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FINE SLICING OF THE VALUE CHAIN AND OFFSHORING OF ESSENTIAL ACTIVITIES: EMPIRICAL EVIDENCE FROM EUROPEAN MULTINATIONALS

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Abstract. The offshoring of more advanced activities is increasing and a debate about the limits of offshoring has emerged. Companies are fine-slicing their value chains, and moving beyond the offshoring of peripheral and non-core activities to the offshoring of *advanced* and *essential activities* that are closer to their core (e.g. research, design and product development). The challenge is to understand the limits of offshoring and the most appropriate modes of offshoring. The purpose of this paper is to analyze what activities are offshorable and how best to govern offshored activities. We argue that companies are redefining their core activities and in this process, some essential activities previously viewed as core activities are being detached from the core, and they become more offshorable.

The study uses a sample of 565 offshoring operations conducted by 263 multinational companies from 15 European countries. A logistic regression was used to analyze the relationship between the activities offshored (non-core versus essential activities) and the offshoring mode implemented (captive offshoring versus offshore outsourcing). We find that essential activities are typically offshored using the captive mode, while offshore outsourcing is commonly used to offshore non-core activities; and this trend is even more pronounced in knowledge-intensive companies where interfaces between the various activities are less standardized.

This paper offers managers and CEOs an integrative tool that can make easier decisions regarding offshoring modes (captive versus offshore outsourcing) and serves as a reference point for further analyses of the implementation of offshoring strategies in multinational enterprises.

Keywords: global sourcing, offshoring, outsourcing, value chain, core activities, multinational firms, international strategies.

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Introduction

Lured by cost savings, access to talented people and new knowledge, an increasing number of companies in a wide variety of industries, including manufacturing, information technology and services (Boardman *et al.* 2008) have begun to offshore a variety of activities. As competition intensifies and the pace of change accelerates, companies are considering possibilities to globally source products, knowledge and services. Increasingly, companies are finding that they cannot just rely on the existing configuration of their activities, which is typically focused on the home country. Rather, they must consider opportunities for global sourcing and offshoring. In this sense, offshoring has become an imperative for many companies (Lewin, Peeters 2006; Pyndt, Pedersen 2006; Dossani, Kenney 2003).

In order to be able to reconfigure activities and reap the benefits of offshoring, companies are organizing their value chain activities more efficiently. In particular, they are fine slicing the value chain in smaller but more coherent modules that can be separated from each other into space and time. The value chain can be reconfigured along a number of dimensions, especially in terms of the location and governance of each value chain activity (Asmussen *et al.* 2009; Asmussen *et al.* 2007). Companies must make decisions about which activities to offshore and how to govern those activities (i.e. whether to keep the activities within company boundaries or to contract them out to independent suppliers).

In relation to these decisions about how and which activities to offshore, it is often argued that companies should keep core activities in-house, and outsource non-core activities. However, several key questions remain unanswered: What are "core" activities and how can they be differentiated from "non-core" activities? Is this division truly dichotomous, i.e. companies only carry out core and non-core activities, or is there a continuum along which some activities are closer to or further away from core activities? As companies fine slice their value chains, they may offshore not only peripheral and non-core activities but also activities that are closer to the core (e.g. research, design and product development). In fact, high value-added activities (engineering, R&D or product design) as well as standardized IT and business processes are increasingly being offshored (Kedia, Mukherjee 2009; UNCTAD 2005). As Lampel and Bhalla argue, the "offshoring of high value added activities will be incorporated into the strategic repertoire of organizations in the 21st century" (2011:357).

In this paper, we argue that companies are redefining their core activities. In this process, some essential activities previously viewed as core activities are being detached from the core and made more offshorable. We also propose that while companies typically keep their distinctive core activities in house and close to headquarters, they are beginning to offshore essential activities that are close to core activities, i.e. activities that are critical to the company's competitive advantage. Companies can leverage on suppliers that have more specialized competences, and they can tap into knowledge and talent in other parts of the world through the offshoring of these essential activities.

We propose that essential activities will be offshored to own subsidiaries (captive offshoring), while the offshoring of non-core activities will often involve independent suppliers (offshore outsourcing). Furthermore, we argue that this differentiation between modes of offshoring will be even more pronounced in knowledge-intensive industries, where interfaces between the different activities are less standardized. The proposed hypotheses are tested on an unique dataset covering 263 companies from 15 different European countries. In total, the dataset covers 565 offshoring operations spanning five different value chain activities. It includes information on offshoring modes and the importance of these activities for the competitive advantage of the companies in question. This data set allows us to study offshoring decisions at the more disaggregated activity level rather than at the more aggregated firm or industry levels typically in focus in extant research.

The remainder of this paper is structured as follows. In section 1, the principal findings of the existing literature are reviewed, gaps are identified, and the hypotheses are developed. Outlines of the methodology and the operational measures used in the study are presented in section 2. The statistical analysis and results are presented in section 3 before conclusions and implications are discussed.

1. Literature review and development of hypotheses

1.1. Captive offshoring or offshore outsourcing

Previous research defines offshoring as the transfer of business processes and activities to foreign locations (Levy 2005). A distinction is typically made between *captive offshoring* (the intra-company transfer of activities to fully owned subsidiaries) and *offshore outsourcing* (the inter-company transfer of activities to independent companies or companies with minority stakes). We view the term *captive offshoring* as synonymous with other concepts used in the literature – including *internal offshoring* (OECD 2005), *offshore in-house sourcing* (OECD 2007) and *offshore insourcing* (Kotabe *et al.* 2007) – that refer to a company's international relocation of activities to its own subsidiaries. We use the term *offshore outsourcing* to refer to the relocation of international activities to independent firms, which others have denoted as *non-captive offshoring* (WTO 2005) and *external offshoring* (OECD 2005). Captive offshoring clearly overlaps with foreign direct investment (FDI) in the sense that captive offshoring involves FDI. However, not all FDI involves captive offshoring (Levy, Dunning 1993). Captive offshoring involves FDI for those activities that have a global (or regional) mandate and are relocated to other locations, while FDI includes many local and market-oriented activities (such as sales subsidiaries and production for the local market) that are not viewed as offshoring.

The offshoring trend originated in the 1960s, when primarily blue-collar manufacturing activities were relocated to low-cost countries. As the communication infrastructure improved and telecommunication costs decreased, offshoring was taken to another level (Levy 2005). The past decade has witnessed an increasing propensity to offshore. Recent findings presented by the Offshoring Research Network (ORN), which has collected the most complete data on companies offshoring activities (a data set that en-

compasses more than 1,600 companies globally), indicated that offshoring has boomed in the last five years (Lewin, Cuoto 2006). Yet, even as offshoring has boomed, it has become more manageable. The political and regulatory environments of host countries have eased considerably, while the knowledge, flexibility and skills of local labor have increased in many emerging countries without a corresponding increase in costs for that resource.

In many ways, the logic of offshoring is breaking away from the dominant view in international business studies. The dominant view suggests that internationalization mainly follows a market-oriented logic (a downstream logic), where competitive advantage is created, in the first instance, at home. This advantage can then be exploited abroad through a global network of subsidiaries that mainly apply and adapt the home-based advantage to the local markets. However, offshoring today follows an upstream logic focused on how companies can tap into resources abroad, including cheap labor, human talent and new knowledge (Boardman *et al.* 2008; Sridhar, Balachandran 1997). According to this logic, competitive advantage is created and developed by sourcing the necessary elements and knowledge from many parts of the world.

In his examination of R&D subsidiaries, Kuemmerle (1997) distinguished between the home-based exploiting logic and the home-based augmenting logic for subsidiaries. Offshoring is a phenomenon related to the home-based augmenting logic, as its starting point lies in the assumption that companies need to source some of their valuable inputs and activities on a global scale and not just in the home market (Martínez-Noya *et al.* 2012). Porter (1986) highlighted the shift in offshoring logic when he proposed that companies are moving from a dispersed value chain configuration (the mini-replica case with optimization in each individual market) to a concentrated value chain configuration (with focus on global optimization). A concentrated value chain configuration implies that companies optimize the organization and location of each individual value chain activity on a global scale. Each value chain activity is concentrated in a different location in order to take advantage of location-specific factors. For example, a company may decide to locate production in China, IT in India and R&D in the US.

The increase in offshoring comes hand in hand with efforts to split the value chain into ever finer modules (sets of activities) that are internally coherent, and to standardized interfaces with other modules to limit the need for extensive communication and coordination. Many companies have gone through this process of fine slicing the value chain, which basically entails learning about their own processes in detail, standardizing some activities, bundling activities in new ways and specifying interfaces among activities. Basically, this process is about cutting the constituent elements of the value chain into ever finer slivers. Often, this process is carried out under the heading of "lean" or "Six Sigma", the goal of which is to reorganize, standardize and specify interfaces among different activities. A major advantage of the modularized, fine-sliced structure is that it allows for more specialization, and for the gathering and dissemination of information to those decision takers that are best placed to use it.

According to some authors (Buckley, Ghauri 2004; Contractor *et al.* 2010; Ørberg, Pedersen 2010), the fine slicing of the value chain is necessary if offshoring strategies

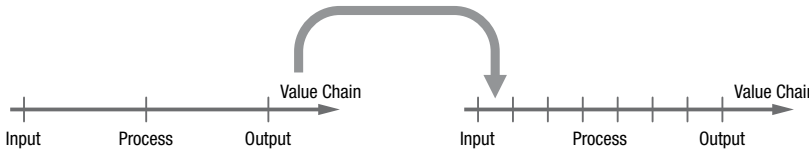


Fig. 1. Fine slicing of the value chain
Source: Adapted from Pyndt and Pedersen (2006).

are to be pursued (see Fig. 1). In light of the trend among firms to "slice" value chains into finer parts and locate these individual parts worldwide, these authors propose that offshoring be analyzed at the activity level.

1.2. The offshoring of core and non-core activities

The offshoring of activities is no longer perceived as an operational tool focused on cost savings, but as a strategic tool. Activities with strategic importance that are closer to the heart of the firm are increasingly being offshored (Contractor *et al.* 2010), so that offshoring includes not only manufacturing jobs, but also more advanced and higher value-adding activities (Lewin, Peeters 2006; UNCTAD 2004). Ward (2004) acknowledged a shift in the offshoring trend from the offshoring of standardized processes to the offshoring of increasingly knowledge-intensive processes that require high levels of domain and subject expertise together with higher-end professional talent. In fact, Lewin and Cuoto (2006) reported that although more standardized activities, like IT and call centers, are still the most common offshored activities, offshoring is increasing the most among more advanced activities, such as R&D, engineering and product design. Similarly, Lewin *et al.* (2009) suggested the emerging global race for talent as the main driver behind the offshoring of more advanced activities.

More recent literature divides the spectrum of relocated or subcontracted activities on the basis of the non-core and core distinction (Levy 2005; Heikkilä, Cordon 2002; Gilley, Rasheed 2000). However, this distinction raises the issue of whether the scale is really dichotomous in terms of core versus non-core. Another question also arises: When companies offshore advanced activities (e.g. product development and R&D), are they necessarily offshoring core activities? Activities "closer to the core" that have typically been conducted near or at headquarters are now being offshored. For example, in the automobile industry (one of the first industries to engage in offshoring), entire sub-systems of cars, such as power-trains, have been offshored to subsidiaries that have global mandates to develop those sub-systems. However, even in this industry, the architectural core activities are typically still conducted close to the heart of the company, where headquarters can exercise full control (Harland *et al.* 2005). A similar trend is seen in the pharmaceutical industry, where many of the innovative processes are outsourced to specialized "contract research organizations" (CROs) that offer services such as product development; clinical trial management; and preclinical, toxicology and clinical laboratory services for the processing of trial samples. Basically, some pharmaceutical firms have narrowed their core activities to the high valued-added activities that occur early on in the innovation process (the architecture of new discoveries) and

to customer interactions at the other end of the value chain, while they outsource the operational parts of their research processes to CROs. Pharmaceutical companies outsourced approximately USD 15 billion to CROs in 2007 (Contractor *et al.* 2010). As these examples show, companies tend to redefine their core activities in order to focus on a narrower set of high value-added activities that typically includes the capability to form the architecture of the system and the interfaces among the elements in the system, while the more operational part of the system are outsourced or offshored.

Consequently, we argue for the introduction of more fine-grained distinctions of the firm's activities. We suggest that activities be divided into three groups: *core activities,* which are the true core activities that are distinctive and crucial for the company's competitive advantage and often of an architectural nature; *essential activities,* which are advanced activities that are complementary and important for the competitive advantage; and *non-core activities*, which are the peripheral activities. Heikkilä and Cordon (2002) make a similar distinction between distinctive competencies (those allowing the company to excel) and essential competencies (those needed to sustain profitable operations). Quinn (1999) defines three similar types of activities: a) core activities, i.e. those that the company performs better than any other enterprise (best-in-world capabilities); b) essential activities, i.e. those that are demanded by customers or are needed to defend the core activities; and c) non-core activities, i.e. those that should be outsourced.

According to McIvor (2000: 31), "the depth of evaluation of the organization's value chain can take place at the activity (such as logistics) or sub-activity (material handling) level depending on the particular circumstances of the organization". To ensure efficiency and effectiveness in offshoring practices, a detailed analysis of each value chain activity is necessary. In this process, each activity should be disaggregated into sub-activities and each sub-activity should then be evaluated according to its strategic importance. In this sense, a new value chain configuration is developed (see Fig. 2). Offshoring decision models consider typically, among other criteria, the context of the activity (Fill, Visser 2000) and the strategic importance of the activity as key factors in offshoring decisions (Kremic *et al.* 2006).

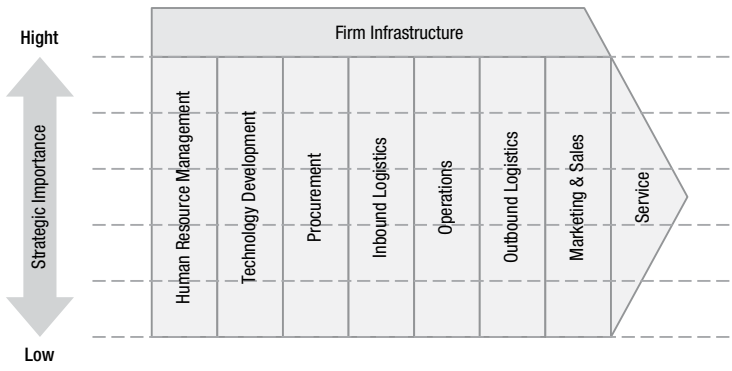


Fig. 2. A new value chain configuration in the fine-slicing context
Source: Adapted from Porter (1987).

We stress that essential activities are often activities that were previously core activities, that still remain close to the core and that remain important for the competitive advantage of the company. Our distinction between core activities and essential activities is in line with the fine slicing of value chain activities, where some activities previously perceived as protected core activities are separated out. In that sense, core activities are typically narrowing, while essential activities are separated out as more independent activities with defined interfaces with other activities (as shown in Fig. 3). Gottfredson *et al.* hinted at this development when they highlighted that only the "core of the core" should be kept inside, while "outsourcing is becoming so sophisticated that even core functions like engineering, R&D, manufacturing, and marketing can – and often should – be moved outside" (2005: 132).

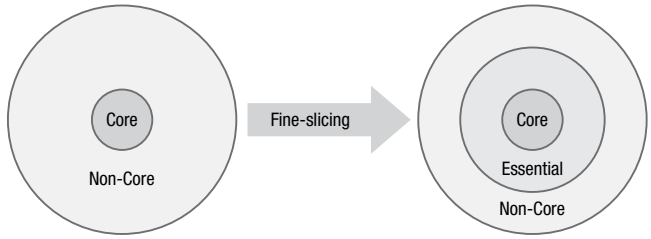


Fig. 3. Core and non-core activities
Source: Adapted from Quinn (1999).

Initially, the majority of organizations followed the established convention based on the competency view of the firm – they mainly offshored non-core activities. *Non-core activities*, also referred to as peripheral activities, are those that are not vital for a company's competitive position (Quinn, Hilmer 1994) and are less strategically relevant for a company's long-term success (Gilley, Rasheed 2000). One strong argument for the offshoring of non-core activities is that it enables companies to allocate more resources – human resources, capital, time and effort – to creating and maintaining their core activities (Gilley, Rasheed 2000; Quinn, Hilmer 1994). In addition to this argument, which builds on the advantages of specialization, the benefits of offshoring may include increased flexibility and cost savings.

However, these arguments for the offshoring of non-core activities point towards the implementation of offshore outsourcing rather than captive offshoring, as only the outsourcing of a task to an independent company will allow the focal company to reap the benefits of specialization and to focus all of their resources on the development and maintenance of core activities. Accordingly, we propose the following hypothesis:

H1: The likelihood of offshoring non-core activities will be greater when offshore outsourcing is adopted.

Recently, a number of studies have reported a trend towards the international relocation of either activities that are strategically important for the company's core (Baden-Fuller *et al.* 2000; Gilley, Rasheed 2000; Lei, Hitt 1995). These important activities include research, design, engineering and product development. The main arguments for relo-

cating these activities are to benefit from specialized suppliers competent in specific activities, and the need to tap into critical knowledge and talented people wherever they can be found. Companies cannot rely on getting the necessary knowledge inputs from their home bases, so they need to scan and mobilize knowledge on a global scale (Doz *et al.* 2001).

The offshoring of these activities requires ongoing communication and co-ordination within the company. As such, there might be inherent benefits in retaining these activities within the boundary of the company rather than passing management control and decision rights to a third party. Captive offshoring also has other benefits, as it is easier to protect knowledge and exploit it internally in such contexts. Therefore, we propose:

H2: The likelihood of offshoring essential activities will be greater when captive offshoring is adopted.

If these hypotheses are supported, our understanding of the decision process surrounding which activities to offshore and which to outsource should be extended. Traditionally, decisions on which activities to outsource have been assumed to involve analyses of which activities were core and which were non-core, with the intention of outsourcing only non-core activities to external suppliers. Today, the decision is clearly more complex, as some of the advanced activities (the essential activities) are separated out from the core activities and have become offshorable, as illustrated in Figure 4.

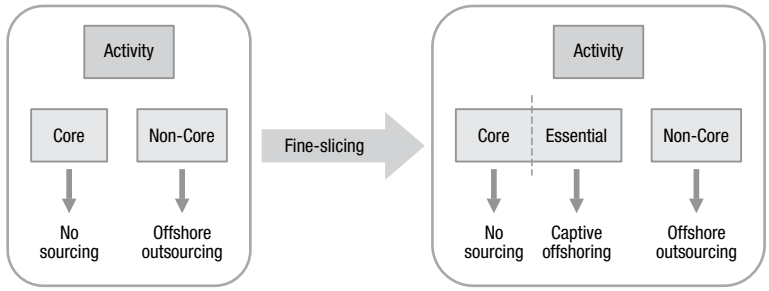


Fig. 4. Evolution of the decision process regarding which activities to outsource

1.3. Knowledge-intensive firms and offshoring

In offshoring strategies, as in any relationship involving location, control and value creation, some resources play a key role. "Knowledge" is one such resource (Mudambi, Venzin 2010; Shin *et al.* 2009; Mudambi 2008; Pyndt, Pedersen 2006). Kremic *et al.* (2006) suggest that "knowledge" is a strategic factor in the offshore outsourcing decision. Knowledge is an intangible asset that is typically characterized as being less visible, more embedded, more tacit and less separable from the rest of the firm than tangible assets (Mudambi, Venzin 2010; Mudambi 2007, 2008). Mudambi and Venzin (2010: 1514) suggest that "an intangible asset controlled by the firm will be able to generate higher returns, *ceteris paribus,* than a competing firm that does not control the asset".

In the international business literature, the nature of knowledge is viewed as one of the major determinants of foreign entry decisions. Knowledge is an intangible asset that is tacit by nature. Therefore, when certain knowledge is necessary to undertake an activity abroad, it is more likely to be transferred within the firm than through the market because firms are more efficient vehicles for knowledge transfer (Kogut, Zander 1992; Hill *et al.* 1990).

Recent theoretical literature suggests that the threat of imitation and the need to protect intellectual property rights are fundamental determinants of a firm's decision to engage in either captive offshoring or offshore outsourcing (Fillat, García 2009; Chen *et al.* 2008; Antràs, Helpman 2004; Quinn, Hilmer 1994). This is mainly because the use of captive offshoring makes companies less vulnerable to potential technology leakage. In this sense, captive offshoring is more likely than offshore outsourcing in knowledge-intensive firms with a high risk of imitation (Antràs 2005).

Some empirical evidence confirms these arguments. Fillat and García (2009) analyzed how companies organized their R&D abroad, i.e. the mode of offshoring that companies preferred when offshoring R&D activities. The results indicated that knowledge-intensive firms tended to offshore through own affiliated subsidiaries (captive offshoring) rather than through offshore outsourcing because these firms were more vulnerable to technology leakage. Chen *et al.* (2008) analyzed how the nature of the assets affected the choice of organization mode (captive offshoring versus offshore outsourcing). The authors considered two types of assets (physical assets and knowledge assets), and investigated whether knowledge-intensive firms preferred one mode of offshoring to the other. Their results signaled that knowledge-intensive firms tended to use captive offshoring strategies.

Essential activities often involve more knowledge-based activities, which are typically more tacit in nature. They are often characterized by complex and less standardized interfaces than other activities. Where ongoing exchanges of knowledge and quick decisions are required, the efficiency of knowledge exchange and subsidiaries' response times are likely to be shorter than when a third-party provider is involved – especially if those decisions trigger the renegotiation of the outsourcing contract. When interfaces are defined and standardized, it is much easier to write an outsourcing contract, set milestones and follow up on the contract; however the loosely defined interfaces often result in a rather vague outsourcing contract.

Some studies suggest that the decision to offshore advanced tasks is related to the firm's knowledge and that a high share of knowledge employees in headquarters positively influences the offshoring of more advanced tasks (Ørberg, Pedersen 2010). According to hypotheses 1 and 2, non-core activities should be outsourced in the form of offshore outsourcing, while essential activities (more advanced activities) should be offshored in the form of captive offshoring. In this sense, if Ørberg and Pedersen's (2010) arguments are true, knowledge-intensive firms will offshore more essential activities and they will do so through captive offshoring. Consequently, we propose the following hypothesis:

H3: The likelihood that essential activities will be offshored using captive offshoring will be greater in highly knowledge-intensive firms.

2. Data and methods

2.1. Research setting and data collection

This study's population consists of manufacturing companies located in the EU-15 (Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom). The main source for population identification was the Amadeus database, which includes (financial) data on more than 10 million European companies from 34 countries. Two selection criteria were used to narrow the population: 1) companies that were "global ultimate owners" with subsidiaries abroad; and 2) companies with an "active" (or unknown) status. A total of 3,460 European companies fulfilled the criteria in the Amadeus database and all these companies were included in the initial data set.

A survey of offshoring behavior was distributed by regular mail to these companies. The survey was translated into five languages (English, French, German, Italian and Spanish), so most companies had the opportunity to respond in their native language. The survey was designed and based on Dillman's total design method (1978) in that Dillman's recommendations of brevity, simplicity, accuracy and relevance were taken into account. Four stages of pre-testing, including evaluations by academic colleagues, were undertaken. The final questionnaire had 14 questions, which were derived from the literature and adapted to the specific context.

In July 2008, the questionnaires were distributed by regular mail to the head of the international department in each of the companies in the population. The envelope included a cover letter, the questionnaire itself (three pages) and a pre-paid return envelope. In the first round, 177 completed questionnaires were received, of which 21 had to be removed from the sample for lack of data. A reminder was sent in December 2008, after which 107 usable questionnaires were received. In total, we obtained a usable sample of 263 completed questionnaires, which represents a response rate of 7.6%. This is almost three points higher than the response rates in other studies based on postal surveys of global manufacturing companies (Yip, Dempster 2005). As shown in Table 1, the 263 responses were divided among 15 different countries, providing a good representation of European manufacturing companies.

Each firm was assigned a unique identification number. On the basis of this identification number, we linked the survey data for each firm to general firm and accounting data in the Amadeus database. This combination of primary data (survey data) and secondary data (Amadeus database) lowers the potential for common-method bias.

The survey instrument was developed to map all of the offshoring and outsourcing activities of the companies. As such, it covered all of the activities that were offshorable, regardless of whether they were essential activities or non-core activities.

2.2. Measurement and validation of constructs

The dependent variable in the model – *essential activity* – indicates the strategic importance of the activity offshored. It is a dichotomous variable that takes the value of 1 when the activity is "important or essential to the company's competitive advantage" and the value of 0 when the activity is "of secondary importance to the competitive

Table 1. Distribution of responses received, by country of origin

Origin country	Surveys sent		Surveys received		Response rate, %
	Number of surveys	%	Number of surveys	%	
Austria	50	1.45	8	3.04	16.00
Belgium	147	4.25	7	2.66	4.76
Denmark	133	3.84	13	4.94	9.77
France	219	6.33	16	6.08	7.31
Finland	91	2.63	4	1.52	4.40
Germany	488	14.10	50	19.01	10.25
Greece	175	5.06	11	4.18	6.29
Holland	125	3.61	6	2.28	4.80
Ireland	35	1.01	4	1.52	11.43
Italy	706	20.40	56	21.29	7.93
Luxemburg	4	0.12	0	0.00	0.00
Portugal	27	0.78	2	0.76	7.41
Spain	629	18.18	49	18.63	7.79
Sweden	202	5.84	17	6.46	8.42
United Kingdom	429	12.40	20	7.60	4.66
EU-15	3,460	100.0	263	100.0	7.6

Sources: AMADEUS data base (2007) and own data collection.

advantage of the company". In order to measure *essential activity* for five value chain activities (R&D and product design, production, purchasing and distribution, sales, and administration), we asked the companies about the importance of the offshored activities in relation to the company's competitive advantage.

In total, 565 offshoring operations were carried out by the 263 companies. Of these, non-core activities had been offshored in 207 cases, while essential activities were offshored in 358 cases (see Table 2). Production and sales activities were offshored more often than other activities (123 and 172 cases, respectively). Notably, R&D and product design were also offshored to a significant degree (79 cases).

The independent variables in the model are *offshoring mode* and the *knowledge intensity* of the company. To measure *offshoring mode*, we asked about the mode used to offshore the activity. The *offshoring mode* for each of the five value chain activities was measured as a dichotomous variable that took the value of 1 in cases of "captive offshoring" (relocation of the activity to own subsidiary: fully owned subsidiaries) and the value of 0 when the company was "offshore outsourcing" activities (relocation of the activity to a third party or a non-equity joint venture). The *knowledge intensity* of the company was measured using the share of low-skilled employees as a percentage of

Table 2. Distribution of the dependent variable, by activity (number of offshoring projects)

	Essential activity		Non-core activity		Total	
	N	%	N	%	N	%
R&D and product design	46	58.23	33	41.77	79	100
Production	91	73.98	32	26.02	123	100
Purchasing and distribution	56	58.33	40	41.67	96	100
Sales activities**	125	72.67	47	27.33	172	100
Administrative activities***	40	42.11	55	57.89	95	100
TOTAL	358	63.36	207	36.64	565	100

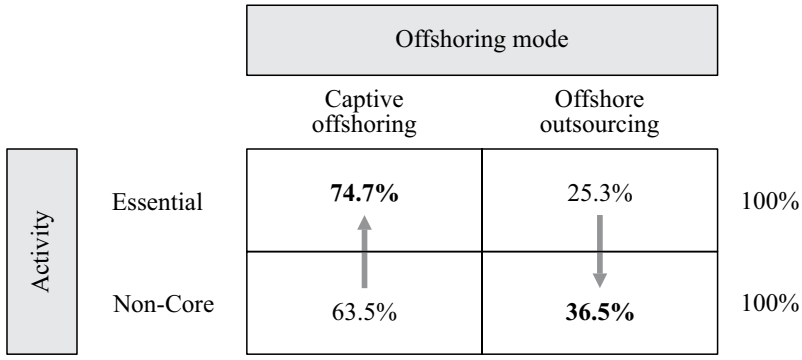
Notes: ** Sales activities include marketing, sales and after-sales activities; *** Administrative activities include human resource management, finance, IT and management activities.

the total number of employees. This proxy variable was measured by asking respondents about the percentage of low-skilled employees involved in the value-creating process and was included as a continuous variable. The variable was reverse coded (multiplied by –1), as companies with a high share of low-skilled employees are viewed as less knowledge intensive, while a small share of low-skilled employees indicates that the company is more knowledge intensive. Finally, in order to test hypothesis 3, an interaction variable was created as the product of the two variables *essential activity* and *knowledge intensity*.

In order to control for the level of internationalization and access to resources, we included two control variables: *company size* (number of employees) and *international experience* (number of years of international operations). *Relative profitability* was included, as the offshoring of an activity might be triggered by red figures and deficits that force a company to move fast (most likely by offshoring non-core activities), or by a surplus that allows the company to act more strategically and consider offshoring more essential activities. This item was measured on a five-point Likert scale. Along the same vein, we added control variables to reflect the characteristics of the *activities* and the interfaces among them. These took the form of dummy variables for each of the activities and enabled us to control for different propensities to offshore essential activities for the five value chain activities (Chandra, Shankar 2004). As production activity was used as the baseline (excluded from the model), the coefficient for the four other activities should be interpreted relative to production activity.

The fact that our approach is not trivial is illustrated in Table 3. As expected, the share of captive offshoring is larger when essential activities are offshored than when non-core activities are offshored (74.7% versus 63.5%), while the opposite is true for offshore outsourcing. However, the table also indicates that although this pattern is dominant, other interesting patterns also seem to be hidden in the data, including a generally high level of captive offshoring. One reason for this finding might be that the population only includes those companies that have subsidiaries abroad, so companies that only use offshore outsourcing and have no foreign subsidiaries are not included.

Table 3. Share of activity by offshoring mode



Finally, in line with other research (Ok 2011; CAPS, A. T. Kearney Inc. 2005; Ehie 2001), we added the drivers or motivations associated with the use of offshoring strategies. We have identified 12 offshoring drivers in the literature and for each offshoring decision the respondents were asked to indicate the importance of the 12 drivers on a five-point scale (where 1 indicated very low importance and 5 indicated very high importance). Based on the responses, we carried out a principal components analysis with the aim of identifying the underlying factors for the 12 drivers. The results indicated that the 12 drivers could be grouped into four factors that explained 65.1% of the total variance (among the 12 drivers). As shown in Table 4, factor 1 captures cost drivers (denoted *cost drivers*), while factor 2 is confined to drivers related to strategic

Table 4. Rotated component matrix[a]

Motives	Factor 1	Factor 2	Factor 3	Factor 4
1. Reduce labor costs	**0.814**	–0.229	–0.010	–0.035
2. Reduce other costs	**0.722**	0.250	–0.035	0.000
3. Change fixed costs into variable	**0.693**	–0.071	0.250	0.175
4. Forecast costs more accurately	**0.609**	0.268	0.209	0.223
5. Access to new markets	–0.150	**0.779**	–0.304	0.085
6. Improve the product quality	0.051	**0.670**	0.318	0.053
7. Reduce the response time to changes	0.202	**0.679**	0.297	0.045
8. Access to high skill employees	0.061	0.350	**0.709**	–0.106
9. Access to non available technology	–0.011	0.058	**0.782**	0.249
10. Focus on core competences	0.317	–0.054	**0.666**	0.220
11. Follow the competitors	0.067	0.030	0.209	**0.874**
12. Common practice in the industry	0.131	0.103	0.049	**0.874**

[a]Six iterations for convergence.
Notes: Extraction method: principal components analysis. Rotation method: varimax with Kaiser normalization.

changes or process improvements (*strategic drivers)*. The drivers associated with access to resources are more prevalent in factor 3 (*resource drivers*), while drivers focusing on competitors are found in factor 4 (*imitation drivers*).

Four control variables – cost drivers, strategic drivers, resource drivers and imitation drivers – were created based on the factor loadings and factor scores for each company. The exact operationalization of all of the variables is described in Table 5.

Table 5. Exact operationalization of the included variables

Variables	Definition
	Dependent variable
Essential activity	Dichotomous variable that takes the value of "1" when the activity relocated is important or essential to the company's competitive advantage and "0" when the activity is complementary or of secondary importance.
	Independent variables
Offshoring mode	Dichotomous variable that takes the value of "1" when the company uses "captive offshoring" and "0" when the company uses "offshore outsourcing".
Knowledge intensity	Proxy: percentage of low-skilled employees multiplied by (–1).
Interaction effect	The product of the two variables: offshoring mode and knowledge intensity.
	Control variables
Company size	Logarithm of the mean of the number of employees for the last five years available (2002–2006) for each company.
International experience	Number of years the company has been active in the international market.
Activity	Activity relocated abroad (dummy variable: R&D and product design, production, purchasing and distribution, sales activities and administrative activities).
Relative profitability	Progress of the company in terms of business results compared with its competitors as being (1) much worse than my competitors to (5) much better.
Cost drivers	Cost drivers for the use of offshoring strategies (factor loading).
Strategic drivers	Drivers related to strategic changes or process improvements (factor loading).
Resource drivers	Drivers associated with access to resources (factor loading).
Imitation drivers	Drivers related to competitors (factor loading).

3. Analysis and results

In order to detect potential problems of multicollinearity among the independent variables in the model, we first examined the bivariate Pearson correlations among all of the variables included in the model. The correlation matrix presented in Table 6 shows that, in general, the correlations are rather low. In fact, the highest correlation among the independent variables is 0.343, which is found between company size and international experience. This is below the usual threshold of 0.5 for detecting potential problems of multicollinearity. In addition, we calculated the variance inflation factors (VIF) associated with each of the variables in the model shown in Table 7. The VIF values were all less than 1.2, which indicates that this data does not seem to suffer from multicollinearity problems.

Table 6. Correlation matrix

	1	2	3	4	5	6	7	8	9	10
1.Offshoring mode	1									
2.Knowledge intensity	0.076	1								
3. Company size	0.240**	0.092**	1							
4. International experience	0.189**	0.043	0.343**	1						
5. Activity	0.166**	0.000	0.000	0.000	1					
6. Relative profitability	0.120**	0.079**	–0.008	0.075**	0.000	1				
7. Cost drivers	–0.123**	–0.121**	–0.094**	0.055*	0.000	–0.063**	1			
8. Strategic drivers	0.124**	–0.022	–0.028	–0.068**	0.000	0.023	0.000	1		
9. Resource drivers	–0.160**	0.119**	–0.024	0.005	0.000	–0.029	0.000	0.000	1	
10. Imitation drivers	–0.060	0.005	–0.064**	0.018	0.000	–0.127**	0.000	0.000	0.000	1
Mean	1.70	–40.75	5.00	28.63	3.43	3.49	0.00	0.00	0.00	0.00
S.D.	0.46	31.03	1.53	23.72	1.40	0.87	0.98	0.98	0.98	0.98
VIF	1.189	1.081	1.209	1.193	1.051	1.063	1.055	1.061	1.060	1.037

Notes: * $p < 0,05$; ** $p < 0,01$.

As the dependent variable in our model (essential activity) is binary (with the values of 0 and 1), the hypotheses were tested using a binomial logit regression model. In a binomial logit model, the likelihood that a company will offshore an "essential activity" versus a "non-core activity" will be:

$$P_i = P(Y_i = 1 | x_i) = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)} = \frac{1}{1+\exp(-x_i\beta)}, \quad (1)$$

where x_i is a vector that contains the individual characteristics for the company i on the independent variables (x) and β is a vector of parameters. The results of logit regression are shown in Table 7.

Table 7. Logit regression models (standard errors in parenthesis)

	Logit 1	Logit 2	Logit 3
Company size	0.073	0.032	0.038
	(0.061)	(0.063)	(0.064)
International experience	–0.003	–0.004	–0.005
	(0.003)	(0.004)	(0.004)
Activity (Baseline category = Production)			
R&D and product design	–0.679*	–0.784*	–0.730*
	(0.310)	(0.316)	(0.318)
Purchasing & distribution	–0.677*	–0.757*	–0.749*
	(0.294)	(0.300)	(0.302)
Sales activities	–0.024	–0.166	–0.144
	(0.272)	(0.279)	(0.280)
Administrative activities	–1.314***	–1.484***	–1.490***
	(0.297)	(0.307)	(0.308)
Relative profitability	0.020	–0.048	–0.009
	(0.107)	(0.111)	(0.112)
Cost drivers	0.016	0.071	0.074
	(0.088)	(0.091)	(0.091)
Strategic drivers	–0.174†	–0.199†	–0.255*
	(0.100)	(0.102)	(0.106)
Resource drivers	–0.061	–0.004	–0.009
	(0.090)	(0.093)	(0.094)
Imitation drivers	–0.042	0.005	–0.010
	(0.094)	(0.097)	(0.098)
Offshoring mode (Baseline category = offshore outsourcing)			
Captive offshoring		0.764***	1.539***
		(0.222)	(0.366)
Knowledge intensity		0.002	–0.010†
		(0.003)	(0.005)
Offshoring mode * knowledge intensity			0.018**
			(0.007)
Constant	0.701	0.840	0.178
	(0.510)	(0.560)	(0.614)

End of Table 7

	Logit 1	Logit 2	Logit 3
χ^2	38.05***	50.61***	57.97***
–2 log likelihood	704.3	691.8	684.4
Cox and Snell R^2	0.065	0.086	0.098
Nagelkerke R^2	0.089	0.117	0.133
Hosmer and Lemeshow Test (χ^2)	4.186	5.695	1.647
Correct classification (%)	66.0	67.3	67.6
N	565	565	565

Notes: † ≤ 0.10; * p ≤ 0.05; ** p ≤ 0.01; *** p ≤ 0.001.

In the first model (Logit 1), we only include the control variables, while we include the offshoring mode (captive or offshore outsourcing) and the knowledge intensity as independent variables in the Logit 2 model. The effect of the offshoring mode in the offshoring of essential activities is positive and significant. However, the main effect of knowledge intensity in the offshoring of essential activities is not significant. The substantial decrease of the –2 log likelihood value (12.5 for 2 degrees of freedom (d.f.) from Logit 1 to Logit 2 indicates that the Logit 2 model fits the data better than the model with only control variables (Logit 1).

In the third model, which is fully specified (Logit 3), we test all of our hypotheses. When moving from the Logit 2 model to the Logit 3 model, the – 2 log likelihood value (7.4 for 1 d.f.) decreases, indicating that the Logit 3 model offers a better fit with the data. In this model, we introduce the interaction effect between the offshoring mode and knowledge intensity. The offshoring mode is highly significant (p = 0.000) and positive, as hypothesized. This indicates that when activities close to core activities are offshored, captive offshoring is typically the mode of choice. As such, this result supports hypotheses 1 and 2. The interaction term that is added in order to test hypothesis 3 is also positive and significant, which indicates that the relation between captive offshoring and the offshoring of essential activities is stronger in companies that are more knowledge intensive, as hypothesized. To facilitate the interpretation of the interaction effect, we used the procedure outlined by Aiken and West (1991) in that we plotted the high and low levels of each variable (one standard deviation above and below the mean). Figure 5 depicts the interaction effect related to Hypothesis 3.

The highest level of offshoring of essential activities is found in the case of captive offshoring by firms with high knowledge intensity. The plot reveals that the choice of offshoring mode (captive offshoring) has little impact on the offshoring of essential activities in firms with low knowledge intensity (a flat line with a slope close to zero), while captive offshoring substantially increases the level of offshoring of essential activities in firms with higher levels of knowledge intensity (the line with the steep increase).

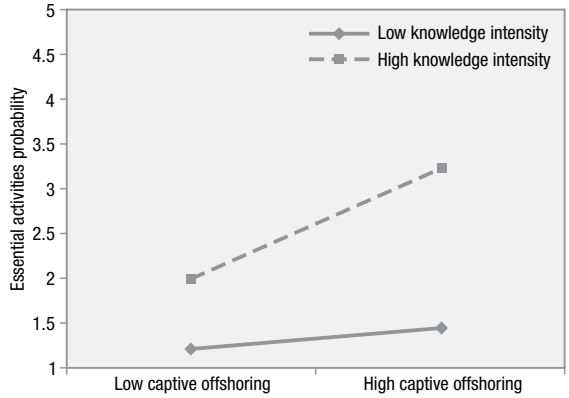


Fig. 5. Graph of offshoring modes and knowledge intensity

Conclusions

Recent decades have brought a dramatic increase in the amount of both captive offshoring and offshore outsourcing. This wave of offshoring and relocating of value chain activities has been fueled by changes in the political and regulatory environments of host countries, which have eased considerably. Other contributing factors include more efficient, less expensive information and communication technologies, and new techniques for organizing the value chain, such as fine slicing and standardization of interfaces among activities. In addition, the intensification of global competition implies that many companies cannot afford to put all of their eggs in one basket; in other words, they cannot assume that they can get access to the most advanced innovations, knowledge and talented people in a single location (the home country). Instead, companies are increasingly forced to create a global network that enables them to tap into knowledge in other parts of the world. This implies a need to offshore more knowledge-based activities. This global networking trend, in turn, makes supply chains longer and more fragmented (Christopher *et al.* 2011).

Interestingly, this wave of offshoring not only includes manufacturing, IT and more standardized activities, where offshoring is driven by cost savings and mainly involves low-skilled labor, but it also includes more advanced activities, like research, design, engineering and product development, as highlighted in many studies (e.g. Lewin, Cuoto 2006; Baden-Fuller *et al.* 2000). This study, which is based on 263 European companies, confirms that although more traditional activities capture the major part of offshoring, more advanced and knowledge-based activities also take a significant part. As our data show, R&D and product design activities represent approximately 15% of all offshoring (79 out of 565 offshoring operations). It has been suggested in the literature that offshoring is shifting from the relocation of standardized activities to the offshoring of more advanced and knowledge-intensive processes, activities that require domain expertise, subject expertise and higher-end professional talent. This claim might go too far, as most offshoring is still driven by cost savings considerations, at least in part.

However, the offshoring of more advanced activities is certainly not insignificant. This raises a number of interesting research questions, particularly because the theoretical development in this area has been slow.

The conventional theoretical wisdom, which is based on transaction cost theory and the resource based view, is that companies should keep their core activities close to headquarters. The main argument in this respect is that companies should do everything possible to protect their core activities. The offshoring or outsourcing of core activities might entail a risk that others could steal or imitate key knowledge, as it will be more difficult to control core activities that are offshored or outsourced.

The biggest challenge is to understand the extent to which the theoretical focus on the protection of core activities aligns itself with the empirical findings related to the rising trend of offshoring advanced activities that are close to the core. In this paper, we have argued that a finer-grained concept of core versus non-core activities is needed, a concept that is generally in line with the increased fine slicing of the value chain activities (Jabbour 2012). The classification of activities as either core or non-core may lead to serious oversimplifications of the complexity of the activities, as some activities obviously are closer to the core than others. As a first step in achieving this more fine-grained understanding, we propose that distinctions be made among three types of activities: 1) true *core activities* that are the really distinctive and crucial activities; 2) *essential activities* that are complementary to core activities and highly important; and 3) *non-core activities* that are more peripheral but still relevant to the success of the company. In fact, essential activities are often originally viewed as core activities but are later separated out as companies upgrade and redefine their core activities. Typically, true core activities center around more architectural competences, while more operational activities are separated out (fine sliced). When the relevant interfaces between these and other activities are in place, such activities can be offshored or outsourced.

We developed three hypotheses based on the ideas that essential activities can, in fact, be offshored to a company's own subsidiary (captive offshoring), and that such offshoring will be even more pronounced among knowledge-intensive companies. The hypotheses were tested in a logit regression model using data on 565 cases of offshoring (spanning five different activities). The hypotheses were basically supported. In general, we view the results as confirmation that some activities closer to the core (essential activities) can be offshored successfully using a captive mode. Although most companies prefer to be highly protective and keep their core activities close to the headquarters, we suggest that the results indicate that companies are increasingly being forced to open up to more knowledge-based offshoring in order to be able to source knowledge and talent in other parts of the world.

This study shows that size and international experience are not determinants of the type of activity offshored. Any company, regardless of its size and international experience, can offshore essential and non-essential activities. However, the nature of the activity (R&D, production, purchasing, sales, or administration) seems to influence decisions on whether to offshore essential activities. Essential activities are more likely to be

offshored in production than in R&D, purchasing or administration. Finally, the results indicate that the decision to offshore essential activities is driven by strategic considerations and not by such factors as cost, resource or imitation, and they show that essential activities are typically offshored using the captive mode, while offshore outsourcing is commonly used to offshore non-core activities. Moreover, the use of captive strategies to offshore essential activities is more pronounced in knowledge-intensive firms where the interfaces among the different activities are less standardized.

Managerial relevance

These results offer managers and CEOs an integrative tool that may help ease decisions regarding offshoring modes (captive versus offshore outsourcing). Our analysis suggests that this important choice is typically based on the type of activities to be offshored. An analysis at the activity level has been frequently been advocated (Ørberg 2011; Contractor *et al.* 2010; Ørberg, Pedersen 2010; Buckley, Ghauri 2004), and this paper moves the level of analysis from the macro level to the micro level. As each generic activity in the value chain can be divided into sub-activities (see Fig. 2), the CEO's role in identifying the parts of an activity that can be unbundled is important. Furthermore, CEOs must understand that the distinction between core and non-core activities is not dichotomous but continuous. In addition, they need to understand that this distinction is not static – it may change depending on the continuous identification and evaluation of activities carried out by the CEOs. Therefore, it is not static.

The results of this study confirm what some authors have suggested: "The very nature of the activities or business functions and the strategic objective of the focal firm can influence the decision-making process of the managers at the disintegration stage" (Kedia, Mukherjee 2009:259). This paper can serve as a reference point for further analyses of the implementation of offshoring strategies in multinational enterprises. The importance of these strategies, especially in manufacturing companies, and the trends toward fine slicing the value chain and offshoring more advanced activities support our research.

In conclusion, we stress that the study and analysis of the offshoring phenomenon require more attention from academics, companies and European institutions if we are to know more about the true reality associated with these strategies. As Kedia and Mukherjee suggest, "additional research should be conducted to clearly identify what activities of the firm can be unbundled and what activities should remain under the hierarchical control" (2009: 259). In this sense, this paper offers a number of results that can be useful for companies that are considering the implementation of offshoring strategies, and for companies that are considering a shift in their offshoring strategies.

Limitations and future research

This study presents some limitations that should be considered in future research. The first one is related to the sample. The sample used is covering the use of offshoring strategies in European multinationals and it does only include information for companies that do conduct offshoring. It does not include information about the not-chosen alternatives; therefore it's not possible to analyze one of the important decisions in the IB

literature – *whether or not to offshore*. These data only allows to analyze the important decisions on *how to organize offshoring activities (captive or not),* which is depending the strategic importance of the activities (essential or not).

This study is focused on the fine-slicing of the value chain, and makes a conceptual distinction between core, essential and non-core activities. However, the data only allows us to analyze the use of offshoring mode in essential and non-core activities, assuming that core activities are not susceptible to offshoring. Basically, we don't have information on core activities that allow us to analyze if companies use offshoring strategies for core activities. Future research should include these activities in order to offer a more complete model of offshoring decision.

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