</td>
<td>−12.19733</td>
<td>7.663086</td>
<td>0.118</td>
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<tr>
<td>Education</td>
<td>−10.59828</td>
<td>7.465132</td>
<td>0.163</td>
</tr>
<tr>
<td>Health care</td>
<td>−11.64544</td>
<td>7.285372</td>
<td>0.117</td>
</tr>
<tr>
<td>Arts/Entertainment</td>
<td>5.543222</td>
<td>19.50073</td>
<td>0.778</td>
</tr>
<tr>
<td>Accommodation</td>
<td>−1.169864</td>
<td>8.252483</td>
<td>0.888</td>
</tr>
<tr>
<td>Public administration</td>
<td>−13.90214</td>
<td>7.036125</td>
<td>0.054*</td>
</tr>
<tr>
<td>Geographic location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>6.162712</td>
<td>2.928647</td>
<td>0.041**</td>
</tr>
<tr>
<td>Midwest</td>
<td>8.431873</td>
<td>2.674957</td>
<td>0.003***</td>
</tr>
<tr>
<td>South</td>
<td>12.1846</td>
<td>3.603967</td>
<td>0.002***</td>
</tr>
<tr>
<td>West</td>
<td>11.19445</td>
<td>3.630372</td>
<td>0.003***</td>
</tr>
<tr>
<td>Model statistics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.0855</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0168</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (19, 45) Clustered standard errors</td>
<td>4.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability &gt; F</td>
<td>0.0000***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>273</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < .10, **P < .05, *** P < .01
One assumption of ordinary least squares (OLS) regression is that $e_{it}$ is independently and identically distributed. This is likely not the case and as information on location is available but cannot be accounted for with individual dummy variables for each state and country due to the sample size, so clustered standard errors were used. Table 14.3 shows that the overall regression equation for the base model is highly statistically significant with an $F$-statistic of $4.27$ ($p = 0.000$). One industry dummy variable (construction) is significant at the .05 level and is associated with lower voluntary turnover. The dummy variables for Midwestern, Western, and Southern states are also significant at the .05 level and are associated with higher voluntary turnover compared to non-US companies. The R-squared value is $13.2$ percent. The adjusted R-squared value of $4.5$ percent is quite small. The lack of significance for the control variables in this base model should not be a concern as \textit{a priori} there is no reason to expect the control variables to be individually or jointly associated with the dependent variable – voluntary employee turnover.

Table 14.4 provides the results of the regression analysis after including those organizations for which annual revenue data was not available and dropping the control variable for 2007 revenues. While this increases the power to detect the effect of relevant variables, an important variable is being omitted which creates a specification problem. When regression analysis is conducted on the larger sample the $F$-statistic remains highly significant at $4.68$ ($p = 0.000$). Three of the industry dummy variables are significant at the .05 level (agriculture and mining, utilities, and public administration). Each of these industries is associated with lower voluntary turnover. All four regional dummy variables are significant at the .05 level and the coefficients are positive, meaning that they are associated with higher voluntary turnover than the base category of non-US organizations. However, the adjusted R-squared value suffers when the revenue variable is dropped, falling from $4.5$ percent to a disturbingly low $1.7$ percent.

A test of whether the source of the data (Market Tools, Greenfield Online, or direct contact with the researcher) biased the results, dummy variables were created for each of the three online survey deployments and added to the above model with the paper questionnaires representing the base group. An examination of the $F$ statistic of $0.40$ showed that a test for joint significance of these variables could also be rejected.
and the results of the partial F tests also suggest that the source of the data was not a concern.

**Voluntary employee turnover and HRO**

Tables 14.5 and 14.6 report the results of regression equations that include an independent variable measuring the lack of any significant HRO. This dummy variable zero HRO equals one of the organization reports zero outsourcing of any HR categories. The results in Table 14.5 for Model 1a (revenues included) show that the zero HRO dummy variable is significant at the .05 level and is negative as hypothesized with a coefficient of $-6.5$. This finding provides evidence that HRO is associated with an economically significant increase in voluntary employee turnover. The coefficient of negative 6.5 is interpreted as follows: not outsourcing any HR activities is associated with more than a six percentage point drop in voluntary turnover. In other words, those organizations not engaging in HRO have higher employee retention (lower voluntary turnover) after controlling for size, industry, and location.

Overall Model 1a is highly significant with an F-statistic of 5.24 ($p = 0.000$). A partial F test on the addition of the zero HRO dummy variable yields an F-statistic of 5.03 ($p = 0.03$). Adding the zero HRO variable increases the explanatory power compared to the Base Model (revenues included) by about one percentage point as the R-squared value increases to 14.4 percent and the adjusted R-squared value increases to 5.4 percent. Several control variables are significant at the .05 level. Industry remains important for utilities and is associated with lower voluntary turnover. The regional dummy variables for each region except the Northeast are statistically significant at the .05 level and are higher than the non-US organizations.

Table 14.6 shows the results from the larger dataset that omits revenue as a control variable. The zero HRO variable adds to the explanatory power of the model with a partial F-statistic of 7.96 ($p = 0.07$). The absolute magnitude of the coefficient for the zero HRO variable in Model 1b (revenues omitted) is greater at a negative 8.6, representing a larger drop in voluntary turnover for organizations eschewing HRO. The coefficient on this independent variable is significant at the .01 level. The overall model is highly significant with an F-statistic of 5.33 ($p = 0.000$). Compared with Model 1a (revenues included), the
Table 14.5  
Model 1a: zero HRO variable added (includes revenue) 2007 voluntary employee turnover (percent per year) clustered standard errors (44 states)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>9.941856</td>
<td>4.996941</td>
<td>0.053*</td>
</tr>
<tr>
<td>Control variables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organizational size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Annual revenues (millions USD)</td>
<td>.0000204</td>
<td>.0000536</td>
<td>0.706</td>
</tr>
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<td>2007 Number of employees (FTEs)</td>
<td>.0000251</td>
<td>.0000501</td>
<td>0.619</td>
</tr>
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<td></td>
<td></td>
</tr>
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<td>Agriculture/Mining</td>
<td>−6.863798</td>
<td>4.11554</td>
<td>0.103</td>
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<td>Utilities</td>
<td>−12.34451</td>
<td>3.974601</td>
<td>0.003***</td>
</tr>
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<td>Construction</td>
<td>−3.716978</td>
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<td>0.616</td>
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<td>Manufacturing</td>
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<td>0.760</td>
</tr>
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<td>6.187785</td>
<td>0.278</td>
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<tr>
<td>Transportation</td>
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<td>0.981</td>
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</tr>
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<td>Finance/Insurance/Real estate</td>
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</tr>
<tr>
<td>Business and professional services</td>
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<td>5.336062</td>
<td>0.298</td>
</tr>
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<td>Education</td>
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<td>4.809902</td>
<td>0.395</td>
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</tr>
<tr>
<td>Northeast</td>
<td>5.163949</td>
<td>2.781508</td>
<td>0.070*</td>
</tr>
<tr>
<td>Midwest</td>
<td>7.501209</td>
<td>2.648902</td>
<td>0.007***</td>
</tr>
<tr>
<td>South</td>
<td>12.02272</td>
<td>3.906064</td>
<td>0.004***</td>
</tr>
<tr>
<td>West</td>
<td>9.530596</td>
<td>4.177631</td>
<td>0.028**</td>
</tr>
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<td></td>
</tr>
<tr>
<td>Zero human resource outsourcing</td>
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<td>2.888716</td>
<td>0.030**</td>
</tr>
<tr>
<td>Partial F-statistic</td>
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<td>0.0302**</td>
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<tr>
<td><strong>Model statistics</strong></td>
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</tr>
<tr>
<td>R-squared</td>
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</tr>
<tr>
<td>Adjusted R-squared</td>
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</tr>
<tr>
<td>F (21, 43) Clustered standard errors</td>
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</tr>
<tr>
<td>Probability &gt; F</td>
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<td></td>
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<tr>
<td>Observations</td>
<td>222</td>
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</table>

* P < .10, ** P < .05, *** P < .01
Table 14.6 Model 1b: zero HRO variable added (omits revenue) 2007 voluntary employee turnover (percent per year) clustered standard errors (46 states)

<table>
<thead>
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<th>Control variables:</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
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<tbody>
<tr>
<td>Intercept</td>
<td>17.10177</td>
<td>6.673608</td>
<td>0.014***</td>
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<td><strong>Organizational size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Number of employees (FTEs)</td>
<td>0.0000241</td>
<td>0.0000461</td>
<td>0.604</td>
</tr>
<tr>
<td><strong>Primary industry</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture/Mining</td>
<td>-13.7215</td>
<td>6.574874</td>
<td>0.043**</td>
</tr>
<tr>
<td>Utilities</td>
<td>-20.50836</td>
<td>6.814048</td>
<td>0.004***</td>
</tr>
<tr>
<td>Construction</td>
<td>-13.27032</td>
<td>9.435607</td>
<td>0.166</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.217133</td>
<td>4.29504</td>
<td>0.778</td>
</tr>
<tr>
<td>Wholesale/Retail trade</td>
<td>-14.57422</td>
<td>7.893869</td>
<td>0.071*</td>
</tr>
<tr>
<td>Transportation</td>
<td>-8.138339</td>
<td>7.843791</td>
<td>0.305</td>
</tr>
<tr>
<td>Information</td>
<td>-11.78648</td>
<td>8.265555</td>
<td>0.161</td>
</tr>
<tr>
<td>Finance/Insurance/Real estate</td>
<td>-6.94133</td>
<td>7.517517</td>
<td>0.361</td>
</tr>
<tr>
<td>Business and professional services</td>
<td>-11.43734</td>
<td>7.329961</td>
<td>0.126</td>
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<tr>
<td>Education</td>
<td>-12.01022</td>
<td>7.576455</td>
<td>0.120</td>
</tr>
<tr>
<td>Health care</td>
<td>-11.87317</td>
<td>7.373585</td>
<td>0.114</td>
</tr>
<tr>
<td>Arts/Entertainment</td>
<td>5.961133</td>
<td>19.40937</td>
<td>0.760</td>
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<tr>
<td>Accommodation</td>
<td>-1.1689117</td>
<td>8.279582</td>
<td>0.984</td>
</tr>
<tr>
<td>Public administration</td>
<td>-14.33287</td>
<td>7.398417</td>
<td>0.059*</td>
</tr>
<tr>
<td><strong>Geographic location</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>6.534254</td>
<td>2.950272</td>
<td>0.032**</td>
</tr>
<tr>
<td>Midwest</td>
<td>7.896956</td>
<td>2.371254</td>
<td>0.002***</td>
</tr>
<tr>
<td>South</td>
<td>12.05298</td>
<td>3.586083</td>
<td>0.002***</td>
</tr>
<tr>
<td>West</td>
<td>10.7795</td>
<td>3.309974</td>
<td>0.002***</td>
</tr>
<tr>
<td><strong>Independent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero human resource outsourcing</td>
<td>-8.570191</td>
<td>3.037597</td>
<td>0.007</td>
</tr>
<tr>
<td>Partial F-statistic</td>
<td>7.96</td>
<td>0.0071</td>
<td></td>
</tr>
</tbody>
</table>

**Model statistics**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>.1044</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>.0333</td>
<td></td>
</tr>
<tr>
<td>F (20, 45) Clustered standard errors</td>
<td>5.33</td>
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<tr>
<td>Probability &gt; F</td>
<td>0.0000***</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>273</td>
<td></td>
</tr>
</tbody>
</table>

* P < .10, ** P < .05, *** P < .01
R-squared in Model 1b (revenues omitted) falls to 10.4 percent and the adjusted R-squared decreases to 3.3 percent.

As was the case for Model 1a (revenues included), in Model 1b several control variables are significant at the .05 level. Industry remains important for both the utilities and agriculture and mining sectors and is associated with lower voluntary turnover. Each of the four regional dummy variables is significant and positive at the .05 level compared to the non-US organization.

**Employee satisfaction and HRO**

The concerns about the power to detect a relationship with employee satisfaction were well founded. Model 2 uses regional controls but cannot use clustered standard errors for state effects. The number of employees to control for size but dummy variables for industry effects could not be included due to the small sample size. Robust standard errors were used instead of clustered standard errors. Model 2 has an F-statistic that is significant at the .01 level, but the adjusted R-squared value falls to zero. As Table 14.7 shows, no statistically significant relationship exists with the independent variable of interest (zero HRO) in Model 2.

**Customer satisfaction and HRO**

Concerns about the power to detect a relationship between HRO and customer satisfaction were even greater. Again due to the smaller sample size, Model 3 uses only regional controls and number of employees as control variables and replaces clustered standard errors with robust standard errors. Model 3 is highly significant overall with an F-statistic of 4.92 (p = 0.001). Table 14.8 shows a statistically significant relationship exists with overall customer satisfaction and those organizations not engaging in HRO of any activities. The size of the coefficient is $-8.57$ percentage points, which is a materially significant finding. In other words, those organizations not engaging in HRO have customer satisfaction scores 8.6 percentage points higher than a comparison group that does engage in HRO. The R-squared value for Model 3 is 15.4 percent compared to 14.4 percent in Model 1a (revenues included) and the adjusted R-squared value is 7.1 percent.
Table 14.7 Model 2: zero HRO (omits revenue) regressed on 2007 employee satisfaction scaled to percentage of maximum score

<table>
<thead>
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<th></th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
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<tbody>
<tr>
<td>Intercept</td>
<td>73.36015</td>
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<td>0.000</td>
</tr>
<tr>
<td>Control variables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Number of employees (FTEs)</td>
<td>−.0000171</td>
<td>.0000114</td>
<td>0.143</td>
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<tr>
<td>Geographic location</td>
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<td></td>
<td></td>
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<tr>
<td>Northeast</td>
<td>2.800367</td>
<td>11.2101</td>
<td>0.804</td>
</tr>
<tr>
<td>Midwest</td>
<td>8.230758</td>
<td>10.87696</td>
<td>0.454</td>
</tr>
<tr>
<td>South</td>
<td>4.952988</td>
<td>11.05635</td>
<td>0.657</td>
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<tr>
<td>West</td>
<td>4.322057</td>
<td>11.13808</td>
<td>0.700</td>
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<tr>
<td>Independent variables:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Zero HR outsourcing</td>
<td>−.9916174</td>
<td>7.155279</td>
<td>0.891</td>
</tr>
</tbody>
</table>

Model statistics

- R-squared: 0.0249
- Adjusted R-squared: −0.0408
- F (6, 34) Robust standard errors: 2.57
- Probability > F: 0.0365***
- Observations: 96

*P < .10, **P < .05, ***P < .01

compared to 5.4 percent in Model 1a. The relationship between customer satisfaction and HRO merits additional investigation.

In light of these results each hypothesis is revisited to reflect on the findings.

(H1): HRO will be negatively related to employee retention (lower voluntary employee turnover).

This hypothesis has the strongest support of the three. The regression analysis provides evidence that the organizations engaged in HRO have higher voluntary employer turnover compared to those with zero (or a negligible) HRO. The size of the effect is in the double digits and should be something to note for organizations, as reducing turnover by ten percent has large potential to reduce hiring and training costs. While evidence of association is provided by these findings the causality is
Table 14.8 Model 3: zero HRO (omits revenue) regressed on 2007 customer satisfaction scaled to percentage of maximum score using robust standard errors

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
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<td>Control variables:</td>
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<tr>
<td>Organizational size</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2007 number of employees (FTEs)</td>
<td>.0000198</td>
<td>7.11e-06</td>
<td>0.009***</td>
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<td>Geographic location</td>
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<td>Northeast</td>
<td>3.729693</td>
<td>11.97295</td>
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<td>Midwest</td>
<td>6.682477</td>
<td>11.93972</td>
<td>0.580</td>
</tr>
<tr>
<td>South</td>
<td>12.14596</td>
<td>11.70842</td>
<td>0.308</td>
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<tr>
<td>West</td>
<td>6.584533</td>
<td>11.89044</td>
<td>0.584</td>
</tr>
<tr>
<td>Independent variables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero HR outsourcing</td>
<td>9.343181</td>
<td>3.322002</td>
<td>0.009***</td>
</tr>
<tr>
<td>Model statistics</td>
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<tr>
<td>R-squared</td>
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</tr>
<tr>
<td>Adjusted R-squared</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>F (6, 62)</td>
<td>3.25</td>
<td></td>
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<td>Probability &gt; F</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < .10, ** P < .05, *** P < .01

indeterminate. It is possible that organizations with higher voluntary employee turnover have turned to HRO as a means of getting better quality HR services. Testing the consistency of this finding should be done with additional studies ideally of a longitudinal design.

The data collected for this study do not support the second hypothesis:

(H2): HRO will be negatively related to higher employee satisfaction.

As noted this result may be due to a lack of power to detect such an association due to the smaller number of organizations providing measures of employee satisfaction or engagement. However, if this result stands with a larger sample it would be troubling as one would expect theoretically that any differences in employee turnover would
result from reductions in employee satisfaction or engagement. Testing the third hypothesis provides some potentially important results for managers.

(H3): HRO will be **negatively** related to higher customer satisfaction.

In spite of the very low power of the test, there is a statistically significant and sizable relationship between customer satisfaction scores and use of HRO. An improvement of 9 points on a 100 point customer satisfaction scale is noteworthy as is the level of significance (p = 0.01). This finding merits additional study.

**Limitations**

The study reported in this chapter has some major limitations. The cross-sectional design cannot establish a causal link. The results do not tell us about the direction of the relationship and causality could plausibly run in either direction. It could be that those organizations that choose to live with higher levels of employee turnover, or otherwise place less value on their human capital, are more likely to engage in HRO to eliminate the trouble. For example, an organization that chooses to outsource an activity such as training and coaching, might do so knowing they have lower than average employee retention anyway and therefore there is less to lose by replacing HR staff with a vendor.

Another concern is that the percentage of variance explained by each of the three models is relatively low so including other important unobserved factors, such as HR strategy, may alter this relationship. An alternative explanation for the negative relationship between HRO and employee retention and customer satisfaction could be that organizations that engage in higher levels of HRO have less effective HR practices overall or are in less healthy industries and these other factors are the cause of lower satisfaction and retention levels. Future work should look at changes in HRO levels and changes in employee turnover over time.

**Conclusions and implications for managers**

This chapter provides evidence that suggests outsourcing HR activities is associated with important organizational outcomes including voluntary employee turnover and customer satisfaction. Outsourcing
HR is a strategic decision that should not be taken lightly by executives (Cooke et al., 2004; Domberger, 1998). Further discussion of the suitability of particular HR activities to outsourcing and the differential effects of outsourcing particular HR activities is available in Norman (2009). The intent of this chapter is to encourage those weighing a decision to outsource an entire business function to consider the hidden costs of such a contract (Brown, 2007). It is possible that the easily identifiable savings from eliminating a group of HR employees may be outweighed by other effects on the organization. It is hoped that these initial results lead more HR professionals to research the impact of outsourcing decisions in a way that includes these other factors so that the true economic cost is considered in negotiating HRO contracts.

Note

1 Revenue, number of employees, and turnover data are assumed to represent the year 2007 or the level as of December 31, 2007. The majority of data reported was for 2007; in a small number of cases only 2006 data was available and in this case this was used.

References


15

Managing core outsourcing to address fast market growth

A case study of an Indian mobile telecom service provider

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Indian Institute of Management, Bangalore

Introduction

The strategic management literature defines outsourcing as a fundamental strategic decision to reject the internalization of an activity. This means that outsourcing can arise in two ways. First, it may involve the substitution of market transactions for internal activities. This occurs when an organization ceases performing an activity in-house and shifts it to an outside supplier. Second, outsourcing may arise through abstention. That is, a firm may decide never to engage in a given activity and thus abstain from it altogether, even though it is well within the firm’s managerial, technical, and financial capacity to do so. (Gilley, Rasheed and Shammari, 2006)

Among the various benefits associated with outsourcing, locating activities where they function more efficiently and effectively with the right balance of cost, flexibility, and risk is often cited as the most salient outcome (Kelly and Poole, 2006; Linder, 2004).

While there have been a large number of studies on the outsourcing of functional activity, more specifically on peripheral outsourcing (the outsourcing of non core activities), little is known about core outsourcing, that is the outsourcing of strategically relevant, core activities and the internal capabilities that an organization must develop to parlay core outsourcing into an improved market position. This gap is egregious because unless the link between core outsourcing, governance process, and competitive advantage is clearly established, organizations may not be able to deliver intended outcomes through core outsourcing. This chapter will describe the efforts made by a leading Indian mobile telecom service provider experiencing fast market growth combined with rapid technological change through core
outsourcing. After a brief background of the company, subsequent sections will describe the research methodology, the results, and a discussion of the study’s findings.

The subject firm

Bharti Airtel is the largest wireless service provider in the country, with more than 85.7 million subscribers\(^1\) and a market share of 24.7 percent as of January 2009. Given Bharti’s market capitalization of 1.51 trillion rupees ($31.43 billion) in January 2009, it had sales of US $767 million in fiscal 2008 and a compound annual growth rate of 57 percent.

The company offers its cellular services under the Airtel brand. It complements its mobile, broadband, and telephone services with national and international long-distance services and provides end-to-end data and enterprise services to corporate customers through its nationwide fiber optic backbone, last mile connectivity in fixed-line and mobile circles, VSATs, ISP, and international bandwidth access through the gateways and landing station.

In early 2004, Bharti Airtel decided to outsource both its IT systems management and its networks. These are parts of the telecom business that all telecom companies globally consider their core business. Bharti signed a 10-year $750 million contract with IBM, outsourcing Bharti’s information technology services including billing, management of customer accounts, and operation of the Bharti intranet. Then, over a period of four months, Bharti signed contracts outsourcing its entire network management to Ericsson (fourteen circles or geographic regions), Nokia Networks (four circles or geographic regions), and Siemens (three circles or geographic regions). The total value of the contracts was $400 million. This trio managed base stations (antennae, switches, routers, transmitters, and receivers) within their circles, deployed new stations as required, rolled out new networks and applications, and took on board roughly 800 Bharti staff. They also added new staff dedicated to Bharti as the networks expanded.

As a result of these outsourcing contracts, Bharti handled just a few things: marketing, sales, and distribution. Apart from that, it monitored its vendors, saw that they observed the parameters of the contracts, and made sure that they deployed and built only the best systems and networks for Bharti’s operations.
Industry context

The Indian mobile telecommunication industry has been experiencing very fast market growth. The Indian mobile user base increased from 10 million in 2002 to 150 million in 2007, with an average growth rate of 90 percent year over year. Oligopolistic competition was unfolding. There were competitors in the Global System for Mobile Communications (GSM) and Code Division Multiple Access (CDMA). Bharti Airtel, Vodafone – Hutch were in the GSM space, while Tata Indicom and Reliance were in the CDMA space. The number of subscribers to mobile networks was growing at a rapid rate on a national basis.

By its own admission, Bharti Airtel had lost money every year until 2003 and had posted profit from 2004. The watershed in its growth and profits came from strategic outsourcing. Bharti Airtel decided to outsource its network which is the core of its business. As Chairman Sunil Mittal, put it:  

If something goes wrong with my switch, there’s no way anyone from Bharti can do anything about it. An Ericsson guy is going to have to come and fix it. I don’t manufacture it; I can’t maintain or upgrade it. So I’m thinking, “This doesn’t really belong to me. Let’s just throw it out.” Western companies . . . have proven ability to work for large mobile providers and can render services locally through Indian subsidiaries. IBM has thousands of people in India who work only on my job. Indians run it, but they’re governed by the IBM structure, under the command and control of IBM’s global experts.

Expanding operations in a technology-intensive business requires the acquisition and retention of technically competent talent. The challenge was to attract and retain them, since the best and brightest would always look forward to working for companies who are well known in that particular area of technology.

Methodology

The objectives of the study were as follows: to examine the conditions that lead to the formation of outsourcing arrangements; to probe the outsourcing governance process after the outsourcing agreements were operational; and to examine outsourcing outcomes to identify problems that may come about as a result of dissatisfaction with the results of outsourcing arrangements.
Data for this study was collected as a part of a larger study on managing outsourcing. The author used a retrospective case study method to collect data about the subject company and a series of semi-structured interviews were orchestrated with key executives of Bharti Airtel. The structured part of the interview featured questions drawn from the extant literature on outsourcing. In addition to the prepared set of questions, the interviewer led the discussion to cover related outsourcing issues. The interviews were taped and subsequently transcribed into a document.

The author used Owen’s (1984) thematic analysis to interpret the interview notes. In making a case for qualitative analysis, Wood et al. (1994) reasoned that “thematic analysis is doubly interpretive because it probes not only symbolic constructions, but also relies on discursive accounts as the primary data that reveal the meanings (participants) generate from their experiences.” Each interview lasted about an hour. Interviews were taped and subsequently transcribed. The interviewer added insights from the interviews that were not reflected or were not readily apparent from the transcription. Questions for the structured part of the interview were gathered by examining the outsourcing literature (Bragg, 1998; Greaver, 1999; Lacity and Willcocks, 2001; Linder, 2004).

Findings

The principal motivations for the outsourcing agreements were to introduce service differentiation along with speed in expansion; to save on current operational costs and reduce capital expenditure; and to consolidate services that were earlier provided by multiple vendors leading to challenges of integration.

Bharti Airtel’s strategic objective was to capitalise on the growth opportunities that the company believed were available in the Indian telecommunications market and to consolidate its position as the leading integrated telecommunications services provider in key markets in India, with a focus on providing mobile services.

Bharti was aiming to free up top management bandwidth to chart out its strategic plan in terms of growth of network footprint, number of subscribers and their usage patterns, and aimed to depend on external contract service providers to operationalize their growth plan.
Table 15.1 Outsourcing customer service

<table>
<thead>
<tr>
<th>Customer segment</th>
<th>Quality of service</th>
<th>In-house/outsourced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-paid care touch</td>
<td>Best in class</td>
<td>In-house</td>
</tr>
<tr>
<td>Balance post-paid + prepaid CT</td>
<td>Premium service</td>
<td>Outsourced</td>
</tr>
<tr>
<td>Normal prepaid</td>
<td>Basic service</td>
<td>Outsourced</td>
</tr>
</tbody>
</table>

The company expected to triple its subscriber base in three years; assuming that it had to maintain 30 per cent spare capacity as buffer in its network, it had to create capacity for about 32 million lines. Adding each line at current prices costs about $100. Therefore, the company was looking at a capital expenditure of approximately $2,430 million. Having outsourced the network, the company would pay only for the 25 million lines that it actually utilized which would cost it roughly $1,700 million. At the outset of the outsourcing contract, the company transferred around 1,000 engineers from its payroll to that of the contract service providers, thereby saving on the recruitment of additional engineers for the increasing number of base stations that it was planning to set up. Vendor consolidation also makes life simpler for BTV in many ways. Prior to outsourcing IT to IBM, Bharti was dealing with a dozen IT suppliers. It had billing from Kenan Systems, customer care from Oracle, hardware from Sun Microsystems and HP, storage systems from EMC, fraud management systems from Subex, data warehousing from NCR Teradata, interconnect systems from Intec, and mediation systems from Hughes Software and Comptel.

Formation of outsourcing agreement and initial challenges

Bharti entered into outsourcing to focus its resources on competencies that were difficult to imitate such as brand loyalty and reputation for quality and service. The premium customers were serviced in-house while the other post-paid and prepaid customer categories were serviced by the external contract service providers (see Table 15.1).

From the point of view of the external contract provider, the main motivation was accelerated market penetration, local market knowledge of the client, and learning to customize equipment/services for local clients. Another motivation was to access the market through a
strong player. The initial key challenge for Bharti was adapting to the lateral organizational role of the outsourcer.

In the words of a senior executive:

As an outsourcing company our whole responsibility was to focus on the key performance indicators (the KPIs) through the 3 Ps of process, positive response, and periodic planned reviews. Our principal technical officers had to be process oriented. We received input from the marketing team, we passed it on to the external contract service provider and they came up with a working plan. They did not implement it right away. They got it validated. There was a review process in it. The whole team was involved in the validation. We gave feedback to our sales and marketing team. This was planned and periodic.

We adopted the positive feedback process. We said, let us see. We were in this situation some time back. We know that to improve on key performance indicators, it took us some time. If we were to look into this problem, with our staff, we would have done this much in this period. Is it fair on our part, just because we have handed over the service to the external contract service provider, that the work should be done in a particular time and in a particular way? We realized that we needed to have realistic expectations from our external contract service providers. The market was growing rapidly, customer demand was going up. We needed to give them time to analyze problems and give them time to solve them. That was positive feedback.

The other initial challenges were building the client base, while servicing the client through external contract providers; the funding and maintenance of dedicated assets; understand and enable understanding of each other’s working culture – coming to terms with transition from hierarchical to lateral orientation, emergence of confrontational rather than collaborative style of relating with external contract service providers, fighting to win on every detail of contract interpretation, domination as a focus and not cooperation with the external contract service provider, aligning decision-making as a process between the outsourcing company and the external contract service provider.

Outsourcing governance

The three key themes which emerged as a consequence of the outsourcing strategy were the role of the interface manager; the need for clear understanding of policy at all levels of client organization and
outsourced service provider organization; and the need for continuous communication in the form of formal and informal reports. Bharti concluded that the way to make outsourcing work on such a huge scale was by creating very tight, extremely detailed service level agreements (SLAs). These SLAs needed to take into account every possible contingency. A Bharti governance team tracked the service level agreements on a daily basis. The team essentially ensured that all SLAs were met. On the network side, Bharti retained a technical team to focus on five areas: design and planning, network deployment, operations and maintenance, value-added services, and quality assurance. Half of the team were looking into the last two areas.

In case of any slippage on an SLA by any of the partners, there were four levels through which a problem could be escalated, right up to Mittal himself.

**Outsourcing outcomes**

Bharti, the outsourcer, appeared to employ both quantitative and qualitative metrics to measure outsourcing outcomes; measurement processes ranged from surveys to hard metrics on operations parameters; outsourcing dyads (the outsourcer–external contract service provider) needed to have clear expectations of the resources and skills that each party would contribute; the interface manager and his team required encouragement to play a business development role in addition to the monitoring and review role which was essentially a liaison role; measurement could have been both retrospective and aimed at the future.

Core outsourcing made tremendous economic sense for Bharti. Prior to the outsourcing agreements, vendors were pushing to sell more equipment and maintenance to Bharti while Bharti was trying to expand and sustain operations with minimum equipment and cost. This inherent conflict was taken care of by the outsourcing contracts. Bharti paid the external contract service providers for the telecommunication network when the network was used by Bharti’s customers which excluded payment for unused capacity. Similarly, the IT outsourcing agreement provided for a number of quality controls specified in the SLAs (service level agreements) such as customer satisfaction and new application implementation according to which Bharti agreed to share its revenue with the external contract service provider in a manner which reflected the increase and decrease in revenue for Bharti in
An initiative to consolidate, transform and manage comprehensive IT infrastructure and applications

Figure 15.1. Three components of outsourcer–external service provider relationship

...the form of a corresponding reward or penalty for the external contract service provider. The selection of external contract service providers was based on their ability to scale up, support top-line growth, and go to market strategy (see Figure 15.1).

Notes
2 Report on Indian Telecom – Credit Suisse, October 14, 2008.
4 The study was presented at the 2007 ICM-GDW Conference in Bangalore. While the current study uses the same dataset, the focus of the two studies is quite distinct.

References


Introduction

Offshoring has been gaining momentum in the managerial and academic discussion of the activity of multinational enterprises (MNEs) and the organization of the value chain. There are several motivations to consider for the centrality of offshoring in the scientific debate. First, this phenomenon spread fast due to facilitating factors such as the diffusion of information and communication technologies (ICT) and the lowering of trade barriers. Second, the rapid diffusion of offshoring has radically changed the structure of many manufacturing and service industries (Davies, 2004).

In practice, the concept of offshoring is used to indicate various phenomena such as delocalization of firm’s activities to remote and low-cost countries (Pfannenstein and Tsai, 2004; Robinson and Kalakota, 2004), foreign direct investment (FDI), international manufacturing and, more generally, relocation of value chain activities globally. Building on this broad definition, offshoring is simultaneously a cause and a consequence of international labor division and globalization (Jahns et al., 2006).

Vertical disintegration (Jacobides, 2005) is driven by the desire of firms to match the comparative advantage of foreign locations with their own resources and competencies, so as to maximize their competitive advantage (Kogut, 1985; Mudambi and Venzin, 2008). The definition of entire industries and their competitive dynamics are changing radically, even for those firms that do not modify their level of vertical integration in the home country. On one hand, offshoring modifies the industry structure through the emergence of new intermediaries (and
new intermediate markets). On the other, imitation phenomena within the same industry may lead to an increasing homogeneity of business models: most competitors offshore the same value chain activities in the same countries according to the same motivating factors and, in the end, offer a similar product/service portfolio to the same clients. This leads to the “commoditization” of the entire industry. Unlike other facets of industry evolution (e.g., changes in technology), vertical disintegration and offshoring of value-chain activities may occur without changes in the final products, services, and technologies.

Based on observations made by Monczka et al. (2008) and Klingebiel (2005), in this chapter we distinguish between “offshoring to affiliates” and “offshoring to unaffiliated (contract) parties.” Such a distinction is based on the “ownership” of activities being localized in distant countries. “Offshoring to affiliates” refers to activities carried out within the firm’s boundaries but across borders (and the firm still has full control over the processes being localized overseas). “Offshoring to unaffiliated (contract) parties” is related to activities provided by suppliers in foreign markets (in this case, the contract supplier has control over the processes being outsourced). Our chapter is based on this important distinction in order to interpret better the empirical evidence herein illustrated.

Why do firms decide to locate activities outside the home country or to rely on foreign suppliers? The prime focus of traditional studies was on cost-saving opportunities that are particularly important for labor-intensive activities. In such a case, the decision about the activities’ location depends on a worldwide comparison of labor costs, assuming similarities in performed tasks and in quality standards. The wage cost motivation must not neglect the additional managerial costs related to the transfer of knowledge, supervision of foreign operations, and learning of local culture and business ethics.

Over time, the need for operational flexibility, local capabilities exploitation (Bartlett and Ghoshal, 1998; Doz, 1986; Dunning, 1996, 2000), new innovation sources, and access to new markets became equally important driving forces for offshoring. These new location advantages explain why MNEs began offshoring high-value activities like R&D (Cantwell, 1995) as suggested by the case of Whirlpool Corporation. The successful introduction of microwave ovens in Europe combined with the Japanese/Korean expansion strategy convinced the Major Domestic Appliances (MDA) Division to initiate an agreement
with a local company (1984) for the purchase of low-cost microwaves manufactured in Japan. The alliance was aimed at complementing the product portfolio with cheaper products targeted at mass distribution. Then the local partner was substituted by another company (in 1986) and a new product range was developed thanks to joint efforts in R&D. The time was ripe to move to FDI. Operationally, Whirlpool entered into an alliance with a small Chinese producer as a preliminary step before the acquisition of its factory in 2003. Massive production capability for basic products was thus relocated to China for all subsidiaries giving the opportunity to local/regional subsidiaries’ factories to concentrate on higher value and innovative product development and production. One year later, the R&D center for microwaves was located in China where there were valuable technological competencies. The Chinese R&D center served all subsidiaries even if initially only minor adaptation was possible locally. Similar experiments were undertaken in different product lines/categories. The Whirlpool case suggests that the offshoring process had been highly dynamic, allowing a quick adaptation to new challenges, opportunities, and knowledge.

Our chapter is organized in the following way: first, it briefly describes the changes in the global economic scenario for the domestic appliances industry since the mid-1990s. Second, we analyze the determinants of internationalization of production and supply. In the third place, we examine which activities were mainly involved in “delocalization” and how offshoring to unaffiliated (contract) parties resulted in vertical disintegration for the entire industry and the growing inability of former manufacturers to appropriate the results of investments in such high-value activities as research, design, and development. The chapter closes with a summary of key findings, implications for managerial work, and suggestions for future research.

Offshoring of production and small domestic appliance industry transformation

In many studies, competitive pressures and emergence of new fierce players are seen as important sets of triggers (Porter, 1980, 1985). In our study, both sets of triggers are seen. In the late 1990s, cost-based competition and the increasing bargaining power and strict requests of retailers led to offshoring decisions by some pioneering manufacturing
Table 16.1 Export of electromechanical domestic appliances with self-contained electric motor (code 7757-sitc 3): top 15 countries in 2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Trade value 2007</th>
<th>%</th>
<th>Trade value 2006</th>
<th>%</th>
<th>Trade value 2005</th>
<th>%</th>
<th>Trade value 2004</th>
<th>%</th>
<th>Trade value 2003</th>
<th>%</th>
<th>Trade value 2002</th>
<th>%</th>
<th>CAGR 02–07</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>4,228,457,433</td>
<td>35%</td>
<td>3,536,501,813</td>
<td>31%</td>
<td>2,836,983,303</td>
<td>30%</td>
<td>2,394,490,828</td>
<td>24%</td>
<td>1,840,573,468</td>
<td>22%</td>
<td>1,339,465,300</td>
<td>19%</td>
<td>25.85%</td>
</tr>
<tr>
<td>Germany</td>
<td>1,484,818,000</td>
<td>12%</td>
<td>1,529,968,000</td>
<td>13%</td>
<td>1,421,056,000</td>
<td>15%</td>
<td>1,374,021,000</td>
<td>14%</td>
<td>925,816,000</td>
<td>11%</td>
<td>1,030,453,000</td>
<td>14%</td>
<td>7.58%</td>
</tr>
<tr>
<td>China, Hong Kong SAR</td>
<td>674,897,138</td>
<td>6%</td>
<td>693,621,708</td>
<td>6%</td>
<td>769,131,548</td>
<td>8%</td>
<td>711,525,400</td>
<td>7%</td>
<td>970,685,329</td>
<td>12%</td>
<td>998,294,957</td>
<td>14%</td>
<td>−7.53%</td>
</tr>
<tr>
<td>USA</td>
<td>574,320,141</td>
<td>5%</td>
<td>879,161,894</td>
<td>8%</td>
<td>959,753,005</td>
<td>10%</td>
<td>746,508,694</td>
<td>8%</td>
<td>675,592,946</td>
<td>8%</td>
<td>688,477,883</td>
<td>10%</td>
<td>−3.56%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>553,774,838</td>
<td>5%</td>
<td>400,327,956</td>
<td>4%</td>
<td>331,654,962</td>
<td>4%</td>
<td>326,158,190</td>
<td>3%</td>
<td>158,781,973</td>
<td>2%</td>
<td>90,648,115</td>
<td>1%</td>
<td>43.61%</td>
</tr>
<tr>
<td>Mexico</td>
<td>538,520,919</td>
<td>5%</td>
<td>552,885,318</td>
<td>5%</td>
<td>528,100,771</td>
<td>6%</td>
<td>522,803,770</td>
<td>5%</td>
<td>501,821,072</td>
<td>6%</td>
<td>426,579,158</td>
<td>6%</td>
<td>4.77%</td>
</tr>
<tr>
<td>Rep. of Korea</td>
<td>476,896,550</td>
<td>4%</td>
<td>454,598,790</td>
<td>4%</td>
<td>573,935,894</td>
<td>6%</td>
<td>564,907,031</td>
<td>6%</td>
<td>425,562,688</td>
<td>5%</td>
<td>319,495,836</td>
<td>4%</td>
<td>8.34%</td>
</tr>
<tr>
<td>France</td>
<td>476,409,654</td>
<td>4%</td>
<td>439,154,526</td>
<td>4%</td>
<td>430,122,107</td>
<td>5%</td>
<td>437,467,039</td>
<td>4%</td>
<td>414,713,197</td>
<td>5%</td>
<td>382,934,061</td>
<td>5%</td>
<td>4.47%</td>
</tr>
<tr>
<td>Italy</td>
<td>419,716,186</td>
<td>4%</td>
<td>403,312,337</td>
<td>4%</td>
<td>381,547,057</td>
<td>4%</td>
<td>385,714,560</td>
<td>4%</td>
<td>354,244,681</td>
<td>4%</td>
<td>309,852,646</td>
<td>4%</td>
<td>6.26%</td>
</tr>
<tr>
<td>Hungary</td>
<td>411,010,000</td>
<td>3%</td>
<td>286,020,000</td>
<td>3%</td>
<td>264,117,000</td>
<td>3%</td>
<td>176,560,000</td>
<td>3%</td>
<td>125,473,000</td>
<td>2%</td>
<td>100,283,000</td>
<td>1%</td>
<td>32.59%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>214,974,956</td>
<td>2%</td>
<td>235,450,302</td>
<td>2%</td>
<td>212,006,662</td>
<td>2%</td>
<td>202,805,905</td>
<td>2%</td>
<td>187,951,963</td>
<td>2%</td>
<td>157,603,262</td>
<td>2%</td>
<td>6.41%</td>
</tr>
<tr>
<td>Poland</td>
<td>214,881,513</td>
<td>2%</td>
<td>125,911,588</td>
<td>1%</td>
<td>113,196,457</td>
<td>1%</td>
<td>85,114,803</td>
<td>1%</td>
<td>66,259,000</td>
<td>1%</td>
<td>58,641,000</td>
<td>1%</td>
<td>29.66%</td>
</tr>
<tr>
<td>Belgium</td>
<td>195,403,455</td>
<td>2%</td>
<td>178,734,697</td>
<td>2%</td>
<td>170,205,279</td>
<td>2%</td>
<td>164,858,841</td>
<td>2%</td>
<td>140,002,909</td>
<td>2%</td>
<td>112,461,343</td>
<td>2%</td>
<td>11.68%</td>
</tr>
<tr>
<td>Spain</td>
<td>146,997,510</td>
<td>1%</td>
<td>195,301,753</td>
<td>2%</td>
<td>241,986,826</td>
<td>3%</td>
<td>229,430,275</td>
<td>2%</td>
<td>236,475,882</td>
<td>3%</td>
<td>195,192,048</td>
<td>3%</td>
<td>−5.51%</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>144,575,535</td>
<td>1%</td>
<td>113,866,940</td>
<td>1%</td>
<td>91,909,516</td>
<td>1%</td>
<td>70,932,312</td>
<td>1%</td>
<td>39,963,780</td>
<td>0%</td>
<td>33,964,051</td>
<td>0%</td>
<td>33.60%</td>
</tr>
</tbody>
</table>

TOTAL                  | 11,951,347,230   | 100%| 11,361,598,909   | 100%| 9,435,054,474    | 100%| 9,856,857,537    | 100%| 8,300,310,100    | 100%| 7,211,978,364    | 100%| 10.63%     

companies. Widespread changes in production models were accompanied by a fundamental revision of logistics, purchasing practices, and investment structure. In some industries, product innovation, a distinguishing feature of many market players, gradually became less important than flexibility, variety of offered product categories, cost, and price level.

The domestic appliances and consumer electronics industries in the Far East were also undergoing relevant changes, presenting more specific triggers for Italian firms. The development of industrial networks and the start-up of many manufacturing companies at different stages of the value chain resulted in the availability of enormous production capacity and an array of product typologies and components. Daily relationships with Western clients increased the level of sophistication of production and stimulated the accumulation of new competencies in technology and product development. Worldwide, the Far East offered the cheapest local manufacturing costs relative to international competitors. As a result, there was unprecedented growth in the Far East’s overall industrial production and export rate since the late 1990s. Table 16.1 shows export trade value in the period 2002–07 for small domestic appliances (“Electromechanical domestic appliances with self-contained electric motor,” Code 7757-SITC REV.3, United Nations Commodity Trade Statistics Database). Today, China and Hong Kong represent 41 percent of global export while all other countries have an irrelevant market share. In the same table, important double-digit growth rates (cumulative average growth rate – CAGR) emerge for China, Malaysia, Hungary, Poland, and Czech Republic. The dominance of Low Cost Countries (LCCs) as main exporters is a confirmation of cost pressures that feature today’s industry scenario. The main client for China is the USA with a 33 percent share of the total export trade value (see Table 16.2).

Facing adverse changes in the domestic markets, Italian firms made significant restructuring efforts. Sourcing from LCCs to reduce dependence on Italian production and suppliers was at the heart of firms’ strategy. Some Italian firms also made attempts to strengthen their downstream strategies and to enter international markets to compensate declining domestic sales and to react to the worsening of the competitive scenario.

Following the example of their European peers and Italian importers, Italian manufacturers of small domestic appliances started exploring
Table 16.2  *Chinese export of electromechanical domestic appliances with self-contained electric motor (code 7757-sitc 3): first 3 partners*

<table>
<thead>
<tr>
<th>Country</th>
<th>Trade value 2007</th>
<th>%</th>
<th>Trade value 2006</th>
<th>%</th>
<th>Trade value 2005</th>
<th>%</th>
<th>Trade value 2004</th>
<th>%</th>
<th>Trade value 2003</th>
<th>%</th>
<th>Trade value 2002</th>
<th>%</th>
<th>CAGR 02–07</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1,399,128,223</td>
<td>33%</td>
<td>1,161,637,700</td>
<td>33%</td>
<td>937,879,448</td>
<td>33%</td>
<td>763,688,189</td>
<td>32%</td>
<td>643,663,131</td>
<td>35%</td>
<td>493,331,576</td>
<td>37%</td>
<td>23.18%</td>
</tr>
<tr>
<td>Germany</td>
<td>343,317,892</td>
<td>8%</td>
<td>265,425,734</td>
<td>8%</td>
<td>270,092,043</td>
<td>10%</td>
<td>244,610,045</td>
<td>10%</td>
<td>162,430,546</td>
<td>9%</td>
<td>107,141,844</td>
<td>8%</td>
<td>26.23%</td>
</tr>
<tr>
<td>Japan</td>
<td>284,047,333</td>
<td>7%</td>
<td>276,112,345</td>
<td>8%</td>
<td>215,380,628</td>
<td>8%</td>
<td>202,540,945</td>
<td>8%</td>
<td>172,098,943</td>
<td>9%</td>
<td>104,550,002</td>
<td>8%</td>
<td>22.13%</td>
</tr>
<tr>
<td><strong>Total export</strong></td>
<td>4,228,457,433</td>
<td>100%</td>
<td>3,536,501,813</td>
<td>100%</td>
<td>2,836,983,303</td>
<td>100%</td>
<td>2,394,490,828</td>
<td>100%</td>
<td>1,840,573,468</td>
<td>100%</td>
<td>1,339,465,300</td>
<td>100%</td>
<td>25.85%</td>
</tr>
</tbody>
</table>

sourcing opportunities in such LCCs as China and Hong Kong. First, firms started experimenting with sourcing in LCCs by visiting the large trade fairs in Hong Kong and Canton once or twice a year. Italian operators had been returning to Italy with thousands of catalogues, price lists, and business cards as a basis for selection of potential sourcing partners. Later, sourcing from China became an obligatory choice for those products that were no longer produced in Europe or for products with a high labor content or whose technology was developed and exploited in China.

As a result, in 2007 Italy became the ninth largest importing country for domestic appliances (see Table 16.3) and China was the leading supplier with a share of 48 percent of the total import trade value (see Table 16.4), followed by Germany (26 percent) and France (10 percent). After a ten-year period of exploration, the nature of relationships between Italian companies and Chinese suppliers changed from a pure quantity–price negotiation to strong cooperation also in product design and development. Italian players had been making attempts to increase their level of control by frequent factory visits, introduction of different types of quality control (in-line, pre-shipment, on arrival), and creation of local branches. Given the average size of the firms, offshoring to unaffiliated (contract) parties was seen as the only viable option. Offshoring was gradually adopted not only for production activities but also for logistics, quality control, and product design and development. However, even though the majority of companies chose offshoring to unaffiliated companies, some specific overseas activities as suppliers’ selection and negotiation, in-line quality control, and logistics management are usually performed by firms’ local overseas branches which employ both local personnel and Italians.

Why did offshoring to unaffiliated (contract) parties become so popular for production activities? Interviews with industry opinion leaders (association of Italian producers of small domestic appliances) confirmed that often small and medium enterprises (SMEs) did not possess sufficient financial resources or were not eager to invest in remote locations that were perceived as particularly risky. FDI entry modes (starting from a preliminary joint venture with one or several local players) were mainly chosen by a few larger firms. Many firms still choose to produce in Italy some product categories with low labor content and low volumes that do not justify high transportation costs
<table>
<thead>
<tr>
<th>Country</th>
<th>Trade value 2007</th>
<th>%</th>
<th>Trade value 2006</th>
<th>%</th>
<th>Trade value 2005</th>
<th>%</th>
<th>Trade value 2004</th>
<th>%</th>
<th>Trade value 2003</th>
<th>%</th>
<th>Trade value 2002</th>
<th>%</th>
<th>CAGR 02–07</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>3,225,374,913</td>
<td>26%</td>
<td>3,186,004,787</td>
<td>27%</td>
<td>3,131,423,393</td>
<td>28%</td>
<td>2,868,816,666</td>
<td>28%</td>
<td>2,480,036,558</td>
<td>27%</td>
<td>1,993,772,446</td>
<td>26%</td>
<td>10.10%</td>
</tr>
<tr>
<td>Germany</td>
<td>925,388,000</td>
<td>7%</td>
<td>902,366,000</td>
<td>8%</td>
<td>969,793,000</td>
<td>9%</td>
<td>917,948,000</td>
<td>9%</td>
<td>741,093,000</td>
<td>8%</td>
<td>648,874,000</td>
<td>8%</td>
<td>7.36%</td>
</tr>
<tr>
<td>Japan</td>
<td>715,506,230</td>
<td>6%</td>
<td>692,742,703</td>
<td>6%</td>
<td>572,750,778</td>
<td>5%</td>
<td>499,354,175</td>
<td>5%</td>
<td>461,656,492</td>
<td>5%</td>
<td>380,910,114</td>
<td>5%</td>
<td>13.44%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>673,622,103</td>
<td>5%</td>
<td>690,060,177</td>
<td>6%</td>
<td>626,359,535</td>
<td>6%</td>
<td>672,534,826</td>
<td>6%</td>
<td>545,872,027</td>
<td>6%</td>
<td>448,934,448</td>
<td>6%</td>
<td>8.45%</td>
</tr>
<tr>
<td>France</td>
<td>620,904,327</td>
<td>5%</td>
<td>547,895,940</td>
<td>5%</td>
<td>516,767,171</td>
<td>5%</td>
<td>491,807,593</td>
<td>5%</td>
<td>416,907,696</td>
<td>5%</td>
<td>329,188,952</td>
<td>4%</td>
<td>13.53%</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>505,512,307</td>
<td>4%</td>
<td>343,898,953</td>
<td>3%</td>
<td>272,426,863</td>
<td>2%</td>
<td>200,437,332</td>
<td>2%</td>
<td>130,868,569</td>
<td>1%</td>
<td>94,566,079</td>
<td>1%</td>
<td>39.83%</td>
</tr>
<tr>
<td>China, Hong Kong</td>
<td>461,201,512</td>
<td>4%</td>
<td>525,789,255</td>
<td>4%</td>
<td>550,837,156</td>
<td>5%</td>
<td>543,127,106</td>
<td>5%</td>
<td>740,099,312</td>
<td>8%</td>
<td>793,758,393</td>
<td>10%</td>
<td>−10.29%</td>
</tr>
<tr>
<td>Canada</td>
<td>456,596,696</td>
<td>4%</td>
<td>400,472,805</td>
<td>3%</td>
<td>360,501,472</td>
<td>3%</td>
<td>315,928,647</td>
<td>3%</td>
<td>302,074,295</td>
<td>3%</td>
<td>282,415,809</td>
<td>4%</td>
<td>10.09%</td>
</tr>
<tr>
<td>Italy</td>
<td>413,410,139</td>
<td>3%</td>
<td>428,942,897</td>
<td>4%</td>
<td>407,673,273</td>
<td>4%</td>
<td>396,672,677</td>
<td>4%</td>
<td>354,965,914</td>
<td>4%</td>
<td>262,384,265</td>
<td>3%</td>
<td>9.52%</td>
</tr>
<tr>
<td>Spain</td>
<td>300,035,468</td>
<td>2%</td>
<td>299,314,436</td>
<td>3%</td>
<td>322,862,773</td>
<td>3%</td>
<td>271,620,597</td>
<td>3%</td>
<td>219,244,148</td>
<td>2%</td>
<td>212,640,656</td>
<td>3%</td>
<td>7.13%</td>
</tr>
<tr>
<td>Belgium</td>
<td>283,780,238</td>
<td>2%</td>
<td>284,305,187</td>
<td>2%</td>
<td>242,135,572</td>
<td>2%</td>
<td>232,120,980</td>
<td>2%</td>
<td>202,246,731</td>
<td>2%</td>
<td>163,516,966</td>
<td>2%</td>
<td>11.66%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>257,021,359</td>
<td>2%</td>
<td>251,065,985</td>
<td>2%</td>
<td>248,052,190</td>
<td>2%</td>
<td>225,933,895</td>
<td>2%</td>
<td>225,393,982</td>
<td>2%</td>
<td>193,008,720</td>
<td>3%</td>
<td>5.90%</td>
</tr>
<tr>
<td>Australia</td>
<td>231,030,657</td>
<td>2%</td>
<td>214,346,476</td>
<td>2%</td>
<td>181,753,178</td>
<td>2%</td>
<td>170,530,130</td>
<td>2%</td>
<td>152,522,800</td>
<td>2%</td>
<td>126,606,352</td>
<td>2%</td>
<td>12.78%</td>
</tr>
<tr>
<td>Poland</td>
<td>221,656,445</td>
<td>2%</td>
<td>145,617,865</td>
<td>1%</td>
<td>116,638,358</td>
<td>1%</td>
<td>74,620,845</td>
<td>1%</td>
<td>61,488,000</td>
<td>1%</td>
<td>59,967,000</td>
<td>1%</td>
<td>29.88%</td>
</tr>
<tr>
<td>Sweden</td>
<td>215,489,820</td>
<td>2%</td>
<td>173,541,656</td>
<td>1%</td>
<td>154,424,428</td>
<td>1%</td>
<td>128,706,268</td>
<td>1%</td>
<td>104,429,503</td>
<td>1%</td>
<td>80,576,072</td>
<td>1%</td>
<td>21.74%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12,444,318,228</td>
<td>100%</td>
<td>11,822,582,564</td>
<td>100%</td>
<td>11,309,139,309</td>
<td>100%</td>
<td>10,360,057,803</td>
<td>100%</td>
<td>9,089,431,159</td>
<td>100%</td>
<td>7,666,606,737</td>
<td>100%</td>
<td>10.17%</td>
</tr>
</tbody>
</table>

Table 16.4 *Italian import of electromechanical domestic appliances with self-contained electric motor (code 7757-sitc 3): first 3 partners*

<table>
<thead>
<tr>
<th>Country</th>
<th>Trade value</th>
<th>07</th>
<th>%</th>
<th>06</th>
<th>%</th>
<th>05</th>
<th>%</th>
<th>04</th>
<th>%</th>
<th>03</th>
<th>%</th>
<th>02</th>
<th>%</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>200,091,814</td>
<td>48%</td>
<td>159,650,022</td>
<td>39%</td>
<td>128,898,459</td>
<td>32%</td>
<td>88,048,736</td>
<td>25%</td>
<td>54,759,641</td>
<td>21%</td>
<td>29.58%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>106,940,835</td>
<td>26%</td>
<td>128,314,684</td>
<td>31%</td>
<td>136,391,900</td>
<td>34%</td>
<td>117,459,241</td>
<td>33%</td>
<td>97,188,372</td>
<td>37%</td>
<td>1.93%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>41,596,943</td>
<td>10%</td>
<td>52,180,200</td>
<td>13%</td>
<td>56,568,418</td>
<td>14%</td>
<td>61,706,216</td>
<td>17%</td>
<td>47,669,426</td>
<td>18%</td>
<td>−2.69%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total import</strong></td>
<td>413,410,139</td>
<td>100%</td>
<td>407,673,273</td>
<td>100%</td>
<td>396,672,677</td>
<td>100%</td>
<td>354,965,914</td>
<td>100%</td>
<td>262,384,265</td>
<td>100%</td>
<td>9.52%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

and long shipping times (around 75–90 days of transportation from China to Italy), unacceptable for modern distribution.

More recently, some benefits related to offshoring in China have weakened. Some factors have contributed to a 30 percent increase in purchasing costs: higher logistics and labor costs, change in workforce regulation, lower support of Chinese government to Western firms investing in China and to Chinese exporters, appreciation of HK dollar. As a consequence, some companies are evaluating: (1) in-sourcing of products with low labor content, large size products (that impact on transportation costs), and seasonal products (to be on time is a condition sine qua non); (2) moving to other countries like Turkey, Vietnam, or Albania. However, in these new areas the production activity is not so structured and organized as in China and the product variety is narrower.

Research questions

Concluding the description provided in the previous paragraphs, the following research questions (RQs) guided our investigation and the findings illustrated in this chapter: (1) Which driving factors, on the external and firm’s levels, could explain the diffusion of offshoring to affiliates and to unaffiliated (contract) parties? (2) What kind of activities were delocalized over time by manufacturers? (3) How did the industry structure evolution impact the firms’ high-value activities that were still performed in the home country?

In order to answer the above RQs, the remaining part of the chapter is structured as follows: as regards the first RQ, the next section discusses the drivers of decisions related to offshoring to affiliates and offshoring to unaffiliated (contract) parties. This will be followed by an exploration of the other two RQs.

Research design

Our statistical analysis showed that Italy was amongst the main importers of household appliances and that China is a leading exporter. So far, we have provided neither any interpretation of this phenomenon nor any analysis of the impact it had on the structure of the industry in Italy. To fill in details that cannot be addressed using only
Imitative offshoring strategies

quantitative data, our methodology is based on case studies (Eisenhardt, 1989, 1991; Gibbert et al., 2008).

This study uses in-depth case studies from five Italian producers as the main data source to answer the above research questions. Our survey has been conducted between March 2008 and January 2009, with archival data being used to integrate information provided during interviews. The informants for this study’s survey items are CEOs, Managing Directors, and purchasing managers.

Using mainly the definitions we mentioned earlier and referencing previous literature on the subject, we developed both a checklist for the qualitative interview and a survey questionnaire.

We organized a round table with three manufacturing companies, an importer, and a buyer from a large retailing chain to understand the competitive scenario (structure and dynamics) and the main related challenges. To gather preliminary information on the industry trends we were allowed to participate in an official meeting with the scientific committee of the national association of domestic appliance manufacturers (CECED Italia) with around 100 members (see Table 16.5) and asked their opinion and suggestions regarding clearness and appropriateness of the questions in the checklist and items in the questionnaire. We then revised the research document for data collection following the companies’ feedback. The questionnaire was sent to all members of CECED Italia with a 25 percent response rate. Recording data for three years (1997, 2002, 2007), the questionnaire included the following sections: product portfolio, offshoring, international production, organizational structure to manage and supervise international activities, motivations for offshoring, results achieved with offshoring. The quantitative answers to the questionnaire provided a basis for the selection of case studies.

Amongst the manufacturers associated with CECED Italia, we selected five companies according to three selection criteria. In the first place, we focused on Italian manufacturing companies (the association includes also commercial subsidiaries of MNEs like Samsung and Bosch-Siemens). Second, we selected manufacturers that decided years ago to relocate some activities in remote locations (excluding delocalization and outsourcing in Europe) or that had been producing overseas since the start-up in 2006 (Company E). Lastly, we were obliged to consider companies that showed willingness to cooperate
Table 16.5 List of CECEI Italia members

| 1 | ADLER S.p.A.       | 34 | ELFRAMO S.p.A.       |
| 2 | AN CAMINI S.r.l.   | 35 | ELICA S.p.A.         |
| 3 | ANGELO PO GRANDI CUCINE S.p.A. | 36 | EUROTEC S.r.l.      |
| 4 | ANTONIO MERLONI SPA | 37 | EVEREL GROUP        |
| 5 | ARDES S.p.A.       | 38 | EXPO INOX S.p.A.    |
| 6 | ARGOCLIMA S.p.A.   | 39 | FABER S.p.A.        |
| 7 | ARIETE S.p.A.      | 40 | FERROLI S.p.A.      |
| 8 | ARO TUBI TRAFILERIE S.p.A. | 41 | FOINOX S.r.l.       |
| 10 | BEMATEC S.r.l.     | 43 | FRANKE S.p.A.       |
| 11 | BERTAZZONI S.p.A.  | 44 | FRIMONT S.p.A.      |
| 12 | BERTO'S S.p.A.     | 45 | G.B.D. S.p.A.       |
| 13 | BEST S.p.A.        | 46 | GIRM S.p.A.         |
| 14 | BEZA S.r.l.        | 47 | GLEM GAS S.p.A.     |
| 15 | BRANDT ITALIA S.p.A. | 48 | GORENJE KORTING ITALIA S.r.l. |
| 16 | BSD Srl            | 49 | GROUPE SEB ITALIA S.p.A. |
| 17 | BSH ELETTRODOMESTICI S.p.A. | 50 | GRUPPO ALI |
| 18 | C.L.A.M. soc. coop. a.r.l. | 51 | GRUPPO PIAZZETTA S.p.A. |
| 19 | CAMINETTI MONTEGRAPPA S.r.l. | 52 | HITACHI EUROPE SRL |
| 20 | CAMINI WIERER S.p.A. | 53 | IMMERMAS S.p.A.     |
| 21 | CANDY HOOVER GROUP | 54 | INDESIT COMPANY S.p.A. |
| 22 | CARRIER S.p.A.     | 55 | IRCA S.p.A.         |
| 23 | CASTEL MAC S.p.A.  | 56 | ITW FASTEX          |
| 24 | COLA S.r.l. – Gruppo Ferroli | 57 | ITW ISPRA CONTROLS ELETTRONICA |
| 25 | COPRECI ITALIA S.r.l. | 58 | ITW ISPRA CONTROLS |
| 26 | DAIKIN AIR CONDITIONING ITALY SpA | 59 | LG ELECTRONICS ITALIA S.p.A. |
| 27 | DE LONGHI APPLIANCES S.r.l. | 60 | LIFE TOOL TECHNOLOGIES S.p.A. |
| 28 | DESMON S.r.l.      | 61 | LOFRA S.p.A.        |
| 30 | ECR ITALY S.p.A.   | 63 | MERلونI             |
| 31 | ELECTROLUX ITALIA S.p.A. | 64 | MIELE ITALIA S.r.l. |
| 32 | ELECTROLUX PROFESSIONAL S.p.A. | 65 | MITSUBISHI ELECTRIC EUROPE B.V. |
and to provide data for our research without any constraints. Using the above criteria, we settled on five manufacturing companies and analyzed their experience in offshoring to affiliates or to unaffiliated parties. All five cases are somewhat different in terms of year of foundation, product portfolio, company size, ownership structure, typology of clients, and organization of the vertical channel. The small sample therefore reflects the selection of multiple cases “suitable for illuminating and extending relationships and logic among constructs . . . chosen for the likelihood that they will offer theoretical insight” (Eisenhardt and Graebner, 2007: 27; Eisenhardt, 1991).

Company A was founded in 1964 in Tuscany. In 1995, it was acquired by a famous UK group and, then, in 2001 by an Italian competitor (also a member of CECED Italia). Export represents 60 percent

<table>
<thead>
<tr>
<th>No.</th>
<th>Company Name</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>MO.EL. S.r.l.</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>MUSTER e DIKSON SERVICE SpA</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>NARDI Elettrodomestici S.p.A.</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>NILMA S.p.A.</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>O.L.S. S.r.l.</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>OFFICINE E SMALLTERIE VICTENTE S.p.A.</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>OLIMPIA SPLENDID S.p.A.</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>PALAZZETTI LELIO S.p.A.</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>PANASONIC ITALIA S.p.A.</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>PHILIPS S.p.A.</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>POLIEDRA S.r.l.</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>POLITI S.p.A.</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>PROCTER &amp; GAMBLE S.r.l.</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>RIELLO S.p.A.</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>ROBERT BOSCH S.p.A.</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>ROCCHEGGIANI S.P.A.</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>SABAF S.p.A.</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>SABIANA S.p.A.</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>SAECO International Group S.p.A.</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>SAMSUNG Electronics Italia S.p.A.</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>SCHIEDEL S.r.l.</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>SENSATA TECHNOLOGIES ITALIA S.r.l.</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>SKF</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>SMEG S.p.A.</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>SP.EL S.r.l. Spezia</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>TECNOWIND S.p.A.</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>TENACTA GROUP S.p.A.</td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>TERIM S.p.A.</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>TERMOZETA S.p.A.</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>VAILLANT SUNIER DUVAL ITALIA S.p.A.</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>VORTEX</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** CECED Italy.
of total turnover. “A” is market leader in the segment of electronic cheese graters.

Company B was founded in 1957 in Lombardy for the fabrication of electrical engines and assembling of household appliances. In the following years, it introduced new product lines, still in the catalogue: heating systems, professional hairdryers, domestic appliances, vacuum cleaners, air purifiers. In 2000, “B” decided to acquire semi-finished products and components from around sixty Chinese manufacturers in order to be more competitive and flexible in Italy. There are around twenty-four clients and they participate actively in product development. Unlike the other case studies, “B” does not sell directly to retailers but to companies (e.g., manufacturers) that commercialize its products under their own brands.

Company C is a large group created in 1999 whose core business is domestic appliances sold in Italy with a well-known brand born in 1974 in Lombardy. This brand became famous with an innovative electric bed-warmer (leader in Europe in such a product category). “C” is Italian market leader in the segment of hairdryers. The group exports to UK, Germany, and the US.

Company D was founded in the mid-1950s in Lombardy and in 1992 was acquired by another Italian group operating in eighty countries. It exports around 16 percent of total sales in thirty countries (mainly in the EU). In 1997, “D” had an important cooperation with an MNE specialized in childcare based on a product (a baby’s bottle warmer) that represented, for that year, around 20 percent of total turnover. “D” does offshore outsourcing mainly for personal care products and mini-fridges. Furthermore, components are bought for products assembled in Italy.

Company E was acquired in 2006 by a group established in the same year by a joint venture between an engineering company (belonging to a leading Italian group in major appliances with a turnover of around €4,000 million), leader in the transfer of technologies, and an Italian company with a world-class know-how and a leading brand in personal care products. The engineering company, with a turnover of around €60 million, has to date realized more than 100 production sites in twenty-five countries in the world. In particular, forty-two plants were realized in China, six of which were joint ventures with local partners. Following the acquisition, “E” was able to make use of the factory in the Far East built by the owning group in 2007. This
factory will be able to satisfy 100 percent production needs within the next two years. In the past, “E” relied on Chinese suppliers, but supervised the quality standards directly.

The composition of the product offering of the five companies is showed in Table 16.6. This table is organized by main product categories: small domestic appliances for the kitchen (e.g., mixers, blenders); house cleaning (e.g., vacuum cleaners, irons); personal care (e.g., hairdryers, razors); conditioning and heating systems, and other product items such as air purifiers, electromedical devices, mini-fridges, etc. For each category, we indicate the percentage of total turnover, specifying the area of production (Italy vs. foreign countries).

Table 16.7 presents a brief profile of the companies’ structure and vertical channel organization. Lastly, Table 16.8 illustrates the economic profile of the analyzed companies. As regards Company “E”, Table 16.8 reports the data for the controlling group. Before the acquisition, “E” achieved a turnover of 6,489,005 euro with ROA of 4.88 percent and ROE of 1.6 percent.

Of the five Italian firms in the sample, one (Company E) has combined offshoring to unaffiliated (contract) parties with offshoring to affiliates. The remaining four companies chose to offshore activities to unaffiliated parties.

During the interviews, we asked respondents to refer to the past ten years (if companies already had operations in 1998) as the time frame within which to answer questions regarding the evolution of the domestic appliances industry and the driving forces leading such a transformation of the competitive environment; the organization of the value-chain activities and the level of vertical integration; motivations of offshoring; “pros” and “cons” of offshoring; the dynamics in location decisions; the results achieved thanks to offshoring.

Why do firms localize value-chain activities internationally?

A theoretical explanation for offshoring is depicted in the following paragraph, followed by a brief discussion of the empirical evidence.

The traditional international business (IB) theory provides several motivations for international growth both on export markets and supplying markets. Firms choose to offshore their activities for similar reasons that they choose to internationalize. Any examination of the
Table 16.6 Product range by area of production (Italy vs. foreign countries): analysis of five cases from Italian small domestic appliances industry (% of total revenues, 1997–2002–2007)

<table>
<thead>
<tr>
<th></th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
<th>Company E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCT RANGE:</strong></td>
<td>Produced in Italy</td>
<td>Produced abroad</td>
<td>Total</td>
<td>Produced in Italy</td>
<td>Produced abroad</td>
</tr>
<tr>
<td>House cleaning appliances</td>
<td>35.0% 3.0% 38.0%</td>
<td>– – –</td>
<td>– – –</td>
<td>20.7% 2.3% 23%</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>38.5% 3.1% 41.6%</td>
<td>– – –</td>
<td>– – –</td>
<td>23.1% 9.9% 33%</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>1.8% 36.0% 37.8%</td>
<td>– 8.30% 8.3%</td>
<td>21.7% 9.3% 31%</td>
<td>– – –</td>
<td>– – –</td>
</tr>
<tr>
<td>Personal care appliances</td>
<td>– 1.0% 1.0%</td>
<td>– – –</td>
<td>– – –</td>
<td>27.0% – 27.0%</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>– 0.6% 0.6%</td>
<td>– – –</td>
<td>– – –</td>
<td>17.3% 1.9% 19.2%</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>0.4% – 0.4%</td>
<td>– 22.7% 22.7%</td>
<td>29.6% 7.4% 37.0%</td>
<td>– – –</td>
<td>– – –</td>
</tr>
<tr>
<td>Air conditioning/heating appliances</td>
<td>0.2% – 0.2%</td>
<td>– – –</td>
<td>– – –</td>
<td>21.7% 9.3% 31%</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>– – – –</td>
<td>– 16.9% 13.95%</td>
<td>31% – –</td>
<td>– – –</td>
<td>– – –</td>
</tr>
<tr>
<td></td>
<td>– – – –</td>
<td>– 43.9% 43.9%</td>
<td>10.0% 10% 20%</td>
<td>– – –</td>
<td>– – –</td>
</tr>
<tr>
<td>Other domestic appliances</td>
<td>46.5% 6.0% 52.5%</td>
<td>– –</td>
<td>– –</td>
<td>19% – 19%</td>
<td>55.0% –</td>
</tr>
<tr>
<td></td>
<td>19.4% 33.1% 52.5%</td>
<td>– –</td>
<td>– –</td>
<td>17% – 17%</td>
<td>35.5% –</td>
</tr>
<tr>
<td></td>
<td>2.9% 46.5% 49.4%</td>
<td>– 3.8% 3.8%</td>
<td>12% –</td>
<td>12% 19.5% 1.5%</td>
<td>21.0% –</td>
</tr>
<tr>
<td>Other products</td>
<td>– – 8.3% –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>45.0% –</td>
</tr>
<tr>
<td></td>
<td>– – 5.3% –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>51.5% –</td>
</tr>
<tr>
<td></td>
<td>– – 12.4% –</td>
<td>21.2% 21.2%</td>
<td>– –</td>
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<td>80</td>
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<td>3,042,184</td>
<td>–</td>
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<tr>
<td>ROA (%)</td>
<td>4.03</td>
<td>2.35</td>
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<tr>
<td>ROE (%)</td>
<td>−15.1</td>
<td>−5.89</td>
<td>–</td>
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<tr>
<td>Debt/equity ratio</td>
<td>6.23</td>
<td>4.26</td>
<td>–</td>
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<tr>
<td>Employees</td>
<td>24</td>
<td>29</td>
<td>–</td>
<td>–</td>
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</tbody>
</table>

Source: AIDA database.
drivers of offshoring is incomplete without starting from such a general framework.

There is an extensive body of literature dealing with the determinants of internationalization. Among these determinants, we report the following: to diversify risk, to tap the world market for goods and services, to respond to increased foreign competition, to reduce costs, to overcome protective devices (e.g., tariff barriers), and to take advantage of technological expertise (Rugman and Collinson, 2006). Also, internal market saturation could boost internationalization. As we see, some of the drivers go beyond the characteristics of the firm and the industry in which a company operates: differences in factor markets, tax and legal system, and financial market. This set of motivations could be enriched with strategic objectives consistent with the firm’s growth strategy. It implies that firms expand abroad to increase their size (as measured as value of turnover and number of employees) and to improve their capabilities. Through the internationalization process, firms try to successfully combine firm-specific advantages (as defined as unique capabilities built on product, process technology, marketing, etc.) with country-specific advantages (based on natural resource endowment, labor force, or cultural factors; Ohlin, 1933).

As far as international production is concerned, Dunning (1981, 1988, 1998) suggests that possibilities to obtain ownership, location, and internalization (i.e., “OLI triad”) advantages determine FDI and MNE choices. The extent to which the factors endowment is rich, transportation, production, and communication costs are low, and the degree of industrialization is high, will make a location attractive for foreign firms. The changing nature and importance of external economies has been set out in Krugman (1991) and Dunning (1998). Similarly, ownership-specific parameters (i.e., firm-specific) such as age, size, and strategy may stimulate companies to go abroad and to make internationalization more viable. Over the second half of the nineties, authors’ approach to this subject has undergone considerable change. One group of scholars (typified particularly by Vernon, 1966) focused on the location variables; while a second strand concentrated on the ways in which foreign firms exploit their set of resources and competencies globally (Caves, 1982, 1996). Earlier in this chapter, we suggested that changes in the delocalization pattern (“what and where”) of small domestic appliances firms have been similar to those of most firms, which could mean that the firm-specific variables
are less relevant in explaining the changes that have occurred in the industry.

Once a firm decides to match its competitive advantage with the comparative or competitive advantage of a foreign location, it has to face the *internalization* dilemma: offshoring to affiliates or offshoring to unaffiliated (contract) parties? Any theory of internationalization must then take account of how direct production may result in a different value-added and cost profile than that which would arise if production were carried out by local firms. Essentially, the firm will decide for direct operation or to rely on foreign suppliers according to a transaction cost analysis: in the case of market failure, FDI is more convenient. In particular, the firm is not incentivized to directly invest in a foreign market if the ownership-specific advantages are not sufficient to compensate for additional (compared to incumbent firms) costs and the effort of setting up and operating a foreign subsidiary (the so-called “liability of foreignness”). Dunning (1998: 53) also acknowledges some motivations that make transaction cost lower and FDI much easier: (1) the liberalization of cross-border markets; (2) the rootedness of affiliates in host economies; (3) the shift of location needs from those to do with natural resources, lower labor cost, and access to markets to those to do with access to knowledge and learning; (4) the decisive role of the physical and human infrastructure and institutional framework of the host country.

Although the outsourcing literature acknowledges that transaction cost economics (TCE) provides an exhaustive explanation of make-or-buy decisions, also in foreign locations, most studies in IB have analyzed the internalization of foreign operation by looking at the overall internationalization process. The direct control of delocalized activities is the last stage in the firm’s involvement in a specific national market (Johanson and Vahlne, 1990; Johanson and Wiedersheim-Paul, 1975).

Following these general observations, the analysis of the specific driving forces for offshoring is recently beginning to catch the attention of IB researchers. More specifically, Jahns *et al.* (2006) differentiate between (1) environmental driving forces, and (2) company-level driving forces.

The former set of forces includes economic factors (e.g., wage differentials, interest rates), political-legal conditions (e.g., taxation and competition laws, trade barriers), socio-demographic driving forces
(e.g., population size, age structure, education levels); and technological drivers (e.g., transportation technologies, telecommunications). Although all decisions are strictly interconnected, this first set of drivers may have a greater influence on the decision about “where” to relocate a value chain activity (i.e., country selection).

The latter set of forces refers to three fundamental theories: transaction cost theory, the resource-based view, and the market-based view of the firm.

Transaction cost economics (Williamson, 1979) is used here in reference to “how” to relocate activities across borders, that is, whether the activity carried out across borders has to be kept under the MNE’s legal control or to be outsourced to foreign suppliers. As in the home country, if the ex-ante and ex-post transaction costs and the purchasing costs are higher than the costs for internal production and the costs of internal coordination, to “make” is the best option. Building on arguments presented by the resource-based view (RBV) of the firm, it is possible to contend that through offshoring MNEs may, from one side, exploit their unique capabilities in other countries and, from the other, fill a competencies gap. This argument indicates that RBV supports the offshoring decisions in terms of “whether” and “what.”

Finally, according to the market-based view, locations chosen for offshoring of some business activities today might also represent attractive customer markets tomorrow.

In incorporating all these previous contributions into our thinking, we were able to offer an explanation of the international allocation of economic activity. More specifically, we elaborated a framework for identifying and discussing the driving forces of offshoring, depicted in Table 16.9.

Indeed, to draw any conclusions about the relative impact of drivers on offshoring we must disentangle the effects on operative and strategic performance from external motivations, generation of business opportunities, and acquisition of new resources and competencies.

Motivation of offshoring to affiliates or to unaffiliated (contract) parties: empirical evidence

In this section, we revisit the empirical results using both questionnaires and interviews. As we reported, companies tend to assign to offshoring multiple objectives expressing high (and equal) importance
### Table 16.9 Survey on driving forces of offshoring: analysis of five cases from Italian small domestic appliances industry

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<td>To face competitive pressures</td>
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<td>To imitate competitors</td>
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<td><strong>INTERNAL</strong></td>
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<td>To improve economic and competitive performance</td>
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<td>– Customer loyalty</td>
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<td>– Greater production capacity</td>
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<td>– Better quality</td>
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<td>To get access to new competencies and to generate business opportunities</td>
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<td>– Skilled labor</td>
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<td>– New competencies</td>
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<td>– New markets</td>
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<td>– Larger product/service offer</td>
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<td>– Gaining access to new vertical channels</td>
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*Note: 1 (“not important”) – 5 (“very important”)*

to many factors (in particular, Company E). However, both sets of data confirm the relevance of the cost minimization driver. All companies, without any exception, indicate “cost savings” as the primary factor explaining offshoring activities. Overall, they find that improvement of economic performance is the key driver, followed by external stimuli. Amongst the external circumstances, competitive pressures are considered much more important than imitation of competitors. Amongst
competitive pressures, the increasing bargaining power of retailers is referred as the more important driving force: “in Italy, a radical change in retailing has occurred in the last ten years, moving from a fragmented and traditional structure to an organized and specialised one, with an increasing bargaining power” (CEO, Company A). In light of the theoretical and empirical concerns raised above, we argue that offshoring decisions were driven mainly by tactical thinking rather than strategic reasoning. The acquisition of new competencies and access to new end markets are considered almost unimportant: “why should a Chinese consumer buy an Italian product made in China? China is by now considered as the specialised location for domestic appliances and consumer electronics. We do not have competitive advantage there nor a strong brand to justify local sale. Furthermore, cultural distance still matters. Maybe the only product Italian companies could sell in the Far East is a coffee machine, but it is a niche” (CEO, Company D).

However, these empirical findings are inconsistent with the criteria used for suppliers’ selection (as revealed by our respondents) based more on experience and competencies than on costs: the competence-based approach is still diffused although offshoring practices started twenty years ago.

Finally, we consider the results companies achieved (as they declared) with offshoring. These include the widening of product offering and the increase of turnover and operating profitability at least until 2003. Still, recent economic data show that all firms have been affected by a worsening of operating and net profitability. Our research identified a number of factors in the five firms that partly account for their declining performance. In particular, the underlying tactical perspective on offshoring has tended to underestimate the complexities and costs of developing buying relations in remote locations privileging cost savings over other factors like innovation capabilities and reliability. Such an approach caused lowering of product quality, increase of organizational complexity, increase of returned products from clients, and in-shoring (e.g., hairdryer production for Company A) as documented in our field analysis. “The entire company must speak English, at least. This is a cultural change for a small company. Due to the different time zones, we should have flexible office hours. Complexity concerns especially logistics and production planning. From a certain point of view we have loosened flexibility because we interact with factories 6,000 km apart” (CEO, Company A).
“Competencies of purchasing departments have changed; besides order management, it is necessary to be professional in selecting and negotiating with suppliers” (Marketing Manager, Company C).

Vertical disintegration of the value chain and its impact on high-value activities

The spatial allocation of firms’ value chains has been extensively analysed by a number of international business scholars (Africano and Magalhaes, 2005; Bartlett and Ghoshal 1998; Buckley and Casson, 1993; Diaz-Alejadro, 1977; Dunning, 1995; Johanson and Vahlne, 1977; Johanson and Wiedersheim-Paul, 1975; Kogut, 1985; Levitt, 1983; Nigh et al., 1986; O’Brien, 1980). By contrast, few studies were dedicated to the allocation of value-chain activities among firms in the international context and to the dynamic analysis of the spatial allocation of value chains. The analysis of five Italian domestic appliances firms conducted in the period of the industry transformation enriches our understanding of the multiplicity of firms’ reactions to the changes in the global external context and of the large range of firms’ decisions regarding the spatial allocation of their activities in an international context.

We used Porter’s (1985) value-chain framework to represent a spatial map of firms’ activities and to detect the evolution of industry vertical disintegration (Jacobides, 2005). Preliminary interviews allowed us to disentangle activities aggregates as follows: (a) “operations” activities were split into production of components, moulding, painting, assembly, graphics, packaging, and quality control activities; (b) outbound logistics were analysed as logistics from the company to the clients and management of warehouses; (c) technology development was split into research, design, development, and prototyping and engineering activities; (d) procurement function was considered separately for moulds production and other suppliers’ management. In order to find empirical evidence on the last two research questions (“what kind of activities were delocalized over time by manufacturers?” and “how did the industry structure modify?”), the interviewed firms were asked to identify activities that were outsourced in Italy or abroad in 1997, 2002, and 2007. Comparison among the five cases allowed us also to define how firms reacted to the increasing maturity of the industry with the growing importance of price
Gabriella Lojacono and Olga Annushkina

competition, increase in private brands, falling prices, and profitability (Porter, 1980). The activity mapping illustrated whether firms chose similar vertical strategies or they decided reactively and imitated one another (Kim and Mauborgne, 1999).

For the simplicity of representation, the results of empirical analysis of five cases are shown in two separate tables: Table 16.10 for firms’ primary activities and Table 16.11 for firms’ support activities.

The interviews showed that three companies out of five at the end of 2007 outsourced to foreign suppliers the production of components, whereas one company (Company D) that had been working with Italian and foreign suppliers decided to withdraw from contracts with foreign producers of components and in 2007 had been working primarily with Italian suppliers. One interviewed company (Company A) maintained the production of components internally.

Molding, painting, and assembly activities by the end of 2007 were outsourced to foreign suppliers by four companies out of five. Whereas Company D, by 2007, had decided, in the case of components production, to rely on Italian suppliers and, moreover, to maintain assembly activities internally. Most companies outsourced inbound and outbound logistics, whereas three companies out of five decided to outsource also management of warehouses in Italy.

Graphical design and packaging of finished products were outsourced mainly to specialized Italian suppliers, whereas very few companies decided to outsource quality control – an activity that was declared as one of the most crucial.

In general, the activities analysis showed that most companies decided to offshore to unaffiliated companies (mainly located in Asia) most production activities along with inbound and outbound logistics. Some high-value specialized activities, such as graphical design and packaging, were either maintained within firm boundaries or outsourced in the home country (Italy). While most companies declared that the decision to offshore production activities was caused by the necessity to implement cost-reduction strategy, the low degree of required coordination with other activities allowed companies to use foreign suppliers to outsource those activities.

Few companies, on the other hand, decided to externalize quality control, considered to be one of the most important activities. Out of five cases, Company D stood alone in its decision to produce in
Table 16.10 Analysis of five cases from Italian small domestic appliances industry: outsourcing of primary activities ($x = $activity was fully outsourced; $x (p) = $activity was partially outsourced); location ("Italy" or "abroad") indicates the location of external contract provider of outsourced activities

<table>
<thead>
<tr>
<th>Location</th>
<th>Production of components</th>
<th>Molding</th>
<th>Painting</th>
<th>Assembly</th>
<th>Logistics from supplier to the company</th>
<th>Logistics from the company to the client</th>
<th>Warehouses</th>
<th>Graphics</th>
<th>Packaging</th>
<th>Quality control in Italy</th>
<th>Quality control abroad</th>
<th>Sales back-office</th>
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<td>Company A</td>
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<th>Molding</th>
<th>Painting</th>
<th>Assembly</th>
<th>Logistics from supplier to the company</th>
<th>Logistics from the company to the client</th>
<th>Warehouses</th>
<th>Graphics</th>
<th>Packaging</th>
<th>Quality control in Italy</th>
<th>Quality control abroad</th>
<th>Sales back-office</th>
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<td>Company D 1997 Italy</td>
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*Source: company data and interviews.*
Table 16.11 Analysis of five cases from Italian small domestic appliances industry: outsourcing of support activities (x = activity was fully outsourced, x (p) = activity was partially outsourced); location (“Italy” or “abroad”) indicates the location of external contract provider of outsourced activities

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*Source: company data and interviews.*
Italy (performing production activities internally or relying on Italian suppliers).

Most of the five companies maintained support activities that provided primary activities with most important inputs in the home country (Italy) only with several exceptions. Among support activities, research, design, and development were still considered by firms as the main value-adding activities. During interviews, firms were asked to define the concept of a “high-value” activity: most firms suggested that they consider an activity to add high value to the product if it allows the firm to differentiate itself from other competitors. Such a definition is very close to the classical definition of the value-added as a difference between sales revenues and costs (Grant, 2002): differentiating opportunities in terms of design, technical characteristics, and product quality may create additional revenue flows. Most firms used R&D, the selection of foreign suppliers, and quality checks as examples of the main value-adding activities, therefore justifying the choice to perform them internally.

Production of molds was outsourced initially in the home country (Italy) and later offshored to foreign (mainly Asian) suppliers by most of the companies interviewed. Company A had been partly outsourcing prototyping to Italian suppliers. During interviews, only the managers of Company E declared that since 2002 the company outsourced in Italy or offshored to unaffiliated companies its research, design, and development activities. In 2002, the firm also decided to offshore prototyping and engineering activities along with the production of molds. Since 2002, Company E had also been outsourcing most of the firm’s infrastructure activities, such as accounting and finance, HR management and IT, to Italian suppliers.

Nevertheless, many support activities were considered by interviewed companies as the main contributors to the value-creation process and therefore were maintained inside the firm.

The dynamics of the delocalization of primary and support activities lead us to the following conclusions:

- Most producers of domestic appliances after 2002 had been drastically reducing activities performed inside the company and had been increasingly using outsourcing of main production activities to Asian and, in some cases, to Italian suppliers.
• Most outsourcing and offshoring decisions were taken by companies in the second half of the past decade (between 2002 and 2007).
• According to interviews, most outsourced activities were transferred to Asian suppliers (in fact, companies started accumulating significant capabilities of suppliers’ selection and management); Italian suppliers managed to obtain outsourcing contracts for some activities that require high specialization (graphical design, prototyping, etc.) or strict interaction with other company activities (logistics, management of warehouses).
• Most companies intend to maintain research, design, development, prototyping, and engineering activities inside the company in Italy; however, the companies’ decisions to outsource and to offshore most of their production functions may lead to the diminishing importance of those high-value activities as R&D can be expected to be gradually transferred “closer” to the production function, i.e., outside of companies.
• The quality control function in most cases remained inside companies and only a few companies declared the intention to use occasional external suppliers of quality control services (Company C declared that it used external controllers of quality mainly in the event of overcapacity during the “high season”).

One of the most important questions facing most of the companies interviewed concerns the role of such high-value activities as research, design, and development. The overall value of R&D activities, separated by offshoring from production activities, is declining: many firms admit that R&D activities are reduced to suggestions on products’ aesthetics to external suppliers. According to interviews with other companies, should the tendency to offshore the assembly function to non-affiliated suppliers continue, most companies would be forced to drastically reduce R&D activities performed in-house and to become importing companies that rely on Asian producers not only for assembly functions, but also for all research, design, and development activities.

According to the Marketing Manager of Company C, most industry players since the mid-1990s promote products as commodities, emphasizing low prices and without dedicating due attention to products’ performance and functionalities. The marketing manager of Company C suggested that it would be extremely important for the company to
maintain R&D and design and marketing activities in order to protect the firm's know-how and to be able to possess some differentiating capabilities.

The extensive use of offshoring to unaffiliated (contract) parties or to affiliates by the interviewed firms confirmed the structural changes in the industry structure (Invernizzi, 2004). Firms' strategies that rely extensively on external collaboration are not new to Italy (Lorenzoni and Lipparini, 1999). In an evolved global context, a firm’s capabilities to benefit (and to coordinate such benefits) from differences among countries in terms of costs and market opportunities is crucial for its profitability (Kogut, 1984). Still, firms, unable to compete effectively on cost or to create a premium differentiating product, “follow the herd” and outsource some vital functions in the attempt to transfer risks (Grant, 2002) or to become more efficient (Puryear and Detrick, 2006). Diffusion of imitative strategies regarding offshoring to unaffiliated contractors (Kim and Mauborgne, 1999) may lead to the vertical disintegration of the industry. Statistical data on import and export, firms' financial reporting, and results of conducted interviews suggest that production activities in the small domestic appliances industry in Italy are becoming less and less important (with several exceptions), and that firms tend to adopt similar vertical structures (R&D, outbound logistics, and marketing in Italy, with most remaining activities offshored or outsourced). Firms try to differentiate from competitors by maintaining some R&D activities in Italy.

However, with assembly activities transferred to unaffiliated offshore companies, the results of R&D activities were also partly transferred outside of the firm as the quality of research, design, and development activities was negatively impacted by the artificial separation from the production floor. Moreover, the results of R&D activities had inadvertently been becoming indirectly (and legally or illegally) available to third parties. Offshoring strategies therefore resulted in the inability of former manufacturers to retain the proprietary advantages obtained through investments in R&D, and in the commoditization of final products that were no longer differentiated in the eyes of the final consumer. Imitative strategies and commoditization lead to price wars that inevitably result in falling prices and profits and in the redistribution of market share towards firms that are more competitive in terms of costs (Grant, 2002).
Conclusions

This study represents an exploratory research study. It is aimed at outlining an integrated framework that would allow one to explain decisions to offshore a firm’s activities to unaffiliated (contract) parties or to affiliates. We seek to assess motivating factors (driving forces) for offshoring and trace the impact of offshoring on the structural evolution of an industry. Offshoring is an intensive and accelerated form of globalization that will have far-reaching effects on industry structures and organization of work. One contribution of this chapter was to portray five examples of Italian domestic appliances producers, and their key motivating factors for offshoring decisions, to detect shifts in the industry’s structure, and to assess the possible impact of offshoring decisions on firms’ high-value activities and possibilities to differentiate.

We saw how changes in the global scenario have been influencing decisions about location and control of some value-chain activities. Particular attention was devoted to the determinants of delocalization and motivations of offshoring. Over a six-year period (2002–07) most of the five analyzed firms decided to offshore some of their business activities, in particular the production function. Second, cost pressure, in particular from consolidated distribution channels, was still a key motivating factor for offshoring. Third, we analyzed which activities were offshored: the five domestic appliances producers tended to offshore activities that were considered as low-value, non-core, or non-specialist, or activities that would benefit from scale and scope economies or labor cost savings. However, interviewed managers admitted that offshoring low-value activities started having negative influences on the firms’ abilities to perform or to appropriate the results of some high-value activities, for instance research and development and on the firms’ ability to differentiate themselves from competitors.

What are the implications of our study for future academic research? First, to return to the theoretical debate mentioned in previous paragraphs, we believe that more attention has to be given to imitative offshoring strategies and the impact they had on the evolution of industry structures tending towards maturity (price competition, declining profitability) and decline.
Despite the recent explosion of offshoring research, there are still many unanswered questions: is the increasing localization of labor-intensive activities from developed to developing countries inexorable? What will be the impact on some of the larger offshoring destinations (e.g., China) or up-and-coming countries (Vietnam)? How might recession affect the pace and composition of offshoring?

Our study has several limitations that can be improved with further research. We analyzed only a small sample of firms belonging to the same industry. A follow-up survey, to be conducted in 3–4 years with the same firms, would also allow us to further analyze the evolution of firms’ outsourcing and offshoring decisions and their possible longer-term impact on industry structure and profitability.

In terms of managerial implications, we suggest that firms should carefully analyze the long-term impact of mimetic offshoring strategies on an industry’s ability to perform high-value activities, develop proprietary capabilities, face increasing price-based competition that leads to the erosion of industry profitability, and to the reduction of differentiation across firms in the sector.

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