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# Determinants of foreign direct investment: evidence from a questionnaire survey in the Japanese manufacturing sector

Kazuo Kadokawa\*

This paper explores the results of a questionnaire survey investigating the determinants of foreign direct investment (FDI) by Japanese manufacturing firms from 1994 to 2009. Specifically, the questionnaire asked the respondent firms their reasons for considering foreign rather than home country locations, as well as major obstacles to undertaking FDI. Although labour availability and proximity to markets, supplier firms and raw materials are key determinants, this study reveals that there are significant variations among manufacturing industries. The analysis also reveals differences among industries with regard to obstacles to undertaking FDI and reasons for preferring a home country location.

## 1. Introduction

This study examines the reasons for which Japanese manufacturers consider offshore production and also explores the advantages of the home country that discourage foreign direct investment (FDI). It also highlights cross-industry variations in the determinants of FDI in the Japanese manufacturing sector. Compared with other large, developed economies, Japanese outward FDI relative to its economic size is exceptionally small (OECD, 1998). Although recent Japanese manufacturing has been increasingly globalized, only 5.3 per cent of the owners of new plants, surveyed from 1994 to 2009, responded that they had considered offshore production. The cause of this idiosyncrasy of the Japanese manufacturing sector has not been sufficiently studied.<sup>1</sup> This study, therefore, investigates the mystery of Japanese firms' exceptional level of preference for the home country.<sup>2</sup>

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<sup>1</sup> The present study follows the line of empirical studies based on the home country of investing firms (e.g. Schroath et al., 1997; Zhao and Zhu, 2000; He, 2003).

<sup>2</sup> This survey study offers more policy-relevant evidence on the actual location decisions than do econometric studies. The "policy-turn" of research has recently been advocated by several economic geographers (Lambooy and Boschma, 2001; Markusen, 2001, 2003; Martin, 2001; Massey, 2001), a resurgence of interest stimulated by the controversial findings of the World Development Report 2009: Reshaping Economic Geography.

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This study explores the questionnaire survey data collected by an affiliated organization of the Ministry of Economy, Trade and Industry (METI). The subject of the survey were newly built or relocated manufacturing plants in Japan from 1994 to 2009.<sup>3</sup> This questionnaire first asked why firms considered foreign rather than domestic locations.<sup>4</sup> Second, it asked why firms remained in the home country.

The questionnaire survey also assessed the impact of policy incentives. Recent empirical studies on FDI are increasingly oriented towards the impact of policies to promote FDI inflows.<sup>5</sup> For instance, many studies note that intra-firm exchange rate management is one of the most important reasons for FDI decisions. Froot and Stein (1991) observed increasing inward FDI during the period of exchange rate depreciation in United States. Klein and Rosengren (1994) confirmed that currency depreciation accelerated FDI inflows through an analysis of various United States data, categorized by the country and type of FDI. The studies of Grubert and Mutti (1991), Swenson (1994) and Kogut and Chang (1996) highlighted M&A cases. Lipesey (2001) and Desai, Goley and Forbes (2004) focused on the period of currency crises in Latin America. Blonigen (1997) demonstrated that real US dollar depreciation against the Japanese yen encouraged Japanese FDI to the United States; Blonigen and Feenstra (1997) indicated that the threat of United States market protection and trade barriers stimulated Japanese FDI to the United States.

Several studies have suggested that the foreign tax rate is an alternative explanation for changes in FDI flows. Hartman (1984, 1985) originally investigated the impact of tax controls on FDI. Slemrod (1990) focused upon double taxation issues. Scholes and Wolfson (1990),

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<sup>3</sup> The questionnaire survey has been a popular tool in location study (Hoover, 1948; Greenhut, 1959; Wheat, 1986; Moriarty, 1980; Schmenner, 1980, 1982; McLaughlin and Robock, 1983; Stevens, 1985; Blair and Premus, 1987; Yoshida, 1987; Glasmeier and Glickman, 1990; Herzog and Schlottman, 1991; Barkley and McNamara, 1994), however, certain studies criticise the questionnaire approach (Nishioka and Krumme, 1973; Cobb, 1982; Calzonetti and Walker, 1991).

<sup>4</sup> The host country determinants of FDI are, in general, categorized into three groups: economic, business facilitation and policy framework (Caves, 1996; Dunning, 1993, 1998; UNCTAD, 1998). The economic determinants can be further classified into three subgroups: market-seeking, resource-seeking and efficiency-seeking. The questionnaire explores the importance of economic determinants to identify the most highly prioritized economic reason.

<sup>5</sup> See De Mooij and Ederveen (2003) for a review of relevant studies.



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Swenson (1994) and Hines (1996) investigated cases in the United States with additional details. Other empirical studies examined the role of foreign institutions (Wheeler and Mody, 1992; Hines, 1995; Wei, 2000a and 2000b) and regulations such as trade barriers (Kugut and Chang, 1996; Blonigen, 1997; Belderbos, 1997; Blonigen, 2002). All these empirical findings yield fairly convincing results in explaining changes in FDI flows.

As discussed later, China is the most popular destination for Japanese manufacturing FDI, and an increasing number of recent empirical studies have investigated FDI flows between China and Japan. Schroath et al. (1993) demonstrated that Japanese joint ventures were most concentrated in the north-eastern provinces of China, and they attributed the reason for this pattern to the proximity to the home market and local cultural factors. Qu and Green (1997) suggested that Japanese manufacturing FDI sought larger city size, a higher consumption level and a more advanced industrial infrastructure, whereas direct investors from Hong Kong (China) were more concerned with cultural ties and geographical distance to the home country. Zhao and Zhu (2000) showed that Japanese firms' location decisions were more driven by the availability of resources, whereas the decision of United States and European firms emphasized the importance of higher labour productivity and local market demand. He (2003) specifically studied the general cross-industry variations in FDI location decision.

Several empirical studies have highlighted the impact of the unique Japanese production system on firms' location decision. Smith and Florida (1994) and Head et al. (1995, 1999) observed that Japanese investments were directed to regions where other similar investments were concentrated. They underscored the role of the *keiretsu* and its vertically integrated production system. Zhou et al. (2002) suggested that the agglomeration of Japanese subsidiaries positively affected subsequent destination choices of other firms. An analogous trend was observed in a Chinese case study by Cheng and Stough (2006) and in a French case study by Crozet et al. (2004).<sup>6</sup>

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6 In addition, recently, the host country determinants of FDI have been well researched, as well as similarities and differences between home and host country characteristics, which, for example, include multinational firms' knowledge-capital FDI strategies (Carr, Markusen and Maskus, 2001; Markusen and Maskus, 2002), multinational firms' vertical production networks in international trade (Hanson, Matalogi, Slaughter, 2005), knowledge spillover through Japanese multinational firms'

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This paper contributes to this line of research by revealing Japanese firms' actual FDI determinants. The studies reviewed thus far highlight many important geographical advantages such as proximity to markets, access to raw materials, concentration of related firms, infrastructural support, input resource availability and cultural differences. The present study discusses those empirical findings on the basis of a survey. Although many empirical studies apply advanced econometric methods, econometric analysis neither guarantees any cause-and-effect relationship nor offers any prioritization of factors determining firms' location. Thus, to ensure and re-examine the findings of those econometric studies, this paper provides further evidence from a location survey.

In contrast to studies that aggregate all industries, this study focuses particularly on industry-specific FDI determinants and examines whether the cross-country variations in their choice can be explained by the nature of individual industries. Cross-industry variations in the determinants of FDI is suggested by Klein and Rosengren (1994). Beyond cross-industry variations, many studies find inter-firm diversity in location strategies; examples include the application of the product life-cycle theory (Malecki, 1981; Galbraith and DeNoble, 1988; Begg and Cameron, 1998), local culture and values preferred by high-tech firms (Haigh, 1990; Nohria and Ghoshal, 1994), the nature of plants and operational strategies (Galbraith and DeNoble, 1995; Ferdows, 1997; Khurana and Talbot, 1998; Brush, Maritan and Karnani, 1999; Vereecke and Van Dierdonck, 2002; Ketels, 2005) and high-tech firms' competitive strategies (Galbraith, Rodriguez and DeNoble, 2008). Following this line of research, the present study contributes evidence of differentiated FDI determinants across industries and examines its rational.

This study applies three multivariate statistical techniques: cluster analysis, correspondence analysis and logistic regression analysis. The multivariate statistical approach for categorical analysis was introduced to social science by Altman (1968), who developed a bankruptcy prediction model. Since Altman, multivariate statistical analysis has been applied in a wide range of research.<sup>7</sup> For example,

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FDIs (Branstetter, 2006). See Blonigen (2005) for a more comprehensive review of the studies on multinational firms' FDI determinants.

<sup>7</sup> See also Ketchen and Shook (1996) for a literature review of studies based on cluster analysis.

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in economic geography, Hill and Brennan (2000) suggested that discriminant analysis combined with cluster analysis was useful for identifying the drivers of industrial clusters.<sup>8</sup> Moreno and Casillas (2007) distinguished between fast-growing SMEs and stagnating SMEs on the basis of several management features of firms, and concluded that high-growth SMEs were characterized by smaller size, high accessibility to idle resources and low availability of financial resources. Gellynck, Vermeire and Viaene (2007) investigated the role of regional networks in innovation processes and used discriminant analysis to discover two innovation potentials; inter-firm networking within region and intra-firm orientation towards international markets. Scott (2008) applied discriminant analysis for the exploration of the spatial correlation between flexible production and design-intensive outputs. Borzacchiello, Nijkamp and Koomen (2010) applied discriminant analysis for identifying group characteristics of urban locations with better transport accessibility.

As mentioned above, multivariate techniques are a widely used analytical approach in management studies. Among various methodologies, this study uses cluster analysis, correspondence analysis and logistic regression analysis. Cluster analysis is used to classify industries on the basis of their FDI determinants, and correspondence analysis is used to illustrate both qualitative and quantitative relationships between determinants and industries. Logistic regression analysis is often considered a qualitative multi-regression analysis comparable to discriminant analysis. This study applies logistic regression analysis rather than discriminant analysis. Since the types of data analysed here are binary categorical data, logistic regression analysis is more advantageous than discriminant analysis, in which the interpretation of the result is similar to that of usual regression analysis.

The structure of this paper is as follows. First, the data and the method of the questionnaire survey are described. Second, the overall result of the questionnaire survey is briefly explored. Third, cluster analysis is performed across industries, classifying industries into three groups on the basis of their FDI determinants. Fourth, the result of logistic regression analysis describes the industry groups and identifies

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<sup>8</sup> See also Hill et al. (1998) and Baum et al. (1999).

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the most important factors that encourage or discourage Japanese FDI. In conclusion, the inter-industrial characteristics of the determinants are compared between the groups.

## 2. Data

The questionnaire data used in this study are published annually by the Japan Industrial Location Center (JILC), which is an affiliate of the Ministry of Economy, Trade and Industry (METI). The objective of the questionnaire survey is to investigate the reasons for location choice of new plants in Japan, and the results are used for the reorganization of land development and the improvement of location efficiency. The scope of the subject (the respondents) and the timing of the survey are the following.

- Subject: two-digit SIC manufacturing industries
- Scope: all new plants (including research institutions) that bought or rented more than 1,000m<sup>2</sup> of land
- Timing: when the contract is made between the owner and buyer (debtor) of the land

New plants include those of both existing and new firms. Plants whose size is smaller than one thousand square metres are excluded from the subject.

The survey was conducted as follows. Managers of new plants receive an identical questionnaire with detailed instructions, a list of reasons for considering foreign locations and a list of reasons for eventually choosing a domestic location. The managers are required to choose the primary and secondary reasons separately; they can choose only one primary reason and up to two secondary reasons. The frequencies with which those reasons are selected are the subject of this study. Due to the limited number of respondents, the frequencies of the primary and secondary reasons are aggregated; therefore, the subject of the analysis becomes the three most important reasons for investing or not investing in foreign countries.

The questionnaire data analysed in this study were generated from 1994 to 2009, although the data are available since 1989. This period was identified because, first, the list of reasons varies from

period to period and a temporal comparison becomes difficult without a consistent list of reasons. Second, since the period is relatively recent, the reasons offered to the respondents are well refined and selected through consideration of the past results.

**Table 1. Determinants of FDI**

<i>Why did you consider foreign production and what is the main reason?</i>	<i>Why did you choose domestic production rather than foreign production and what is the main reason?</i>
<ul style="list-style-type: none"> <li>• <b>Geography and Cultural Factors</b> <ul style="list-style-type: none"> <li>Proximity to market</li> <li>Proximity to raw materials</li> <li>Availability (cost) of labour</li> <li>Availability (cost) of land</li> </ul> </li>   <li>• <b>Industrial Cluster Factors</b> <ul style="list-style-type: none"> <li>Proximity to related firms</li> <li>Access to advanced technology</li> </ul> </li>   <li>• <b>Policy Control Factors</b> <ul style="list-style-type: none"> <li>Support from government</li> <li>Industrial infrastructure</li> <li>Exchange rate management</li> <li>Trade barrier and regulation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Geography and Cultural Factors</b> <ul style="list-style-type: none"> <li>Proximity to raw materials</li> <li>Proximity to market</li> <li>Good relationship with labour union</li> <li>Language and cultural familiarity</li> </ul> </li>   <li>• <b>Industrial Cluster Factors</b> <ul style="list-style-type: none"> <li>Proximity to related firms</li> <li>Labour quality and skills</li> <li>Graduates with science degrees</li> <li><b>Access to research institutions</b></li> <li>Better business services</li> <li>Advanced logistic services</li> </ul> </li>   <li>• <b>Policy Control Factors</b> <ul style="list-style-type: none"> <li>Support from government</li> <li>Industrial infrastructure</li> <li>Political risks and public safety</li> </ul> </li> </ul>

Table 1 lists 10 reasons for which plant managers considered offshore production, and 13 reasons for choosing domestic production in the end. The former reflect advantages found in the East and South-East Asian countries, and the latter reflect those in Japan. As indicated in the table, each reason is classified in one of the three categories: geographical and cultural factors, industrial cluster factors and policy control factors, as organized by the author. Geographical and cultural factors characterize the unique economic and cultural conditions inherent to each country, whereas the latter two categories are factors controllable through private or policy measures. Industrial cluster factors primarily represent the advantages of Marshall's industrial cluster,

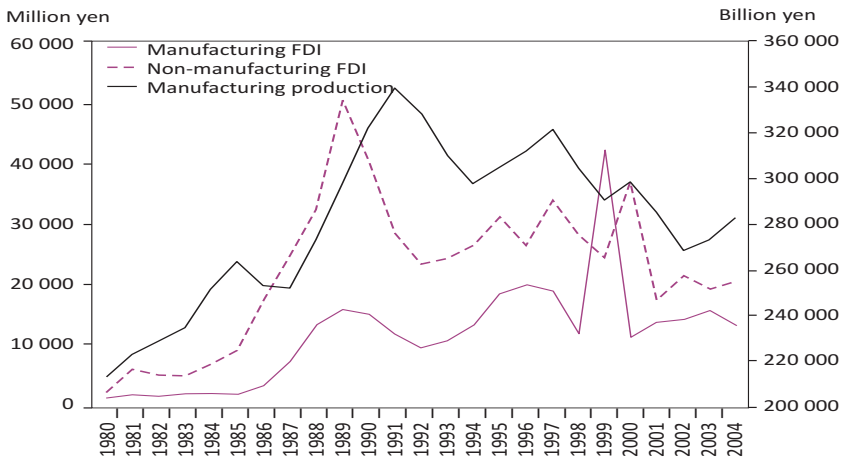
which include development of supporting firms and industries, shared inputs and resources, skilled labour pool and knowledge spillovers. Policy control factors, in contrast to the industrial cluster advantages formed by private firms, are related more to public organizations' policy planning. As this study is concerned with the significance of domestic policy, this last category is of great importance.

However, the definition of the third classification is by no means clear. Industrial infrastructure can also be considered as one of Marshallian advantages, when viewed as a shared input resource, although it remains controlled by policy measures. While potential problems exist in this categorization, it remains useful to generalize the reasons into these categories to identify the properties of individual reasons. The concluding section discusses the overall impact of these grouped determinants for each classified industry group.

### 3. Overview of the survey results

Before describing the general results of the location survey, this section briefly reviews the current trends of Japanese FDI.

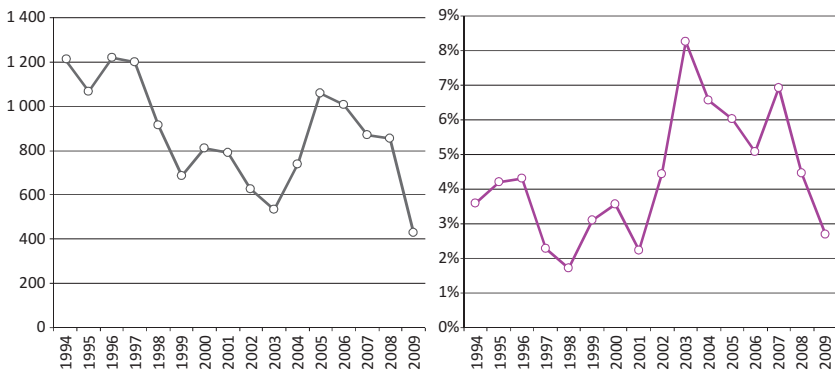
**Figure 1. The value of FDI of manufacturing and non-manufacturing sectors (left axis) and domestic production of manufacturers (right axis)**



Source: Japan External Trade Organization (JETRO) and the Ministry of Economy, Trade and Industry (METI).

Figure 1 illustrates the value of the manufacturing sector's FDI and domestic production. Both FDI and domestic production had grown until the end of the bubble economy in 1990, after which the growth of FDI ceased and the level has been declining since then. It is clear that the volume of manufacturing FDI is positively associated with domestic manufacturing production, although there seems to be a time lag and an irregular leap in 1999. Thus, it is fair to state that FDI is positively correlated with domestic economic and manufacturing expansions.

**Figure 2. Annual number of samples in the survey (left) and the percentage of samples whose managers said that they have considered a foreign location (right).**



In Figure 2, the graph on the left represents the annual number of respondents in this survey, which reflects the number of plants that acquired at least one square kilometre of land for plant construction from 1994 to 2009. The graph on the right presents the share of those who considered a foreign location among new plants' managers. Although the overall trend differs between the two graphs, their fluctuations roughly correlate with one another, the more plants are constructed on domestic land, the more plant managers tend to consider FDI. However, while there is a periodic instability in the consideration of FDI, less than 10 per cent of plant managers considered FDI throughout the study period. The average is 5.3 per cent, indicating that approximately 95 per cent did not consider foreign locations at all.

In particular, for the Japanese manufacturing sector, neighbouring countries such as China and other South-East Asian economies offer lower cost inputs and resources than the home country. Nevertheless,

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figure 2 illustrates that Japanese manufacturers are markedly reluctant to take advantage of the benefits of offshore production. Why do they not exploit low-cost production inputs and resources available in neighbouring countries? What are the location factors that tie manufacturing plants to the home country? How do firms strategically decide upon location region? Does the strategy vary across industries? These are the questions that this study addresses.

The rest of this section briefly examines the overall result of the questionnaire survey. There were 5,495 plants constructed in Japan from 1994 to 2009, and only 293 of them indicated that they had considered locating in a foreign country; more importantly, all of them eventually remained in the home country. The subject of this study is the responses from these 5.3 per cent of the plants that considered FDI.

Figure 3 illustrates the economies identified as the best destination for FDI by plant managers. The total number of plant managers who considered a foreign location was 293 and the percentage represents the frequency with which the economy was chosen as the best destination by them. The most frequently considered country is China, followed by the South-East Asian countries. Common characteristics shared by these countries are inexpensive labour, abundant land and proximity to the Japanese market.

**Figure 3. FDI destinations considered by plant managers**

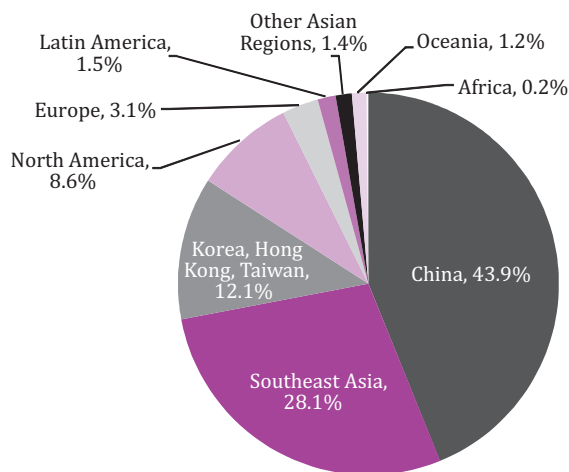




Table 2 illustrates the industry breakdown of plant managers who considered FDI. High-tech industries such as general machinery, electrical machinery and fabricated metal industries are the most likely investors in a foreign location.

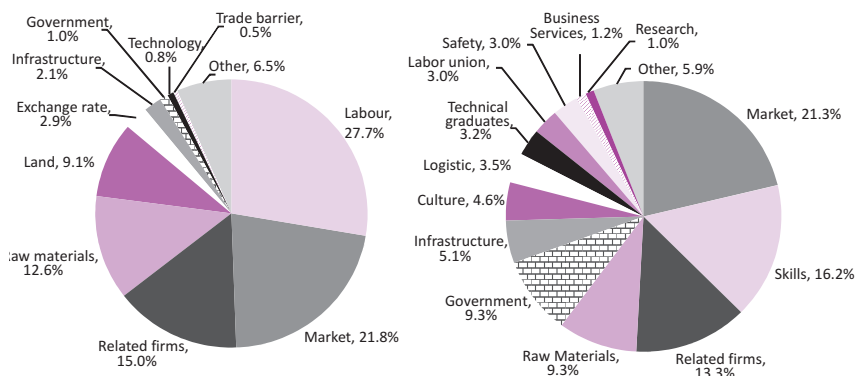
**Table 2. The share of plant managers considering FDI by industry**

Industry	per cent	Industry	per cent
General Machinery	13.6%	Transportation Equipment	2.1%
Fabricated Metal	12.7%	Furniture	1.9%
Electrical Machinery	12.0%	Beverages	1.8%
Plastic	11.8%	Rubber	1.6%
Food	10.9%	Textile	1.4%
Chemical	9.0%	Pulp	1.4%
Ceramic	4.1%	Iron & Steel	1.4%
Miscellaneous	3.2%	Precision Instruments	1.2%
Apparel	2.8%	Leather	0.9%
Lumber	2.8%	Non-Ferrous Metal	0.9%
Printings	2.5%	Petroleum	0.0%

Figure 4 depicts the reasons for considering foreign locations and their frequency. First, the most important reason for considering foreign locations is the availability (cost) of labour, at 27.7 per cent of the total. In addition, the survey revealed that proximity to markets, raw materials and suppliers are important reasons. From the pie chart on the left, it is apparent that input- and proximity-related determinants are more important than policy-related advantages and factors related to business facilitation.

The findings are consistent with those of Guisinger (Guisinger, 1985, 1989, 1992), demonstrating that FDI decisions are made primarily on the basis of economic deliberations that focus particularly on reducing production costs. In addition, although Blonigen (1997) and Blonigen and Feenstra (1997) attributed importance to the roles of exchange rate management and trade barriers, respectively, for Japanese FDI, the present study found the impact to be minor. However, it should be noted that Mytelka (1998) and Phelps et al. (1998) demonstrated that once the destination region was broadly identified, policy incentives played a decisive role in choosing a specific country within a region.

**Figure 4. Reasons for considering FDI and their frequency**



Further, regarding the reasons for choosing a domestic rather than foreign location, proximity to markets, supplier firms and raw materials make up 43.9 per cent of the total, with the general quality of domestic labour (16.2 per cent) as another leading reason. Firms also emphasize government support (9.3 per cent) and industrial infrastructure (5.1 per cent). It is interesting that the respondents worry, to a certain extent, about cultural, language and safety issues in the host countries as noted by Schroath et al. (1993).

While dominant FDI determinants are production input and proximity-related reasons, the reasons to stay in the home country relate more to Marshallian agglomeration advantages. Marshall noted four localized advantages sustaining industrial agglomerations: a skilled labour pool, development of supporting industries, knowledge spillovers and shared input resources. Evidently, a skilled labour pool and supporting industries are associated with the reasons of labour skills and proximity to related firms, respectively, and shared input resources are represented by industrial infrastructure and support from government.

#### 4. Cluster and correspondence analysis

The first half of this empirical section classifies 20 manufacturing industries into industrial groups, and describes the groups based

on their reasons for considering foreign locations.<sup>9</sup> The following hierarchical cluster analysis identifies three large groups of industries.

Figure 5 displays a cluster dendrogram of the overall similarity and dissimilarity among FDI determinants across industries. The method applied in drawing the cluster dendrogram is Ward and the distance Euclidian. The figure identifies three groups of industries: groups 1, 2 and 3, each of which aggregates industries sharing similar FDI determinants. Group 1 consists of light manufacturing industries (food, beverage, lumber, furniture and pulp) while the industries in the other two groups are rather mixed. The percentages of the respondents of groups 1, 2 and 3 are 19.0 per cent, 30.2 per cent and 50.7 per cent, respectively.

**Figure 5. Cluster dendrogram of location reasons for plant managers considering FDI**

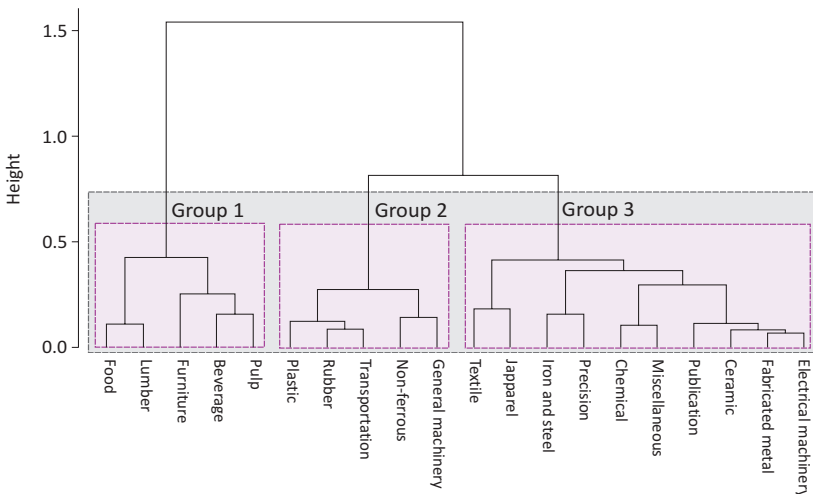
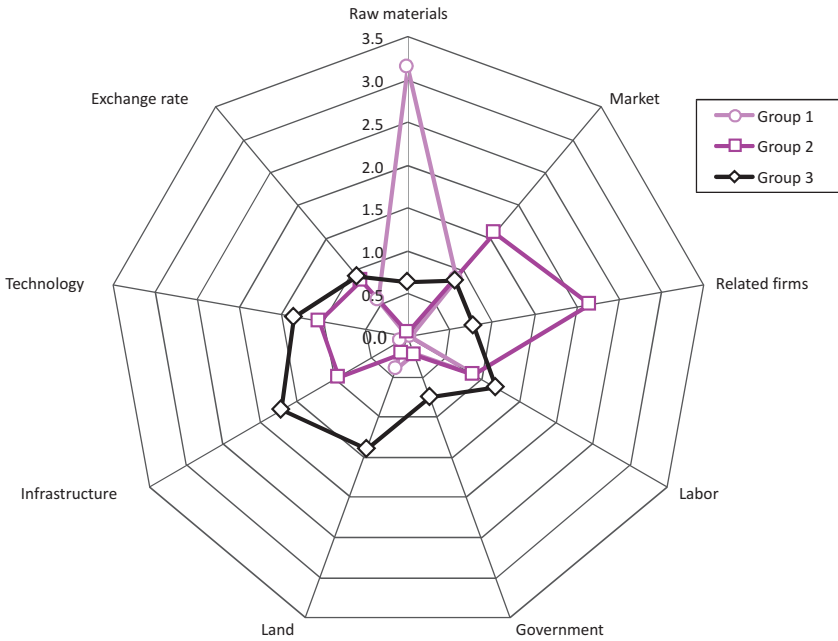


Figure 6 represents how these three industry groups are different in their average profile of FDI determinants. The values used in drawing the radar chart are the average frequency of each determinant chosen by group members over that of the total. Thus, based on figure 6, we can interpret the group characteristics of FDI determinants as follows. First, the average frequency of proximity to raw materials is markedly

<sup>9</sup> Although there were originally 22 manufacturing SIC industries, the leather and petroleum industries are excluded from the data beforehand, because there were insufficient samples to describe their profiles of FDI determinants.

high for group 1. This result is expected because light manufacturing industries, particularly the food industry, are more dependent on raw material than other industries.

**Figure 6. Radar chart of average choice frequency percentages of each industrial group**



The most important determinants for the location choice of group 2 are the proximity to related firms and markets. This group consists of high-tech industries such as general machinery and transportation equipment. Since the general machinery industry is the largest direct investor abroad, this result implies that the advantages of developed input-supplier relationships and larger market size abroad have a meaningful impact of the prospects of the overall Japanese FDI. The necessary transport costs might be relatively higher than those of other industries, which might explain the emphasis on market proximity. For group 3, the average choice frequency is more evenly balanced. This occurs partly because the group is the largest and reflects the average of all industries. However, the group average is higher for

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labour availability, land availability, infrastructure support and access to technology.

**Figure 7. Correspondence analysis of the first survey data**



Figure 7 presents the result of correspondence analysis as a point of reference. Correspondence analysis is effective in plotting variables (reasons) and samples (industries) in the same dimensions with a consistent scale; here, 61 per cent of the total variance of the statistics is explained by the two axes. These axes can be interpreted as the distribution of location reasons. The largest horizontal deviation is observed for raw materials to the right and related firms to the left, while the other reasons fall between those two. This indicates that industries plotted to the right more highly prioritize proximity to raw materials, and those positioned to the left more highly prioritize proximity to related firms. Regarding the vertical axis, policy-related determinants are distributed upward. Moreover, industries plotted in the upper half more highly prioritize policy control factors, whereas others more highly prioritize proximity to raw materials, related firms and markets.

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Based on this distribution, the overall dissimilarities among industry groups are clear, and the grouping is reasonably consistent with that of the cluster dendrogram as well as the average characterization of each industry group in figure 6. The distribution of industries in group 1 leans towards raw materials, which means that group 1 industries seek proximity to raw materials in their choice of FDI destination. The distribution of group 2 industries follows proximity to related firms, and group 2's FDI decision is more oriented towards an agglomeration of related firms. Group 3's distribution is parallel to that of other location reasons, many of which are associated with determinants in policy control factors. Thus, the distributions of those groups are clearly differentiated from one another.

The results of these basic analyses can be linked to an existing line of studies that assert the location of industrial clusters and specialization is largely governed by "natural advantages", which include climatic and geological factors that determine the availability of raw materials and transportation routes (Dicken and Lloyd, 1990; Glaeser et al., 1992; Gordon and McCann, 2000). The finding that traditional light manufacturing industries such as the food, lumber, pulp and beverages industries are attracted to the availability of raw materials is consistent with the "natural advantage" concept

These findings also underscore the important role of industrial and production relationships in the plant location decision.<sup>10</sup> Economic geographers attribute the differences in economic performance to "untraded interdependency" and "relational assets" founded upon specific localized networks (Amin and Thrift, 1994; Martine and Sunley, 1996; Storper, 1997; Amin, 1999; Harrington et al., 2003; Gartler, 2005). Spatial proximity is essential for developing "relational assets" from localized learning and regional innovations systems (Malmberg and Maskell, 1997; Cooke and Morgan, 1998).<sup>11</sup> The local development

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<sup>10</sup> Industrial linkages, other than in research, have been repeatedly emphasized in the studies of economic geography; for example, industrial networks (Håkansson, 1989), production complex (Scott & Storper, 1992), value chain in industrial clusters (Porter, 1990), innovation systems (Lundvall, 1992), industrial systems (Saxenian, 1994) and business systems (Whitley, 1995).

<sup>11</sup> In addition to these theoretical developments, many empirical studies, mainly case studies, are generated by examining the influence of intellectual resources and social and venture capital networks (Saxenian, 1991; Baptista, 1996; Suarez-Villa, 2002; Sorenson, 2003; Stuart and Sorenson, 2003; Alcacer and Chung, 2007).

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of an industry complex in a foreign country affects more group 2 industries (Smith and Florida, 1994; Head et al., 1995, 1999; Zhou et al., 2002), and the influence of industrial networks is effective even in the international context.

With all groups classified by their unique FDI determinants, the next step is to identify those location reasons that discriminate each group from the others. The next section performs logistic regression analyses to characterize each industry group.

## 5. Logistic Regression Analysis

The result of logistic regression analyses is presented in table 3, identifying several significant location reasons for each classified industrial group. In the first group, the greatest pseudo  $R^2$  is observed for proximity to raw materials and the value is one. This indicates that only industries in group 1 chose proximity to raw materials as the important determinant, but none of the other groups; therefore, the importance of access to raw materials perfectly distinguishes the location behaviour of group 1 from others. The pseudo  $R^2$  of proximity to related firms is 0.71 and the coefficient is negative, indicating that such proximity has a negative impact on classifying industries into group 1. In addition, those in group 1 chose proximity to related firms less frequently.

The logistic regression model revealed that the FDI determinants of group 2 are the reverse of group 1's. For group 2, the higher pseudo  $R^2$  is proximity to related firms and markets with positive coefficients, whereas the second highest pseudo  $R^2$  is proximity to raw materials and the coefficient is negative. Therefore, the behavioural characteristics of the second group are opposite of those of the first group. Thus, while the FDI decision of group 1 strictly depends on proximity to raw materials, the decision of group 2 is significantly influenced by proximity to markets and related firms.

Group 3 is clearly distinguished from the other two groups and more frequently chooses land availability, which has only a minor inverse impact on describing groups 1 and 2. Although the significances are minor, labour availability also has a positive impact, and the coefficients of all proximities to raw materials, market and related firms

**Table 3. Logistic regression analysis**

	Group 1					Group 2					Group 3				
	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC
1 Proximity to raw materials	-76.91	299.30	0.00	1.00	4.00	0.94	-42.65	10.73	0.52	14.73	0.72	-4.66	24.72	0.11	28.72
2 Proximity to market	-0.34	-3.76	21.85	0.03	25.85	-6.55	21.72	14.14	0.37	18.14	1.50	-6.99	25.22	0.09	29.22
3 Proximity to related firms	1.81	-82.64	6.57	0.71	10.57	-6.54	33.19	8.30	0.63	12.30	0.35	-2.82	27.13	0.02	31.13
4 Availability (cost) of labor	1.19	-7.64	21.13	0.06	25.13	1.76	-9.65	20.60	0.08	24.60	-4.22	13.76	23.00	0.17	27.00
5 Support from government	-0.85	-39.86	21.69	0.04	25.69	-0.86	-37.95	21.75	0.03	25.75	-0.39	52.13	25.60	0.08	29.60
6 Availability (cost) of land	-0.35	-12.60	20.24	0.10	24.24	0.06	-23.82	17.25	0.23	21.25	-1.94	28.09	17.05	0.39	21.05
7 Industrial Infrastructure	-0.13	-64.24	16.83	0.25	20.83	-0.99	-2.94	22.40	0.00	26.40	-0.65	17.88	24.31	0.12	28.31
8 Access to advanced technology	-0.68	-187.68	19.28	0.14	23.28	-1.13	2.73	22.48	0.00	26.48	-0.22	19.36	26.74	0.04	30.74
9 Exchange rate management	-0.79	-10.03	21.95	0.02	25.95	-1.14	1.29	22.48	0.00	26.48	-0.20	5.81	27.45	0.01	31.45
10 Trade barrier and regulation	-1.11	2.71	22.49	0.00	26.49	-0.95	-142.41	21.46	0.05	25.46	-0.08	24.42	27.36	0.01	31.36



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are negative for group 3, which further distinguishes group 3 from the other two. In general, industries in group 3 are more interested in inexpensive input costs abroad.

Further, let us explore the reason for firms' eventual decision against offshore production and construction of plants in the home country. Table 4 presents the result of the logistic regression analyses, revealing a rather weak statistical significance of the independent reason; however, the result suggests several important implications.

First, group 1's greatest pseudo  $R^2$  is for language and cultural differences, and its second greatest is for domestic logistical infrastructure and services. The coefficient of the former is negative and for the latter, positive. Thus, the result implies that group 1 opted not to undertake FDI because of the advanced logistical infrastructure and services in the home country, whereas language and cultural matters were less of a concern for these industries. Qu and Green (1997) argued that Japanese manufacturing firms tended to seek more advanced industrial infrastructure in foreign countries, and our finding is consistent with their view; although in this case, the argument is that domestic infrastructure makes the option of FDI less attractive. Therefore, in general, group 1 seeks proximity to raw materials in foreign lands, but eventually decided not to invest due to a better logistical environment in Japan. This suggests that the advantages of access to raw materials in foreign countries are outweighed by advanced domestic transport networks.

Second, group 2's highest pseudo  $R^2$  is for domestic logistic infrastructure and services with a negative coefficient, and its second highest  $R^2$  is political and cultural safety with a positive coefficient. Hence, advanced domestic logistics systems are not the major reason why they decided against investing abroad; political and public safety has a greater impact on their decisions. It is interesting to see that logistical infrastructure and services are observed to be less influential for group 2, whereas it is the most influential factor for group 1. Domestic business services and a supportive domestic government also seem to influence group 2's decision against FDI, but domestic labour quality and proximity to related firms are less influential, which is consistent with the previous finding that group 2 industries seek

**Table 4. Logistic regression analysis**

	Group 1				Group 2				Group 3						
	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC	intercept	coefficient	-2LL	Pseudo R <sup>2</sup>	AIC
1 Proximity to Raw Materials	-1.28	1.81	22.41	0.00	26.41	-1.69	5.53	21.74	0.03	25.74	0.61	-6.27	26.66	0.04	30.66
2 Proximity to Market	-2.03	3.59	21.93	0.02	25.93	-0.64	-1.89	22.34	0.01	26.34	0.33	-1.33	27.62	0.00	31.62
3 Proximity to Related Firms	-0.21	-8.23	21.00	0.07	25.00	-0.18	-8.58	20.89	0.07	24.89	-1.71	14.20	22.82	0.18	26.82
4 Labor Quality and Skills	-2.03	5.31	21.81	0.03	25.81	0.40	-9.78	20.69	0.08	24.69	-0.37	2.19	27.57	0.01	31.57
5 Graduates with science degree	-1.16	1.64	22.47	0.00	26.47	-0.85	-7.64	22.15	0.02	26.15	-0.14	3.96	27.59	0.01	31.59
6 Support from Government	-0.89	-2.04	22.38	0.00	26.38	-2.08	8.17	20.57	0.09	24.57	0.53	-5.06	26.82	0.03	30.82
7 Good Relations to Labor Union	-1.24	4.98	22.36	0.01	26.36	-0.92	-7.46	22.26	0.01	26.26	-0.02	0.90	27.72	0.00	31.72
8 Better Business Services	-1.06	-6.28	22.45	0.00	26.45	-1.51	49.75	19.69	0.12	23.69	0.31	-67.09	25.20	0.09	29.20
9 Industrial Infrastructure	-0.95	-2.90	22.36	0.01	26.36	-1.42	5.24	21.96	0.02	25.96	0.12	-2.26	27.61	0.00	31.61
10 Access to Research Institutions	-0.81	-48.41	21.31	0.05	25.31	-0.94	-21.64	22.11	0.02	26.11	-0.34	42.49	25.83	0.07	29.83
11 Logistic Service	-1.86	13.65	19.37	0.14	23.37	-0.17	-39.33	18.13	0.19	22.13	0.11	-2.21	27.61	0.00	31.61
12 Political and Public Safety	-0.46	-23.07	20.64	0.08	24.64	-2.40	30.07	18.40	0.18	22.40	0.29	-8.31	27.28	0.02	31.28
13 Language and Cultural Conversancy	-0.03	-66.40	15.65	0.30	19.65	-1.50	8.47	21.75	0.03	25.75	-0.37	8.93	26.77	0.03	30.77

proximity to related firms in foreign lands but are disappointed in that quest.

Third, group 3's greatest pseudo  $R^2$  is for proximity to related firms with a positive coefficient, and its second highest is access to research with a positive coefficient. Industries in group 3 are attracted to offshore production for land availability, and the result suggested that foreign locations are less attractive in comparison due to domestic concentration of related firms and research institutions. This might partly reflect the current knowledge-intensive manufacturing process.

Because the statistical significance of individual analysis is relatively weak, to support the interpretation of the latter analysis, the result of multiple logistic regression analysis is presented in table 5, where pseudo  $R^2$  is improved, particularly for group 2, and all signs of the coefficient are consistent with those in table 4.

**Table 5. Multiple logistic regression analysis**

	Group 1			Group 2			Group 3	
0 Intercept s.e.	-0.57 0.89	-0.22 1.02	-0.24 1.26	-1.36 1.06	-1.83 1.28	-3.43 2.13	-1.24 1.02	-1.77 1.20
3 Proximity to Related Firms s.e.			0.30 8.93				12.77 7.17	12.93 7.56
6 Support from Government s.e.						11.73 8.25		
8 Better Business Services s.e.					87.51 82.89	100.26 95.03	-59.71 67.72	-71.77 61.97
10 Access to Research Institutions s.e.								110.32 107.45
11 Logistic Service s.e.	7.50 8.68	6.97 9.05	6.96 9.02	-40.73 31.42	-69.02 57.67	-73.06 66.01		
12 Political and Public Safety s.e.		-12.31 18.51	-12.37 18.68	29.89 19.13	29.01 18.97	32.36 25.31		
13 Language and Cultural Conversancy s.e.	-58.04 47.93	-55.13 47.24	-55.50 48.60					
-2LL	14.76	14.26	14.26	14.84	11.29	8.87	21.21	17.65
Pseudo $R^2$	0.34	0.37	0.37	0.34	0.50	0.61	0.23	0.36
AIC	20.76	22.26	24.26	20.84	19.29	18.87	27.21	25.65

## 6. Conclusion

The findings of this study are summarized in table 6. The column labelled “General” represents the overall ranking of respondents’ choice frequency for reasons both to invest and not to invest in foreign countries.<sup>12</sup> It seems that the most influential reasons for positive and negative FDI decisions are in geography and cultural factors, and other determinants actually have minor impact.

**Table 6. Summary of the findings**

	General		To invest			Not to invest		
	To invest	Not to invest	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
<b>► Geography and Cultural Factor</b>								
Proximity to raw materials	4	4	+	—	—			
Proximity to market	2	1	—	+				
Land availability (cost)	5			—	+			
Labor availability (cost)	1				+			
Labor relations		10						
Language and cultural matters		9					—	
<b>► Industrial Cluster Factor</b>								
Proximity to related firms	3	3	—	+			—	+
Labor quality (skills)		2						
Access to research institutions		11						
Access to advanced technologies	10							
Better business services		7					+	—
Advanced logistic system		8				+		-
<b>► Policy Control Factor</b>								
Support from local government	8	5						
Physical infrastructure	7	6	—		+			
Exchange rate regime	6							
Trade barriers	10							
Political and public safety							—	+

Further, let us focus on cross-industry variations. First, regarding FDI determinants, group 1 is attracted to raw materials, group 2 by proximity to related firms and markets and group 3 by the availability of land, labour and infrastructure

In general, the inter-group difference of FDI determinants is observed predominantly for geographical and cultural factors, which are also the two most influential types of FDI determinants. In contrast, reasons for not investing abroad are predominantly among the industrial cluster factors, which are less influential in decisions to undertake

<sup>12</sup> Labour quality and graduates with science degrees are aggregated in labour quality.

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FDI. In many respects, the empirical findings are consistent with our expectations. Firms search for low-cost input and resources abroad, which is not surprising given that the vast majority of FDI is directed to China and South-East Asian countries. However, plants are drawn back to the home country because of the domestic agglomeration of related firms, skilled labour pools, infrastructure development and policy supports, which are well captured by Marshall's industrial cluster concept. At the same time, several interesting behavioural features are revealed in this study. Important positive and negative FDI determinants are only weakly related to policy incentives, such as exchange management and trade barriers, which implies that international policy is less influential than other important determinants.

The findings on cross-industry variations imply that international division of labour and regional specialization may arise due to the internationally diversified locations' advantages. It seems that firms in group 1 seek proximity to raw materials, but this advantage is counter-balanced by the well-developed domestic logistical system. The implication of the findings is that the acceleration of FDI by this group results from transport costs and thus they can be discouraged to some extent by domestic policy, as improved domestic logistical systems offset longer distances for accessing raw materials. FDI by group 2 firms is encouraged by the growth of foreign markets and industry networks, and discouraged by mature domestic business services and safety. These determinants imply that this group's FDI might be accelerated as foreign markets grow, particularly the Chinese market, and the agglomeration of supporting industries develops. Group 3 industries are attracted to low-cost foreign input; however, they also cite the advantages of domestic industrial linkages as the reason for preferring domestic locations. Hence, domestic industrial clusters are acting as counter-weight to the pull of foreign locations.

These findings indicate that current international trade is neither sufficiently explained by the Ricardian model nor by the Heckscher-Ohlin model. Instead, the pattern of international specialization can be increasingly shaped by the complex evolution of regional location advantages and spatial distributions. Although the FDI determinants of industries in group 2 seem to be consistent with the concept of New Economic Geography (Krugman, 1991a, 1991b and Fujita et al., 1999), at least in terms of the roles of input-output linkages and transport

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costs, the theory fails to capture the behavioural features of industries in groups 1 and 3.

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# **The role of the network coordinator in the attraction of foreign investment in R&D: the case of the Brazilian oil and gas industry\***

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Frederico Rocha and Ana Urraca Ruiz\*\*

This analyses recent R&D investments undertaken by transnational equipment and service suppliers in Brazil, trying to identify their motives and to capture the role played by international market characteristics and the main technology players in Brazil. Three main features attracted these companies' R&D investments to Brazil: the size of the pre-salt oil and gas fields, Petrobras' accumulated capabilities and the existment of qualified personnel. This paper shows that companies follow different strategies. FMC adopts an asset-exploiting strategy while Baker Hughes and Schlumberger follow more of an asset-augmenting strategy. The paper then argues that the role of the network coordinator and its technological capabilities are central to the location of suppliers' R&D investments.

## **I. Introduction**

This paper analyses recent R&D investments undertaken by oil and gas equipment and service supplier companies in Brazil, trying to identify their motives and to capture the role played by international market characteristics and the main technology players in Brazil. The paper argues that network coordinators may play a key role in determining the location of R&D facilities

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of their suppliers due to the need to interact and exchange information when developing new technologies.

Innovation economics literature has examined the increasing internationalization of transnational corporations' (TNCs) R&D activities (Granstrand et al., 1993; Cantwell, 1995; Dunning, 1994; Florida, 1997; UNCTAD, 2005). Overseas R&D activities take up an increasing share of TNCs' total R&D expenditures, while their shares in host countries' total R&D efforts are also on the rise. These internationalized R&D activities have been classified according to their main knowledge source. In the terminology of Criscuolo et al. (2004), when firms, in their overseas R&D labs, use knowledge assets that were acquired, developed and accumulated in their home country, they are undertaking *asset-exploiting* R&D. Most of what literature has defined as demand motives for internationalization (Zanfei, 2000) may be framed in this category. If a TNC's overseas R&D centres principally use knowledge that is produced by other agents in the host country, it is said that they have an *asset-augmenting* strategy; that is, the TNC's foreign R&D labs are absorbing technological knowledge in the foreign country and are probably transferring it to the headquarters and other affiliates. Most of the supply motives for the internationalization of R&D are classified into this category.

Underlying the location choices are the requirements for proximity and their implications for the learning process, usually associated with capturing and transferring codified and tacit knowledge. There is a large volume of work on the role played by proximity in knowledge transfer (e.g. Jaffe, Trajtenberg and Henderson, 1993; Jaffe and Trajtenberg, 1999; Howells, 2002).

Asset-exploiting R&D activities are mostly an intra-firm process in the sense that knowledge is brought from the headquarters (or other affiliates) and used to attend the needs by its foreign affiliates requiring technological solutions. In asset-augmenting activities, spillovers from the environment have to be absorbed and therefore the building of inter-firm or face-to-face channels acquires greater importance.

As a consequence, for asset-augmenting R&D activities, it is more likely that TNCs select only a few selected foreign locations to undertake these activities, since the costs of creating absorptive capabilities are high due to the complexity of the task. Not surprisingly, while TNCs'



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asset-exploiting activities have been more evenly spread worldwide with a large share located in emerging developing countries such as China, India, Brazil and Mexico, asset-augmenting R&D seems to be still concentrated in the Triad countries (UNCTAD, 2005).

The presence of technology leaders and complementary national innovation systems are often considered as the main reasons for the location choice of asset-augmenting R&D and therefore the main explanation of the international concentration of such activities. However, literature seems to have underplayed the role of user–producer relationships in inter-firm networks in determining R&D location and internationalization. Most of the studies on the role of user–producer links in the determination of the location of R&D are found in the global production network (GPN) literature, in which the focus is on the network coordinators’ R&D investment in countries where suppliers are located. Ernst and Kim (2002) discuss that R&D and engineering personnel may be dispatched to local supplier networks in developing countries to ensure the transfer of knowledge. This would take place when transfer of tacit knowledge is required or when the learning process for codified knowledge requires close contact. Thus, network coordinators may carry out production-oriented technological activities in foreign locations.

As an example, Chen (2004) examines R&D investments in China by first tier suppliers from Taiwan Province of China and show how these companies have increased their production facilities and have carried out R&D investments as a result of the GPN movement towards China. Two important features of Chen’s work are: (i) the distinct role played by the first tier suppliers who also undertake relevant R&D investment; and (ii) the dominance of production-related R&D activities in China.

Chen and other authors on the GPN, however, have not addressed the consequences of the GPN for the location of first tier suppliers’ R&D activities. The role played by first tier suppliers in innovation processes has been widely investigated in the innovation economics literature. Womack et al. (1991) stress the importance of suppliers’ participation in the product conceptualization stage of the lean production system. Bidault et al. (1998) analyse the determinants of early supplier involvement (ESI) practices in a large number of

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industries. They show that these practices have been widely spread and that they involve sharing of information, suggestion for cost and quality improvements, participation in the designing of parts and components, and the undertaking of full responsibility from conceptualization to manufacturing.

The development of these practices requires the transfer of tacit knowledge that may well require contact. Then, one should expect that in innovatory processes that entail user-supplier interaction, proximity requirements will lead to the clustering of R&D labs and engineering personnel. Whenever these user-supplier alliances have transnational participation, this will end-up in foreign direct investment (FDI) in R&D, which is the focus of this paper.

The paper is composed of five sections including this introduction. In the next section, we characterize the oil and gas industry and the relationship that oil and gas companies have with equipment and services suppliers, explaining the need for knowledge flows between the users and suppliers. The section also discusses Petrobras' learning and capability-building processes, stressing its role as network coordinator and the innovative challenges of the pre-salt oil fields. Section 3 examines the supplier companies' previous R&D internationalization strategies using patent data. It also assesses the motives that underlie their R&D investments in Brazil through the findings from the interviews with Petrobras' R&D lab director and staff and with the CEOs of the suppliers' affiliates in Brazil. Section 4 discusses policy implications and section 5 draws the main conclusions.

## **2. The Brazilian oil and gas Industry**

### **2.1. The organization of upstream oil and gas industry: technological imperatives**

One important characteristic of the upstream oil and gas industry is its incapacity to differentiate the product. This characteristic has driven the industry towards cost reducing strategies. One of the main strategy was to achieve scale economies. However, due varied and highly specific geological conditions in different oil fields, the achievement of economies of scale in production is difficult. As a consequence, economies of scope have become a more important

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route for reducing costs (Bridge, 2008). In order to achieve economies of scope, the industry relied on specialized service and equipment suppliers that provided solutions for different geological conditions. This important organizational advance was a consequence of the pattern of competition between oil and gas companies. Oil and gas companies compete through a process of risk control, managing the identification and acquisition of oil fields, the pace of production and the logistics of supply. Service and equipment suppliers compete through service quality, innovation and up-bringing of solutions in extreme exploration and production conditions and cost reduction (Acha and Cusmano, 2005).

Jacquier-Roux and Bougeois (2002) argue that the tendency for the division of labour across these two groups of firms increased since the 1980s, when the oil price declined and oil and gas companies decided to reduce R&D expenditures from the average of 1 per cent of total sales to 0.5 per cent. This decrease in R&D intensity has been accompanied by an increasing technological role played by service and equipment suppliers whose strategies also changed in some important ways. First, they engaged in very aggressive M&As resulting in greater diversification of their activities. This process generated four large integrated companies (Schlumberger, Baker Hughes, Halliburton and Weatherford) and in some ways the process is still ongoing (Iloitty, 2004).<sup>1</sup> Second, these companies substantially increased their technological intensity and diversified their technological portfolios (partially explained by the M&A process). The decrease in technological activity of oil and gas companies has been compensated by the increase in technological intensity of service and equipment suppliers (Jacquier-Roux and Bougeois, 2002). The relationship established between the two parties has changed from short-run commercial relations towards long-run partnerships. The main reason for the undertaking of long-run partnerships is associated with geological heterogeneity that may require development of specific solutions. Therefore, innovation is a constant theme in the relationship between these actors and the sharing of information is central to their operation.

Figure 1 shows R&D expenditures of major oil and gas companies and those of service and equipment suppliers. Some

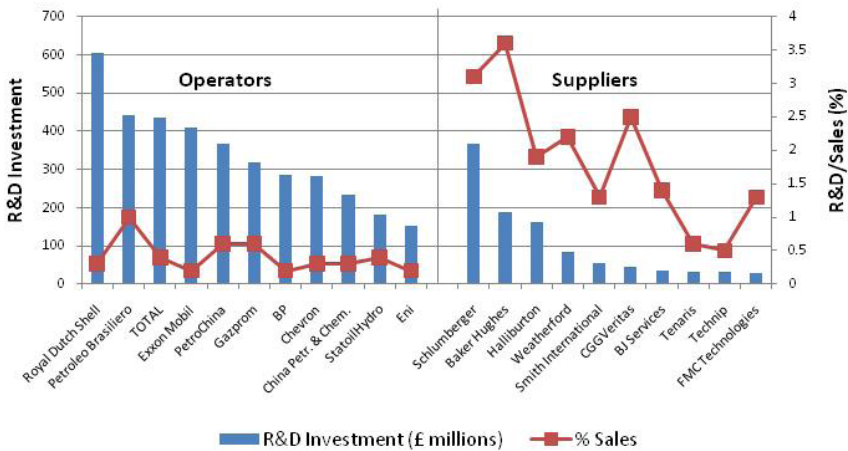
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<sup>1</sup> The last large transaction involved the acquisition of BJ by Baker Hughes and took place in 2009.

important observations may be derived from the values presented. First, service and equipment suppliers are more technology-intensive compared to oil and gas companies. Second, the R&D expenditures of oil and gas companies are still very large, suggesting that oil and gas companies still perform an important role as network coordinators in the industry (Acha and Cusomano, 2005).

**Figure 1. R&D expenditures and R&D Intensity (R&D/Sales) of major oil and gas companies and service and equipment suppliers, 2008**

(Millions of pounds sterling and per cent)



Source: Department of Trade and Industry, United Kingdom, 2008.

## 2.2. Petrobras and the technological requirement of the Brazilian oil and gas industry

Petrobras has the second largest R&D budget among the major oil and gas companies and the highest R&D intensity, reaching one per cent of sales (figure 1).<sup>2</sup> This position was achieved through a strong drive in recent years that took the company's R&D budget from £111 millions in 2004 to £443 millions in 2008. This drive was motivated by two factors: (i) the growth of sales as a consequence of increases in oil prices and production; and (ii) an increase in R&D intensity from

<sup>2</sup> One per cent used to be the industry average R&D expenditure before the 1990's.

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0.7 per cent in 2004 to 1 per cent of sales in 2008. The increase in R&D intensity of Petrobras in the period was partially influenced by regulatory measures that made investments in R&D by oil and gas companies mandatory. The regulation by Agência Nacional do Petróleo (ANP) require oil operators invest in R&D activities in Brazil one per cent of the rents from high productivity oil fields. The regulation stipulates that 0.5 percent of the rents should be directed to university research<sup>3</sup> in oil and gas related subjects.<sup>4</sup>

Petrobras has long been a very R&D-intensive company. It should be stressed, however, that the positioning of the company as a technological leader was associated with two different trends. On the one hand, Petrobras benefited from the changes in the organization of the industry related to the increasing importance of supplier companies as technological partner. Bridge (2008) argues that the accumulated knowledge of supplier companies allowed State-owned oil companies located in developing countries to access advanced technologies. Furtado and De Freitas (2000) document three cases associated with subsea technology in which Petrobras was able to develop new technologies for its subsea operations through cooperative efforts with supplier companies. They also show how through this process of cooperative agreements with suppliers and other oil companies, Petrobras developed from a position of co-sponsor to that of the network coordinator. Dantas and Bell (2009) also show how Petrobras was able to learn from collaborative agreements. In particular, they show that the network configuration has evolved from what they call a *passive learning network* to a *strategic learning innovation network*.

On the other hand, Petrobras has a history of undertaking important in-house R&D activities with nationalistic approaches. These efforts involved personnel from its main R&D lab, CENPES, located inside the campus of the *Universidade Federal de Rio de Janeiro* (UFRJ),

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<sup>3</sup> It should be stressed that ANP resources are not the only oil and gas related science and technology resources destined to Universities. The Ministry of Science and Technology also controls a slightly larger budget derived from oil and gas royalties called CTPETRO. The main difference is that ANP resources should attend oil companies' R&D interests while CTPETRO should target science and technology policy goals.

<sup>4</sup> The other half per cent may be directed either to university or to business R&D. Petrobras spends more than the 0.5 percentage point of these rents in its R&D centre, CENPES (Leopoldo Miguez de Melo Research and Development Center)

domestically located suppliers<sup>5</sup> and universities. Though some of these efforts were unsuccessful, they generated large amount of learning and development of absorptive capacity (see Furtado and De Freitas, 2004).<sup>6</sup> Furthermore, they played an important role in developing linkages and collaborative capacity with Brazilian universities. Therefore, they were able to develop important linkages between the industry and research institutions. Domestic universities became a central player in the *strategic learning innovation network* articulated by Petrobras.

**Table 1. ANP regulation R&D expenditures of oil and gas companies, 1998–2008**  
(Millions of dollars<sup>a</sup>)

	Oil and Gas Operator			Total
	PETROBRAS	SHELL	REPSOL	
1998	1,624,991	0	0	1,624,991
1999	15,988,766	0	0	15,988,766
2000	51,490,603	0	0	51,490,603
2001	54,167,790	0	0	54,167,790
2002	90,241,560	0	0	90,241,560
2003	105,053,341	0	0	105,053,341
2004	134,177,719	3,663,376	0	137,841,095
2005	208,072,498	937,270	0	209,009,767
2006	282,183,775	0	1,171,280	283,355,055
2007	313,418,522	0	3,214,655	316,633,177
2008	465,558,734	0	3,889,341	469,448,075

Source: Agência Nacional do Petróleo.

<sup>a</sup> Converted from Brazilian real to dollar by average dollar value, according to Banco Central do Brasil.

The linkages with universities have strengthened after the implementation of the ANP regulation on R&D. In order to use the resources from ANP, Petrobras developed a network type of organization called “thematic networks”. These networks enjoyed large flows of resources until 2008, which were used to establish an up-to-date lab infrastructure spread over many universities (see table

<sup>5</sup> Some are national capital enterprises, others are multinational companies located in Brazil.

<sup>6</sup> Furtado and De Freitas (2004) document seven nationalist oriented projects in PROCAP 1000 only one of which resulted successful. They relate however these projects with future gains by Petrobras.

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1). Furthermore, these resources were also used to train personnel for oil and gas business and to open new undergraduate and graduate programmes related to the oil and gas industry.

### **2.3. Changes in the technological requirement after the discoveries of pre-salt fields**

The capability accumulated by Petrobras made possible a strong expansion of the oil and gas production in Brazil (figure 2). This has culminated in the discovery of the pre-salt oil fields<sup>7</sup> that represent a very sizeable oil reservoir. The technology used to explore and produce in these regions was similar to that used in other offshore operations, such as the North Sea and the Gulf of Mexico, though, as stated above, adaptations to local geological characteristics were always necessary. The expansion of production from 2013 on will increasingly depend on the exploration of the new pre-salt oil fields.

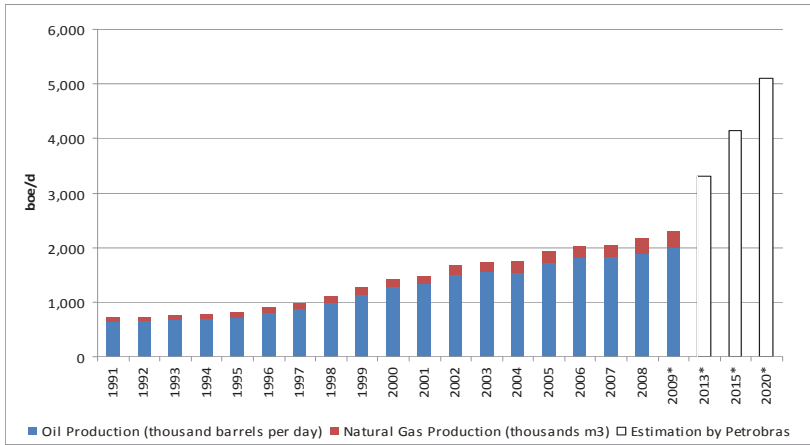
The pre-salt oil fields are shown to have large potentials.<sup>8</sup> Furthermore, similar geological formations are present in other regions, such as the West African Coast. There are, however, some new technological challenges for oil companies. Bicalho et al. (2009) list five main areas where technological solutions are still to be found: (i) reservoir engineering and characterization; (ii) well drilling and completing, dealing with problems associated with drilling detours caused by the salt environment and corrosion management due to the presence of CO<sub>2</sub>; (iii) working with risers in subsea areas with depth over 2000 meters; (iv) anchoring and managing floating devices, developing connections to risers to work in extreme conditions; and (v) associated gas logistics. It will require more than the available technology to overcome the obstacles associated with these challenges, and pioneer suppliers would be in an advantageous position.

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<sup>7</sup> The pre-salt oil fields covers an area of 120.000 km<sup>2</sup> at the Brazilian coast. The area begins in Santa Catarina, south of Brazil and follows for 800 km until it gets to Espirito Santo. It is called pre-salt due to its geological location underneath a salt layer. The oil deposits are located in deep and ultra-deep waters beneath three thousands meters of rock and sand and up to 2000 meters of a salt layer.

<sup>8</sup> The recent discoveries announced by Petrobras seem to be large. The Tupi and Iara oil fields together seem to be sufficient to double Brazil's oil reserves from 12 billion barrels to 24 billion barrels (Bicalho et al. 2009). There have been some other discoveries with still unknown volumes such as Jupiter and Carioca that some speculate would take pre-salt oil reserves up to 50 billion barrels (Berman 2008).

**Figure 2. Brazilian oil and gas production, 2001–2009, and estimates for 2013, 2015 and 2020**  
(thousand barrels of oil equivalent per day)



Source: Agência Nacional do Petróleo, Anuário da ANP, 2001 and 2009.

\* Data for 2009 and estimations for 2013, 2015 and 2020 were obtained from Petrobras in [http://www.petrobras.com.br/pt/noticias/producao-de-petroleo\\_no-pais-aumentou-6-3-porcento-em-2009/](http://www.petrobras.com.br/pt/noticias/producao-de-petroleo_no-pais-aumentou-6-3-porcento-em-2009/).

In a sense, it is similar to the situation faced by the North Sea oil industry when offshore production was at its birth and there was a need to develop new technological solutions (see Furtado and De Freitas, 2000). However, there is one key difference. In that context, the main oil and gas operators had their headquarters and R&D labs located in the United States, near the Gulf of Mexico, where service and equipment suppliers already held their main R&D facilities (Hatakenaka et al., 2005). In that case, there was no need for them to move to new locations. In the pre-salt oil fields in Brazil, the main operator is Petrobras that has located its R&D facilities in Brazil.

After the announcement of the pre-salt discoveries, the pressure towards the development of a domestic industry increased. However, domestic development of adequate technological capabilities would take time that would compromise investment and production targets. In order to deal with these technological challenges, CENPES adopted a strategy that involved doubling its facilities and coordinating and promoting closer interaction with Petrobras' key suppliers .

Petrobras took the decision to develop these technological solutions through a joint effort with major integrated service and



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equipment supplier TNCs. The need for full dedication and close exchange of information required the establishment of R&D facilities of these suppliers near CENPES. Petrobras coordinated the installation of R&D laboratories of these first tier suppliers to develop new pre-salt solutions according to the different competences of the players involved.

The R&D labs were to be located at the UFRJ campus in a site two kilometres away from CENPES. Four service and equipment supplier TNCs have signed contracts with UFRJ: Schlumberger, Baker Hughes, FMC and Halliburton. Furthermore, General Electric has also signed a formal deal to install an R&D facility though the oil and gas industry will not be its only partner. Their sole activity in the site will be R&D, as the university does not permit any other activities. This should therefore be an important oil and gas R&D cluster. The next section will reflect on the main factors of attraction for these service and equipment supplier TNCs.

### **3. Technological internationalization strategies of the supplier companies**

#### **3.1. Methodological issues**

This section uses information from the interviews conducted by the authors and from the European Patent Office (EPO) Bulletin Database to explore R&D internationalization strategies of the main oil and gas service and equipment suppliers.

The nationality of the patent is defined by the residence of the inventor. The differences between the nationality of the applicant firm and the nationality of the inventor define the rate of internationalization of the firm's innovatory activity. We have defined the nationality of the applicant firm by the nationality of the parent company.<sup>9</sup>

Patel and Vega (1999) and Le Bas and Sierra (2002) elaborate a taxonomy according to the type of knowledge developed using patent statistics. The taxonomy classifies strategies according to two criteria: the revealed technological advantage (RTA) of the firm in its home country in the technical field covered by the patent (RTA home),

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<sup>9</sup> Schlumberger is here treated as a US firm.

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measured by the ratio of the share of company's patenting in that technical field to the share of EPO's patenting in the same technical field; and the revealed technological advantage of the host country in that technical field covered by the patent (RTA host), measured by the ratio of share of host country's patenting in that technical field to EPO's patenting in that technical field.

From these two criteria, they obtain four classifications: (i) type 1 – *technology seeking*, RTA home < 1 and RTA host > 1 where the firm seeks to augment its technical base by exploiting a host country's technological advantage. This may be related to tapping in or monitoring for internationalization; (ii) type 2 – *home base exploiting* where RTA home > 1 and RTA host < 1, where the firm is more likely to be executing adaptive R&D; (iii) type 3 – *home base augmenting*, both RTA home and RTA host > 1, which may also be associated with technology monitoring; and (iv) type 4 – *market seeking*, where market specific needs may require firms to adapt their technologies. It is clear that types 1 and 3 match what has been termed asset-augmenting strategies, type 2, asset-exploiting strategies and type 4 is different from the two types of strategies argued in the introduction of this paper and are mostly explained by acquisition of new affiliates.

In order to deal with the specific importance of each technology for the service and equipment suppliers, and to simplify presentation of the results, the paper uses a specific patent classification system derived from the aggregation of the 4-digits international patent classification, which enabled the identification of major and minor technical fields for their specific technological profiles (see annex 1).

The second source of information used in the paper are interviews carried out with: (i) chief executives of the affiliates of Schlumberger, Baker Hughes and FMC in Brazil; (ii) management of the Technological Park of UFRJ; (iii) head and main R&D managers of Petrobras R&D centre (CENPES). The interviews followed a semi-structured questionnaire that covered the following points:

- general information on the company and its activities in Brazil – number of employees in Brazil, in the world, expected size of the laboratory in Rio de Janeiro, laboratories around the world, planned total investment in R&D in Brazilian facilities, annual budget for R&D.

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- technological strategies – the relative importance of R&D investment in Brazil and the type of efforts that were planned (adaptive, innovative, research, development or engineering, niche, core, complementary technologies), relationship between the R&D lab in Brazil and parent R&D labs, role of the investments in the productive strategy of the TNC, main determinants of the investment (pre-salt scale, need to adapt products, cost of qualified labour, supply of specialized labour, need for interaction with suppliers, pressure from customers), sources of knowledge to be used in the lab;
  - expected spillovers and local factors – share of Brazilian and foreign researchers, relative importance in the TNC of the foreign researchers allocated to the lab, the role of property rights, interaction with the university (labour hiring, use of R&D labs and local infrastructure, collaborative research, the role played by specific knowledge held by the university) the role played by competitors' location, role played by suppliers' location, importance of the proximity with CENPES.

The questionnaire sought open answers and that there was no intention to quantify results given the small number of corporations involved. Petrobras' executives and the technological park manager were interviewed in order to capture their perception about the investments of the TNCs. Additional questions were made in order to analyze their expectations about their own organizations and the interests involved.

Patent information was collected on the four TNCs – Baker Hughes, FMC, Halliburton and Schlumberger – from 1980 to 2008.<sup>10</sup> Information on the headquarters and affiliates were obtained from lootty (2004) and from the companies' websites. Though Halliburton has not yet decided to invest in the Technological Park, the firm's data were collected for comparison with Baker Hughes and Schlumberger, the other two integrated service and equipment suppliers.<sup>11</sup>

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<sup>10</sup> The patenting activity of other service and equipment suppliers was not so intense in order to include them.

<sup>11</sup> Patents have been widely used in the literature to analyze competence building at the firm and at national levels for several reasons; they provide detailed and reliable information for long time series, they can be grouped according to firm, nationality and technical fields, and they represent output measures of the innovative process from formal and informal efforts (Patel and Pavitt, 1991). However, patents do have some shortcomings. They limit the analysis to those results that can be patented and that applicants have chosen to patent in that specific national or international office. This means that there may be some biases related to differences in the propensity to

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### 3.2. R&D internationalization strategies of equipment and service suppliers

Internationalization of technological activities is by far the most advanced at Schlumberger: 67.5 per cent of its total patenting have inventors resident outside its home country. In contrast, Halliburton has the lowest level of international technological activities with only 13 per cent of the total patenting having designated inventors resident outside the United States. The levels of internationalization of FMC and Baker Hughes are similar to the average identified for United States TNCs by UNCTAD (2005).<sup>12</sup>

Table 2 also presents the co-patenting activities of these firms – patents that are filed together with other firms, research institutions or universities. This may be an indicator of the level of interaction with other agents in the system of innovation, which is also related to the absorption of spillovers and therefore to asset-augmenting strategies. It should, however, be stressed that the measure captures only formal activities related to patenting. The overall rate of co-patenting is very low but it is always greater in international locations. Schlumberger is the only firm with a high level of co-patenting, which is mostly carried out in foreign locations. Almost a quarter of its patenting with foreign inventors occurs in cooperation with other firms or universities, while the other three have 5 per cent or less of its patenting with foreign inventors.

These data reveal important differences about the R&D internationalization strategies of the four TNCs and also the M&A processes they went through. In fact, only Schlumberger seems to

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patent across sectors and technologies and differences in market and appropriation strategies. Furthermore, some of the local and international spillovers of innovative activity may not be captured by patent statistics. This may limit the analysis of policy implications (Cantwell and Iammarino 2003). The advantages and justifications for the use of EPO's statistics over USPTO have been analyzed in Le Bas and Sierra 2002, Grupp and Schmoch 1999) and are related to the greater internationalization of EPO and the greater filter it represents for usually it is not the first patenting office and its filing fees are much higher. We ask the reader to refer to those papers for greater information.

<sup>12</sup> The level of internationalization shown by USA companies in UNCTAD (2005) is calculated using the UNCTAD survey and provide therefore information on 2004 R&D activities while R&D internationalization here measured uses patent and has effects accumulated since 1978. Therefore, it should be seen as having a bias towards underestimating the level of internationalization of R&D activities.

**Table 2. Cooperation and Internationalization ratios for selected companies, 1978–2008**

	Total Number of Patents			Number of Patents with Foreign Resident Inventors			Internationalization Ratio (%)			Rate of Cooperation		
	Filed with Partners	Individually Filed	Total	Filed with Partners	Individually Filed	Total	Filed with Partners	Individually Filed	Total	National	International	Total
BAKER-HUGHES	4	488	492	2	116	118	50.0	23.8	24.0	0.5	1.7	0.8
FMC	14	567	581	9	164	173	64.3	28.9	29.8	1.2	5.2	2.4
HALLIBURTON	14	886	900	6	111	117	42.9	12.5	13.0	1.0	5.1	1.6
SCHLUMBERGER	146	808	954	145	499	644	99.3	61.8	67.5	0.3	22.5	15.3

**Source:** Own elaboration from EPO Bulletin.

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have a conscious strategy of R&D internationalization. Its greater level of internationalization is due to two important characteristics. First, it is influenced by its French origin, which explains the high percentage of patenting with French inventors. Second, the company adopts a more aggressive international strategy, trying to capture knowledge generated in host countries. It emerged through the interviews that the aim of the company is to have an international distribution of R&D similar to the international distribution of its sales. They have three types of R&D labs:

- (i) basic research labs, which was pointed out as being “almost a university”, that develops knowledge to be used by the whole company. The company has five labs dedicated to this activity in the United States, the United Kingdom, Japan, the Russian Federation and Saudi Arabia;
- (ii) development and engineering labs which are responsible for the elaboration of direct productive solutions. These labs solve global problems and the solutions should be applied worldwide. There is a great number of laboratories with this characteristics in the corporation; and
- (iii) regional technology centres which are responsible for the adaptation of the solutions elaborated by the development and engineering labs.

Baker Hughes’ R&D internationalization is a consequence of its M&A process. Some of the R&D labs of acquired companies were kept open due to their high local capabilities. This occurred for instance with Eastman Christensen in Germany, which explains the high share that German inventors’ patents have in total Baker and Hughes international patenting (see Table 3). Baker Hughes did not have a clearly designed international R&D strategy until recently and the interviewees were quite enthusiastic about this pioneering experiment in developing countries (Rio de Janeiro and Bahrein will be the first experiments).<sup>13</sup>

The more disperse international activity of FMC is explained by its reliance on user–producer interactions. It has also been affected by M&As. The Brazilian affiliate is one example of an acquisition

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<sup>13</sup> Until now, R&D labs were concentrated in the US and Germany.

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that had consequences for its R&D activities. Former CBV had a history of capability accumulation and learning through interaction with Petrobras. In this case, its acquisition by FMC maintained the technological capabilities accumulation strategy and the previously developed interaction with Petrobras, which resulted in the patenting activity with Brazilian inventors shown in table 3. However, the main orientation of the company follows a more centralized model of production of knowledge with research executed in the home country and development in the host country.

Halliburton has the lowest R&D intensity among the large integrated supplier companies (see figure 1). It is furthermore the most reluctant TNC to internationalize its R&D activities. This may explain its reluctance to invest in an R&D lab in Brazil.

Firms adopt, however, very similar strategies with respect to the location of their cooperative efforts with strong prevalence of type 3, home-base augmenting R&D strategies, followed by type 2, home-base exploiting, strategies; that is, they internationalize in fields they have established competencies. In most cases, the host country also has such competencies. This large reliance on firms' home country competences also seems to be a general conclusion of previous studies (Le Bas and Sierra, 2002; Patel and Vega, 1999). It is very rare that firms internationally seek competences they do not hold in their home countries. Table 3 shows, nonetheless, that the proportions of the competences developed abroad by Schlumberger and FMC outside their home country's research RTAs are not so small (a little less than 1/3). However, all core technical fields developed by Schlumberger and FMC outside their home countries are also core technical fields in their home countries. Whenever a technical field plays a relevant role in foreign affiliates, this same technical field also plays a relevant role in their home countries. Core competences are therefore defined at home.

The question is: *why did these TNCs decide to operate R&D labs in Brazil?* Through the interviews, we were able to identify three common answers. First, all TNCs were attracted by the scale of the pre-salt oil fields. Thus, market size and growth potential played a central role in the establishment of R&D efforts abroad. All companies report this as their most important motivation.

**Table 3. R&D internationalization strategies adopted by oil and gas service and equipment supplier TNCs by host country (Per cent)**

Host Country	Schlumberger				Halliburton				FMC				Baker Hughes											
	Type 1	Type 2	Type 3	Type 4	Total Share	Type 1	Type 2	Type 3	Type 4	Total Share	Type 1	Type 2	Type 3	Type 4	Total Share	Type 1	Type 2	Type 3	Type 4	Total Share				
BE	6.8	62.7	20.3	10.2	100	8.4	0.0	100.0	0.0	100	3.8	0.0	59.4	3.1	37.5	100	20.3							
BR												7.1	42.9	50.0	0.0	100	8.9	66.7	33.3	0.0	100	2.8		
CA	20.0	45.0	35.0	0.0	100	2.9	4.3	26.1	60.9	8.7	100	22.1	18.8	31.3	43.8	6.3	100	10.1	15.4	7.7	38.5	100	12.1	
DE	15.4	15.4	30.8	38.5	100	1.9	0.0	100.0	0.0	0.0	100	3.8	33.3	33.3	22.2	11.1	100	5.7	6.1	51.5	36.4	6.1	100	30.8
FR	6.2	38.7	22.0	33.1	100	43.6	0.0	75.0	25.0	0.0	100	3.8	45.5	0.0	45.5	9.1	100	7.0						
GB	5.7	6.8	74.4	13.1	100	25.1	2.9	0.0	88.6	8.6	100	33.7	16.1	6.5	61.3	16.1	100	19.6	0.0	0.0	93.2	6.8	100	41.1
JP	17.6	70.6	11.8	0.0	100	2.4																		
NL	5.9	52.9	29.4	11.8	100	2.4	4.5	88.2	0.0	27.3	100	21.15	54.5	45.5	0.0	0.0	100	7.0	0.0	80.0	0.0	20.0	100	4.7
NO	13.4	3.7	67.1	15.9	100	11.7	0.0	0.0	91.7	8.3	100	11.5	23.5	11.8	64.7	0.0	100	21.5	0.0	0.0	55.6	44.4	100	8.4
RU	0.0	0.0	90.9	9.1	100	1.6																		
Total	7.7	28.9	41.9	21.6	100	108.7	2.9	30.8	54.8	11.5	100	88.89	19.6	27.8	39.9	12.7	100	91.3	3.7	22.4	59.8	14.0	100	90.7

Source: Own elaboration from EPO Bulletin.



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Second, the TNCs were attracted by CENPES' technological competences. The interest in CENPES' competences is nonetheless different among these TNCs. On the one hand, the integrated companies want to learn about exploration and production conditions in the pre-salt oil fields because they are aware that knowledge developed for the Brazilian pre-salt fields may be used elsewhere. Schlumberger and Baker Hughes have contracted at least one development project with CENPES. This means the use of a full dedicated team to interact and produce solutions together with CENPES. It should be stated that this position matches CENPES' intention to have the full attention of researchers from these companies. It is also clear that suppliers have early involvement in the design of Petrobras' pre-salt operations. They are therefore part of the effort to establish technological trajectories to overcome new challenges. Furthermore, the type of contract established seems to go well beyond arm's length transactions, requiring very high sunk. This type of relationship seems to fit into what Bidault et al. (1998) called "early supplier involvement".

FMC has a classic user-supplier relationship in which its main objective is to understand the user needs to adapt its engineering solutions. In the words of the president of the Brazilian operations of FMC "I would rather be inside CENPES, but two kilometres away is okay". The main difference with the integrated companies is that FMC will mostly use information provided by Petrobras, but it does not seem that information from their R&D labs will be flowing into CENPES.

Third, all interviewees have stated that Brazil has a skilled and qualified labour force to develop R&D activities.<sup>14</sup> In the case of FMC, they already have a robust engineering department in Brazil with about 150 people working. Therefore, they have experience with qualified personnel.

Companies differ, however, in the size and direction of their efforts. The investments by FMC will continue the already established strategy of adapting technology elaborated by the parent firm to Petrobras' needs. The centre will maintain FMC' strategies of being very intensive in engineering efforts. The most important difference will be the increase in the size of their R&D and engineering operations as they plan to have 250 engineers working at their R&D facilities.

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<sup>14</sup> According to CAPES, Brazil had, in 2009, more than 160,000 PhD. students.

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They will also build a submarine measurement and test laboratory. Due to the type of knowledge being acquired from CENPES and to the reliance on technology from the headquarters, one may say that it is a continuation, in a new site, of the relationship already established with Petrobras in recent years with a strong emphasis on *asset exploiting*.

In contrast to FMC, the establishment of these labs represents a disruption of the type of technological relationship that the integrated service supplier TNCs, Schlumberger and Baker Hughes, have with Petrobras. Schlumberger has the most ambitious project for the UFRJ site. It defined its R&D lab in Brazil as a mix of a regional technology centre and a development and engineering centre. In one large project with Petrobras, they will be developing technology for local purposes, which is to be adapted for use in other parts of the world later. It will begin acquiring local knowledge to produce for local purposes, but then this information should flow to other units of the TNC. In this sense, they are establishing an *asset-augmenting* strategy. Their lab is planned to have, in its first phase, 350 researchers, which may increase later. At the beginning, 30 to 40 per cent of the researchers will come from other parts of the company with the rest being hired in Brazil. The company has a hierarchy of researchers in fellows (the highest level – only eleven in the company), advisers, principals and seniors. The Brazilian R&D facility should have one fellow and at least one adviser. The fellow will be working in the development and engineering project with Petrobras. This shows the importance they are attaching to the research centre in Brazil.

According to Baker Hughes' managers, the R&D investments in Brazil change the company's internationalization strategy in the sense that it is a first step towards a more decentralized R&D. The company will be adopting strategies which are partly *asset augmenting*. The lab should hire 100 researchers. The joint project with Petrobras will require an expenditure of around \$30 million in three years plus \$10 million of investments in equipment. Petrobras will be spending other \$10 million on the same project.

Firms also intend to interact with universities, mainly with UFRJ. All of them have stated that the first step is to hire human resources graduating from the universities. They are aware of the large infrastructure that has been established with ANP's resources and are

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willing to interact with the universities in order to use its human and physical infrastructure and to undertake joint research. Baker Hughes already has agreements with some departments for maintenance and use of R&D labs. Furthermore, the university has changed its behaviour towards companies and has started to establish policies for interacting with them.

### **3.3. Summing-up**

The importance of the user-supplier relationship in complex industries has been well documented in literature. In fact, as shown by Bidault et al. (1998), complexity of the environment is a key aspect for the determination of the closeness and intensity of early supplier involvement. As has been shown in section 2, the oil and gas industry fits into this description and the strategies pursued by oil and gas operators since the 1980s have contributed to the increasing need for interaction, as suppliers acquired greater importance in the industry's technological development.

The Brazilian pre-salt oil fields bring about two important novelties to the industry's technological development. First, the Brazilian pre-salt oil fields present new technological challenges. The solution of these challenges will determine cost reduction in future explorations in the oil fields in Brazil and in other pre-salt geological conditions, such as those present in the Gulf of Mexico and West Africa. This scenario implies that supplier companies carry out R&D investments in order to overcome obstacles and achieve technological leadership. Second, there has been an entry of a new technological leader amongst oil operators in the sense that technological knowledge accumulated by Petrobras is necessary for the development of these areas. This leader is not located in the usual oil and gas clusters. Therefore, the development of technology by service and equipment suppliers is associated with interaction with Petrobras and has to be accompanied by foreign investments in R&D as long as the development of the interaction requires proximity.

Proximity seems to be a requirement when one analyses location choices. All investments have been directed to exactly the same location as the Petrobras' R&D centre, CENPES. Furthermore, the two large integrated suppliers have well defined projects that they should be working on directly with Petrobras and that should accumulate

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knowledge and expertise to be used elsewhere. These aspects characterize the investments in Brazil as *asset augmenting*.

The point to be stressed is that if the operator were to be located elsewhere, investment would be brought to this other location. This is the main reason why R&D investments in foreign sites are not as widespread as it would be if one accounted for the high geological heterogeneity of exploration and exploitation activities. Most of the industry has been located in the Gulf region and therefore interaction is done with those R&D labs. The effort undertaken by Petrobras to acquire and develop technological capabilities has fostered its role as network coordinator and has rendered possible the announced R&D investments in Brazil.

These features may have one important consequence for research on the GPN: the location of the network coordinator and most of all of its core R&D labs are not neutral to the location of R&D efforts undertaken by its suppliers. This sounds like a good news to those countries that are able to host network coordinators, but not to those countries that seek a road towards technological leadership in the upgrade of its small and medium enterprises. In this case, it may pose some important constraints to the technological development of economies through the insertions of their small and medium enterprises in the GPN.

#### **4. Discussion and policy implications**

UNCTAD (2005) surveys policy measures and initiatives to attract foreign R&D and assesses their performance. UNCTAD classifies host country policies into three main categories: (i) institutional framework for innovation, (ii) promotion of R&D-related FDI and (iii) industry-specific policies. It should be clear that all three types of policy measures were present in the Brazilian oil and gas case. However, the most distinguishing feature of the present paper is the approach towards industry-specific policies that may provide some lessons for other natural resource intensive industries. These industries – due to their low or medium levels of R&D intensity – receive little attention from literature with respect to R&D attraction. However, as has been shown above, different actors display quite different levels of R&D intensity and the amounts of R&D expenditures are by no means negligible. They have, however, some distinguishing characteristics due to the

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non-renewable character of the resources that may shift bargaining power away from TNCs towards the State. Such a shift may enhance the possibility of implementing R&D attraction policies (Bridge, 2008) that may shape a “a resource based strategy of technological dynamism” (Perez 2008) for countries that have substantial natural resource endowments.<sup>15</sup>

In terms of institutional framework, the Brazilian oil and gas industry has shown some of the characteristics highlighted by UNCTAD (2005). Skilled human resources have been developed in well equipped and qualified universities. Furthermore, Brazil’s oil and gas industry has been able to foster R&D cooperation between the business sector, represented by an internationally integrated national oil company, and the university that has enhanced research capabilities and have rendered possible its full cooperation with other partners. In addition, a budget has been allocated for science and policy activities in the oil and gas industry through ANP resources (table 1). These funds are related to oil and gas rent distribution in the oil and gas industry. The Government has established regulation that drives rent away from operators and channels these rents towards science and technology activities.

For attracting R&D-related FDI, the main policy initiative was the establishment of a science park that gathered different players on the same university campus. The park brings together on the same site the main Petrobras R&D lab, CENPES, one of the leading universities in Brazil and the R&D labs of oil and gas service and equipment supplier TNCs. As commented by UNCTAD (2005), the existence of a science park does not guarantee inflows of FDI. However, the establishment of the park with large R&D opportunities seems to be an important factor for these R&D initiatives. Other R&D policy measures such as fiscal incentives were present but they did not appear to be a key feature.

As has been highlighted above, the oil and gas industry has recently displayed some important shifts in the *loci* of learning and capability accumulation activities. Whereas in the past, oil and gas companies controlled most of the technological knowledge in the industry, the supplier industry has increasingly gained control over this knowledge with the possibility of absorbing economies of scope from

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<sup>15</sup> It should be highlighted that Bridge (2008) does not tackle directly R&D opportunities but rather capability enhancing opportunities in general.

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the knowledge accumulated in different oil fields. This has allowed national oil companies to adopt technology collaboration strategies to secure learning and capability accumulation. Furthermore, State control over non-renewable resources has assured a certain bargaining power in order to implement technological cooperation on those new terms. Brazil has been able to use this power to ensure cooperation between TNCs and the Brazilian business sector in order to provide an adequate environment of learning and capability accumulation. Brazil does not really constitute a novelty in the use of this strategy, which has already been pursued in other oil and gas fields such as the North Sea by Norway (Hatekanaka et al., 2006). The use of this type of discretionary policy that promotes cooperation between domestic firms and TNCs may be a new route towards the promotion of foreign R&D in natural resource intensive environments.

## 5. Conclusion

The purpose of this paper was to analyse the R&D internationalization strategies of TNCs in the oil and gas service and equipment supplier industry that are installing R&D laboratories in Brazil. The paper has shown that these companies have historically followed different R&D internationalization strategies. Schlumberger has displayed the most aggressive strategies, with a greater level of internationalization and of cooperation with host country's local agents. Baker and Hughes and FMC have exhibited a lower level internationalization and interaction with local agents. In the case of Brazil, companies have different starting points and different aims.

Three main features have attracted these companies' R&D investments in Brazil: the size of the pre-salt oil and gas province, Petrobras' accumulated capabilities and the existence of qualified personnel. R&D investments to be carried out by these companies appear to be different in terms of knowledge creation. On the one hand, FMC, the only company with previous technological investments in Brazil, aims to consolidate its position as equipment supplier for Petrobras. To this end, their R&D facilities in Brazil should understand the customer's needs and adapt the firm' technologies accordingly, displaying a clear *asset-exploiting* strategy. On the other hand, the two integrated service and equipment supplier TNCs have specific projects to be developed with Petrobras. They will dedicate personnel to work

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together with Petrobras and intend to use the knowledge generated in local production and, afterwards, transfer it to other affiliates, implying an *asset-augmenting* strategies.

The paper stresses also the role played by the network coordinator in attracting those investments. Previous literature has emphasized the importance of the customer-supplier relationship and the role played by early supplier involvement in innovative projects. This role may be associated with the implementation and attraction of R&D internationalization strategies. As a consequence, the location of the network coordinator seems to have influence in the location of R&D activities by its key partners, and the early involvement of the network coordinator in innovative projects of its partners may have important consequences for the effectiveness of their R&D.

This observation may also help understand the role of R&D policies in the attraction of TNCs' R&D activities. It is clear that a number of "handbook" policy measures have been implemented and institutional requirements have been fulfilled in Brazil. Since the 1970s, Brazilian universities have been involved in technological cooperation with Petrobras and the country has established science and technology funds that provide adequate resources for universities to carry out high-level research. Furthermore, the existence of the UFRJ Technology Park and its specialization in oil and gas technology consolidates a learning atmosphere that may attract this kind of investment. This paper argues, however, that there were sectoral specificities in the attraction of these investments. Most importantly, the Brazilian State or its State-owned company used their bargaining power to establish regulation and promote discretionary actions that were crucial for the attraction of these investments. Petrobras bargained with TNCs and made the establishment of these labs part of the whole deal. The presence of non-renewable resources reserves and State control over rents and licensing were key features for the success of this strategy. These types of measures have already been used successfully for the development of the oil and gas industry in other countries. Nonetheless, an important characteristic of the UFRJ Technological Park is its location in a developing country. Previous successful experiences of attraction of foreign R&D technological efforts have been documented in the oil and gas industry of developed countries, such as Norway and the United Kingdom. This new experience may show a route for the use of

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natural resources for the promotion of technological development and cooperation with foreign capital in developing countries. This may be particularly important in Latin America where there is abundance of natural resources.

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**Annex 1. Number of patents, share of patents per technical field and revealed technological advantage of Baker Hughes (BH), Schlumberger (SLB), Halliburton (HB) and FMC (FMC), 1978–2008**

IPC CODE	IPC classification	Number of Patents						Share of Each Technical Field						Revealed Technological Advantage					
		BH	FMC	HB	SLB	BH	FMC	HB	FMC	BH	SLB	HB	FMC	BH	SLB	HB	FMC	BH	SLB
A	Human Necessities	4	133	3	9	0.8	22.9	0.3	0.9	0.1	1.6	0.0	0.1	0.9	0.1	1.6	0.0	0.1	
B0	Separating and mixing	31	24	15	46	6.3	4.1	1.7	4.8	2.1	1.3	0.5	1.6	4.8	2.1	1.3	0.5	1.6	
C09K	Materials for Miscellaneous Applications	21	3	69	55	4.3	0.5	7.7	5.8	13.6	1.6	24.3	18.3	5.8	13.6	1.6	24.3	18.3	
D	Textiles; Paper	1	16	-	9	0.2	2.8	-	0.9	0.1	1.5	0.0	0.5	0.9	0.1	1.5	0.0	0.5	
E21B	Earth or Rock Drilling	166	52	524	216	33.7	9.0	58.2	22.6	91.7	24.3	158.2	61.5	22.6	91.7	24.3	158.2	61.5	
F	Mechanical Engineering	19	55	19	34	3.9	9.5	2.1	3.6	0.5	1.1	0.2	0.4	3.6	0.5	1.1	0.2	0.4	
G01	Measuring and Testing	126	21	121	234	25.6	3.6	13.4	24.5	4.9	0.7	2.6	4.7	24.5	4.9	0.7	2.6	4.7	
G06	Computing, Calculating and Counting	14	1	29	108	2.8	0.2	3.2	11.3	0.6	0.0	0.7	2.4	11.3	0.6	0.0	0.7	2.4	
H	Electricity	17	16	20	113	3.5	2.8	2.2	11.8	0.2	0.2	0.1	0.7	11.8	0.2	0.2	0.1	0.7	
Other B	Other performing operations	13	94	10	20	2.6	16.2	1.1	2.1	0.2	1.1	0.1	0.1	2.1	0.2	1.1	0.1	0.1	
Other C	Other Chemistry and Metallurgy	44	21	8	8	8.9	3.6	0.9	0.8	1.6	0.7	0.2	0.2	0.8	1.6	0.7	0.2	0.2	
Other C0	Other Organic Chemistry	32	126	63	44	6.5	21.7	7.0	4.6	0.5	1.8	0.6	0.4	4.6	0.5	1.8	0.6	0.4	
Other E	Other Fixed Constructions	2	12	7	1	0.4	2.1	0.8	0.1	0.1	0.7	0.3	0.0	0.1	0.1	0.7	0.3	0.0	
Other G	Other Physics	2	7	12	57	0.4	1.2	1.3	6.0	0.0	0.1	0.2	0.7	6.0	0.0	0.1	0.2	0.7	
	Total	492	581	900	954	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
	Herfindahl-Hirschman Index (HHI)	-	-	-	-	0.202	0.149	0.371	0.152	-	-	-	-	0.152	-	-	-	-	

Source: Own elaboration from EPO Bulletin.

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## **PAPER SERIES**

### **Commemorative papers on the work of John H. Dunning**

The papers appearing in this series are published for commemorating the life and work of the late Professor John H. Dunning. They are based on presentations given at a Fellows' plenary in Valencia, Spain at the annual meeting of the European International Business Academy (EIBA) in December 2009, but they have been substantially revised for publication here.

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# Dunning, John H. (1927-2009)

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Sarianna M. Lundan, Hafiz Mirza and James Zhan

The seminal contribution made by John Dunning to the field of strategic management is the eclectic or OLI paradigm, which explains why a firm would chose to exploit its ownership specific advantages in another country by internalizing their use inside the firm, rather than by means of licensing or contractual partnerships.

**Keywords:** transnational corporations, eclectic theory, OLI paradigm

John Dunning had a career that spanned six decades and resulted in the publication of more than 50 books and countless journal articles on foreign investment and the activities of transnational corporations (TNCs) in 60 different outlets. Among other accolades, this work earned him six honorary doctorates and an OBE from Queen Elizabeth II. His published autobiography (Dunning, 2008) and the last volume of collected essays (Dunning, 2010) offer insight into his career path and the evolution of his recent thinking. The two papers included in this issue touch on the themes that he was occupied with most recently, namely the role of institutions in encouraging or impeding economic activity, and the moral underpinnings of the global economy.

John Dunning was a tremendously productive and well-liked scholar, who became one of the founding fathers of the field of International Business. He was prolific researcher, who was extremely widely read, and drew inspiration from many different sources. The breadth of his work covers the history and patterns of foreign direct investment (FDI) across countries and over time, the theory of the TNC, the impact of TNCs on home and host countries, as well as the political and social dimension of TNC activities. His primary contribution was to bridge the gap between the economic analysis of FDI and the analysis of the TNC as a firm, and to bring these together in what he called the eclectic or OLI paradigm.

The most cited of all of John's publications by far is *Multinational Enterprises and the Global Economy*, the second edition of which we worked on together (Dunning & Lundan, 2008a). Other widely acclaimed and highly cited contributions include his two decade award-winning articles in the *Journal of international Business Studies* (JIBS), the first presenting an

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extension of the eclectic paradigm (Dunning, 1988) and the second emphasizing the importance of location in understanding TNC activity (Dunning, 1998). His published autobiography (Dunning, 2008) and the last volume of collected essays (Dunning, 2010) offer insight into his career path and the evolution of his recent thinking.

The breadth of John's work covers the history and patterns of foreign direct investment (FDI) across countries and over time, the theory of the TNC, the impact of TNCs on home and host countries, as well as the political and social dimension of TNC activities. While many of these topics will be of relevance to those scholars in strategic management who work on International Business issues, probably the most relevant part of John's voluminous output in relation to strategic management is the eclectic or OLI paradigm.

The eclectic theory (as it was first called) was introduced in 1977, and subsequently amended on several occasions to account for new developments in the global economy and in the activities of TNCs. The OLI paradigm is not a theory in the strict sense, but rather a synthesizing framework that brings together different strands of literature to answer three basic questions. First, what enables foreign firms to overcome the 'liability of foreignness' and to outcompete domestic firms in the host country? Second, why do firms in general, and multinational firms in particular, choose specific locations for their activities? Third, why would a firm choose to engage in equity investment across borders rather than to exploit its ownership advantages through licensing, exports or some cooperative entry mode like joint ventures or contractual alliances?

These questions correspond to the three elements that comprise the OLI paradigm, namely ownership advantages (O), locational advantages (L) and internalization advantages (I). Although initially the OLI paradigm was mainly directed to explaining the aggregate pattern and distribution of foreign direct investment across countries, over time it began to be increasingly applied also at the level of the firm, to explain why a particular firm would choose a particular modality to enter a specific market.

In terms of its theoretical background, the understanding of ownership specific advantages was mainly based on industrial organization economics, with a particular emphasis on intangible asset advantages. Later on, this came to be followed by the resource based

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theory of the firm, and specifically the work of Edith Penrose, as well as the concept of dynamic capabilities (Dunning & Lundan, 2010). The basic strategy question of why and how one firm is able to outcompete another was restated in the context of cross-border expansion into the question of what enables foreign firms to outcompete domestic firms in the host country, as well as a related question, which is what allows firms of one nationality to outcompete those of another nationality in different host countries. Drawing on the work of some early scholars like Hymer, Dunning was also quite conscious of the coexistence of explanations of ownership advantage that relied on market power on one hand, and the internalization of the development and exploitation firm-specific knowledge on the other (Dunning & Pitelis, 2008).

The locational component, not surprisingly, relied on the scholarship in economic geography and regional economics. In his last decade-winning article, John was bemoaning the fact that questions related to the development of ownership advantages and the mode of entry had acquired considerably more prominence, while issues of geography, including clustering and agglomeration, were given much less attention in the literature. In his later writing, John also became increasingly interested in institutional analysis (both in economics and in organization theory), and consequently the importance of overall institutional quality and the supporting institutions of markets gained focus as important locational factors (Dunning & Lundan, 2008b).

The theory behind the internalization component was naturally the theory of internalization by Buckley and Casson (1976) and others, derived from the seminal work of Coase (1937). It refers to the conditions under which firms would commit resources to cross-border equity investment instead of relying on less burdensome means such as licensing and exports. In the early versions of the eclectic theory, when the aim was to explain aggregate patterns of FDI, internalization was seen as more or less a binary choice. However, as more attention began to be paid to some of the cooperative modes of entry involving partial equity, such as a joint ventures, or purely contractual relationships, the question of internalization became a question of degree rather than of kind. While most of the discussion concerning the choice between different modalities explored the conditions under which hierarchical control over transactions involving proprietary knowledge-based assets would be preferable to using a market-based mechanism, with

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the growing use of outsourcing and OEM agreements, more attention began also to be paid to the financial commitments and the risks related to assets ownership in relation to the flexibility achieved by contractual modalities.

The enduring strengths of the OLI paradigm are its apparent simplicity, its robustness in the face of changing circumstances, and the ability to simultaneously consider the impact of three inter-related groups of explanatory variables. Throughout his career, Dunning was continuously engaged with issues of policy, and the OLI paradigm provides a means to examine multiple variables simultaneously to provide a more holistic understanding of the impact and influence of TNCs. For such pragmatic aims, partial analyses of the kind where changes in variable X (e.g. corporate governance system or degree of diversification), are expected to have the effect Y (some measure of performance) on the focal firm, are simply not likely to provide relevant answers.

While eclecticism was the hallmark of John's scholarship, it is also the biggest source of criticism of the OLI paradigm and the analyses derived from it. Since the theories that made up the three OLI components were not original to John, he felt little concern about changing and amending the components as needed, in order for the paradigm to accommodate new types of TNC activity or other changes in the global economy. This was the case for instance with the rise of alliance capitalism, which led Dunning to put much more emphasis on strategic alliances and cooperative modes of entry, and most recently it was the case with institutions that influenced his thinking about the sources of ownership advantages, and the locational advantages or disadvantages of different host countries or regions.

These amendments and additions were sometimes greeted with suspicion by colleagues who thought that as a result of such tinkering, the paradigm had become unwieldy (e.g. Narula (2010)). Such critics may well have a point, but having contributed to some of those amendments ourselves, we are the wrong person to judge the final merits of such objections. We do suspect, that for those whose model of the social sciences is close to that of the natural sciences, this kind of eclecticism is likely to prove fundamentally unsatisfactory. However, those scholars who are interested in questions that in one



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way or another concern not just the operations of TNCs as such, but also their impact on the home and host countries, are likely to find the OLI paradigm a useful starting point for their investigations.

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# An institutional perspective on the social responsibility of TNCs

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Sarianna M. Lundan\*

This paper explores the work of the late John Dunning on institutions and the moral imperatives of global capitalism in the context of the social responsibilities of transnational corporations (TNCs). TNCs are viewed as institutional entrepreneurs that develop new governance solutions in response to the complexity and uncertainty they encounter while engaging in value adding activities. Specifically, the paper examines the case where TNCs need to overcome institutional voids or deficits in order to be able to operate in developing host countries. The paper concludes with some reflections on possible future directions for research, particularly at the intersection of law and international business.

**Key words:** institutional change, institutional entrepreneurship, social responsibility, private law

## 1. Introduction

The purpose of this paper is to explore two related themes in the recent work of John Dunning, namely our joint work on institutional change (Cantwell, Dunning and Lundan, 2010; Dunning and Lundan, 2008a, 2008b, 2010), and more generally, John's own work on the moral underpinnings of contemporary capitalism (Dunning, 2003; 2005; 2008). Specifically, we focus on an issue where these two interests intersect, which is in connection with the corporate social responsibility (CSR) of transnational corporations (TNCs). Although much of the discussion here is based on our joint work, this article naturally reflects only the author's views on both the origin and implications of the ideas contained in these papers. Nonetheless, it is hoped that this paper can provide some more context to the work that John was engaged in much of the past decade, and perhaps also inspire future work in some of the new directions identified here.

The argument will proceed in three stages. The first part provides a definition of institutions, and assesses their importance to the analysis of

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the cross-border activities of TNCs. The second section discusses the changing societal expectations of TNCs, and how this ties in with the overall theme of institutions, and particularly what John liked to call human institutions. The third part discusses the connections between what we have discussed under the heading of institutional entrepreneurship, and the role of TNCs in meeting the developmental and sustainability goals of home and host countries.

## **2. TNCs as institutional entrepreneurs**

### **2.1. The need for experimentation and flexibility**

John and I felt that there were two fundamental reasons why the analysis of institutions should gain greater prominence among International Business (IB) scholars (Dunning and Lundan, 2008a). The first is that foreign direct investment (FDI) and TNC activity more broadly are commonly seen as contributing to the process of economic growth. From a prominent institutional viewpoint, economic growth can be understood as a process of the development of more complex institutions to deal with the uncertainties that arise from more complex forms of exchange, involving both market and non-market actors (North, 1990, 2005). Different institutional systems have become increasingly interconnected over geographical space, and TNCs both contribute to, and are affected by, the institutions in their home and host countries.

Second, the increasing social and technological complexity and interconnectedness of the global economy lead to high levels of uncertainty, which TNCs attempt to counter through experimentation with new operational approaches and institutional entrepreneurship, manifested in a greater variety of organizational forms and practices (Cantwell, Dunning and Lundan, 2010). Due to their exposure to multiple markets around the world, TNCs are called on to respond to different kinds of challenges on a continuous basis. This had led, for example, to the greater adoption of various open network structures, that provide greater flexibility in adapting to changes in the institutional environment as well as in the marketplace.

In structural terms, such adaptations are manifested, for example, in the new kinds of relationships being forged between TNC subsidiaries and headquarters, including the use of regional headquarters as a

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coordination devise (Laudien and Freiling, 2011; Piekkari, Nell and Ghauri, 2010). Inside the TNC hierarchy, there is experimentation involving transnational governance forms that are not based on the traditional budget-based control and division of labour found in the multi-divisional structure (Verbeke and Kenworthy, 2008). Outside the TNC hierarchy, there are a myriad of contractual relationships ranging from OEM partnerships to contracting for research and development, clinical trials, or complex management contracts in public utilities or in the hotel sector (UNCTAD, 2011). These allow established TNCs to concentrate the ownership of productive assets in those stages of the value chain where they generate the highest value added, such as in design, marketing and distribution (Chen, 2010).

There are many definitions of institutions in the literature, from institutions as the concept of institutionalized practices in the sociological literature, to the macro institutions such as central banks and other governance institutions that are commonly discussed in the political economy literature. We found it useful to employ the definition used by Douglass North (1990), which simply divides institutions into formal and informal, with the formal institutions consisting of laws and regulations enforced by external institutions like courts, and the informal consisting of norms, rules and customs that are enforceable through social constraints.

Such a broad definition implies that much of what we deal with in the literature on business and economics involves institutions in a fundamental way. The ability to transact with other people, whether in a simple barter exchange, or in a series of complicated relationships through a value chain, requires a set of institutions that create a convergence of expectations and either curb opportunism or encourage cooperation.

Without such institutions transaction costs would be excessively high, although the effort put into monitoring as opposed to the building of goodwill is likely to vary from one principal-agent relationship to another. If people are seen as essentially cooperative, the difficulties in economic exchange are primarily attributed to asymmetrical information and distorted incentives (Forsgren and Holm, 2010; Verbeke and Greidanus, 2009). Even then, in specific contexts such as the transfer of technology, a situation where cooperation is difficult to

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achieve may arise. If, on the other hand, people are seen as essentially self-interested and potentially opportunistic, one may need to establish substantial safeguards against predictable forms of opportunism, such as shirking (Williamson, 1975). Whatever the governance form adopted by the firm, institutions essentially regulate the level of transaction costs it experiences.

Indeed, in a sense saying that one is interested in the economics of institutions is almost redundant, as institutions are ubiquitous in all forms of economic exchange. However, what struck us was the very limited extent to which scholars working at the firm level were interested in the work being done on institutions at the macro level and vice versa. This level-specificity is not necessarily to the detriment of scholarship as such, but both John and I shared an interest in trying to understand how the pieces fit together, and proceeded to apply a unified institutional view both to the governance choices faced by the TNC, as well as to the external institutional constraints.

In our view, institutions represent efforts to regulate and control the complexity and uncertainties that prevail in the global marketplace, and TNCs are at the centre of the emergence of new governance forms and institutions. Since institutions involve new combinations of existing codified rules and new emerging norms, values and methods of interaction, they are highly contextual and not always transferable, even within the firm (Dunning and Lundan, 2010). However, some firm-specific institutions are successfully transferred across borders, resulting in changes (co-evolution) in the host country institutional environment (Cantwell, Dunning and Lundan, 2010).

## **2.2. TNCs and transnational law**

Although John and myself did not have an opportunity to continue to work on these issues together, our work was pointing to an underexplored intersection between IB and international law, and particularly the emergence of private (transnational) law.

From a legal perspective, TNCs often seem to operate either in an under-defined or an over-defined legal space. In the former case, if one looks at the governance of cross-border transactions of TNCs between two developed countries, it is striking how often there is an

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absence of legal certainty concerning different types of transactions. In lieu of conventional legal certainty, firms resolve these uncertainties in different ways. In electronic markets, for example, they have supported the emergence of systems to rate the reliability of sellers, and the creation of new payment intermediaries for buyers, bypassing the traditional route of banks, which were inconvenient for very small transactions (Calliess, 2008). Another solution is to specify contractually the methods for dispute resolution, including naming the jurisdiction and the arbitrator that would oversee any disputes (Calliess et al., 2007). In this sense, TNCs continually adapt and fill in some of the gaps in the existing institutional structure.

In the latter case, TNCs operate in an over-defined space of legal pluralism, where the two dichotomies between law and non-law and national and global levels of rulemaking do not exist as separate categories. Instead, various forms of non-law or soft law interact with conventional law, and global institutions influence the evolution of national institutions. In this space, which has been labelled transnational by some legal scholars (Calliess and Zumbansen, 2010), law remains a facilitator, structuring relationships in the space where trade-offs between traditionally legal and non-legal rules are being made.

A characteristic of this pluralistic domain is that governance is multilevel and systemic. It is neither top-down nor bottom-up, but involves various forms of governance operating at different levels simultaneously. Within the TNC itself, traditional hierarchical modes of governance coexist with contractual forms of governance, including a wide range of nonequity modalities. Such modalities include different contractual forms such as licensing, sometimes coupled with a small equity stake, or different types of licensing combined with long-term contracting agreements. At the level of the home and host countries, transactions are governed by treaty obligations and bilateral agreements, national law, industry self-regulation and firm self-regulation, with soft-law approaches complementing hard law. Thus in this pluralistic space, the question is not one or the other type, but what is at stake in choosing a particular mode of governance rather than another (Zumbansen, 2010).

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### 3. Changing societal expectations of TNCs

A prominent aspect of contemporary globalization is the demand by governments, civil society and consumers for products and services that are produced in a manner that respects human rights, limits environmental damage and in general contributes positive externalities to society as a whole. TNCs have responded to these demands in two ways. On one hand, they have used the changing expectations (itself an institutional change) as an opportunity to develop new products and new markets to serve greener or more ethical customers and constituencies in a process of shared value creation (Porter and Kramer, 2011).

On the other hand, TNCs have also engaged in a variety of forms of self-regulation to influence and control the expectations that are placed upon them (Scherer and Palazzo, 2011). These activities include the local influence and consequent responsibilities of the firm in its home market, but also the effects of its value adding activities throughout its internal and external network of partners, extending to a growing number of markets in both developed and developing countries (Kolk and van Tulder, 2002, 2006).

As a consequence of the plurality of demands, the discussion on social responsibility has shifted away from purely charitable activities (sometimes conceived of as a tax or a social licence to operate) towards an integrated examination of the effects of the value adding activities of the company in both social and economic terms, and most recently, towards a partnership-based model of social engagement (Dahan et al., 2010; Fransen and Kolk, 2007).

In the regulatory arena, we can point to established issues like environmental regulation, where industry initiatives have complemented national regulation, and where national regulation has been shaped by the technological advances made by TNCs (Lundan, 2004). Emerging new multi-stakeholder agreements such as those dealing with food and water security are being instituted by firms, and have also been negotiated on a multilateral basis, such as in the development of the Principles for Responsible Agricultural Investment.<sup>1</sup> The supranational

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<sup>1</sup> *Principles for Responsible Agricultural Investment that Respects Rights, Livelihoods and Resources*. A discussion note prepared by FAO, IFAD, the UNCTAD



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rulemaking directed by the UNFCCC has been complemented by a host of national, regional and industry-driven initiatives to measure and reduce the carbon footprint of human activity (Pinkse and Kolk, 2008; UNCTAD, 2010). With the conclusion of the Ruggie process and the inclusion of human rights in the revised Organisation for Economic Co-operation and Development (OECD) guidelines, the issues of investor rights and responsibilities have also been given renewed attention and prominence (Lundan, 2012).

The *de facto* rules that prevail in the global economy are a complex mix of national regulation, treaty obligations and the self-regulatory activities of TNCs, as well as active participation by civil society. The formal rules governing foreign investment were set up to ensure non-discrimination in the access to resources and markets, and to protect investors from host governments' opportunistic behaviour. The most important supranational agreements came into force in 1995 as a result of the Uruguay round of negotiations, which established the World Trade Organization as a successor to GATT. These include the General Agreement on Trade in Services (GATS), which contains several provisions related to foreign investment, the Agreement on Trade-Related Investment Measures (TRIMs) that outlawed many types of post-entry performance requirements, and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), which has been particularly important for investment in knowledge-intensive activities, and which was actively promoted by TNCs, particularly from the pharmaceutical industry (Ramamurti, 2005).

Various international investment agreements (IIAs) complete the framework of investment rules, with the number of bilateral investment treaties (BITs) reaching 2807 by the end of 2010 (UNCTAD, 2011). In addition to the provisions contained in BITs concluded between States, agreements between individual investors and host States may involve issues such as concessions with respect to taxation and the extent of other social obligations pertaining to foreign investors, particularly in special enterprise zones.

The multilateral agreements that provide specific guidelines for the social responsibilities of TNCs comprise the OECD Guidelines for

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Secretariat and the World Bank Group to contribute to an ongoing global dialogue. TD/B/C.II/CRP.3, 16 April 2010.

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Multinational Enterprises (revised to include human rights obligations in 2011), which oblige the governments of the signatory countries to promote the observance of the guidelines by their TNCs by way of national contact points. Guidelines against corrupt practices are provided by the OECD Anti-Bribery Convention, with governments being responsible for introducing and enforcing legislation at the national level.<sup>2</sup> The United Nations (UN) Global Compact derives its ten core principles from the Universal Declaration of Human Rights of the UN, the ILO Declaration on Fundamental Principles and Rights at Work, the Rio Declaration on Environment and Development, and the UN Convention Against Corruption. The Global Compact currently has some 6000 corporate members, who are expected to set in motion changes in business practices pursuant to the principles, and to report on these in their annual reports or other corporate reporting.<sup>3</sup>

In well-governed societies, the primary guidance in terms of defining the social obligations of TNCs can be derived from the legal system, and the activities of civil society organizations that exercise pressure on firms. In this context, the private rules instituted by TNCs are contestable, and private standards become *de facto* public standards only in specific circumstances. By contrast, in developing and emerging economies, governance deficits can range from endemic corruption and ineffective contract enforcement to failed states with compromised security and a complete absence of legal order. Under such circumstances, in order to carry out their value adding activities, TNCs may need to supplement the public service provision in the host country by providing private means of security, training and education, or health care services (Boddewyn and Lundan, 2010). While TNCs will undoubtedly have to engage in institutional entrepreneurship to support any new products and services, the adaptations they need to overcome such institutional deficits are particularly challenging and germane for the process of development.

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<sup>2</sup> However, enforcement of these and other guidelines is a major issue, also in developed countries.

<sup>3</sup> Relatively few United States firms have joined the Global Compact due to concerns about legal liability. See e.g. Williams (2004).

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#### 4. A special case of social responsibility

At the intersection between the evolving institutions governing economic transactions, and the widening of the social footprint of the firm, TNCs are called on to develop new solutions to enable value adding activity to take place. While in the business and economics literature there is a good understanding of the mechanisms that can be used to support long-distance trade and other kinds of commercial relationships, there is very little understanding of the kinds of governance mechanisms that can be used to solve cooperation problems in relationships that are not part of the core value adding function of the TNC, but that are necessary complements to its activities.

In economic terms, most of the missing public services in developing countries, such as education or health care are private goods, although they are mainly provided by the government. This is because the textbook definition of public or collective goods is that these are goods that are both non-excludable and non-rival in use. If some kind of exclusionary devices can be implemented, such as tolls or membership fees, we have the case of club goods. If, on the other hand, exclusionary devices are ineffective but overcrowding leads to rivalry in use, we have the case of the commons. All other instances are private goods, whose consumption is subject to rivalry in use, and the existence of at least some exclusion devices.

According to this definition, all the public services procured by TNCs are thus in economic terms private goods, that can be owned and operated either by governments or by private individuals or enterprises. If they are provided by the government or civil society, the use of exclusion devices is likely to be quite low. If they are provided by the private sector, the use of exclusion devices can be quite pronounced. Irrespective of who owns the assets used to produce these services, they can be subject to different bundles of property and usage rights. For example, a port facility financed by the government and run by a private company can be subject to clauses that restrict its use and operation. Such exclusions can be contractual, or they can be implicit in the relational contract formed between the state and the private company.

We are particularly interested in the instances where TNCs might contemplate the internal provision of these kinds of services, that fall

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outside of their core area of business. In general, we assume that TNCs would prefer to obtain such services contractually, rather than assume the responsibility for their provision through internalization (Hennart, 1993). However, such agreements may be difficult to negotiate, due to a lack of credible partners and/or government failures that lead to an absence of legal certainty.

The literature on new institutional economics has examined the problems related to the establishment of cooperation and trust in agency relationships where internalization and close monitoring are not possible. One well known example involves the Maghribi traders of the eleventh century Mediterranean, that were governed by an institution that might be called a merchant coalition or a network that enforced sanctions against agents who violated the code (Greif, 1993). Another pertinent example pertains to the European medieval merchant guilds, which used either organizations in the home country (Genovese traders) or foreign “subsidiaries” (the Hanseatic league) that coordinated the responses of merchants to any transgressions by foreign rulers (Greif, Milgrom and Weingast, 1994).

The members of the Maghribi merchant coalition ostracized and retaliated against agents who violated the commercial code. By virtue of their network, the merchants had both the incentive and the necessary information to participate in sanctions when necessary to discipline agents. In contrast to the bilateral and multilateral reputation mechanisms used by the merchants, the ruler-merchant relationships were governed by administrative bodies outside the territory of the ruler, which held power over member merchants in their own territory and supervised them when abroad.

These examples involving long-distance medieval trade took place in a highly complex and uncertain environment, where the ruler of a city could discriminate among merchants by abusing them or protecting them selectively. In medieval cities, the merchant guilds emerged with the encouragement of the rulers as a countervailing power, enhancing the ruler’s ability to commit to an agreement, since an excessively powerful ruler could also expropriate wealth (Greif, Milgrom and Weingast, 1994).

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The merchant guild developed the necessary attributes to enforce agreements with rulers, including embargoes imposed on reneging rulers, thus overcoming the commitment problem. They were tolerated by the rulers because they allowed for the expansion of mutually beneficial trade, although naturally the guilds could be used to both restrict as well as to advance trade. The monopoly rights enjoyed by the guilds in their home country created a stream of rents that served as a bond to ensure the possibility of collective action in the case of transgressions.

While the highly uncertain context of these relationships bears a resemblance to the emerging markets of today, the situation is quite different in the case where the firm is trying to alleviate the negative effects of institutional voids, and not operating in its primary area of business. In a business relationship involving asymmetrical information, and under conditions of imperfect monitoring, internalization might be a viable option. In countries with dysfunctional legal systems, that are characterized by thin markets and high transaction costs, relational contracting may be used to replace legal security in commercial relationships (McMillan and Woodruff, 2000).

Such bilateral contracts and clientelistic relationships (Geertz, 1978) work on the basis of the expectation of repeated trading. However, for the TNC in our case, the expectation is that it would stop the provision of non-core services as soon as they are supplied to a sufficient degree in the host country. Multilateral relationships are a possibility, but unlike the merchant guilds, the investing firm is unlikely to be able to rely on collective sanctions against any offending partners, and even reputational threats using the media are likely to backfire.

Consequently, when operating in host countries with governance deficits, we would expect TNCs to prefer to deal with established NGOs whose reputations act as a security bond. With global NGOs, TNCs can attempt to build bilateral relationships based on repeating trading due to the possibility of future partnering in other markets (Dahan et al., 2010). Such relationships call for the development of specific skills in contracting, and the design of new governance structures that address the contextual specificities (Kim and Mahoney, 2010; Mayer and Argyres, 2004). If global NGOs are not available, the TNC might offer assistance to develop the local NGOs into local partners with whom the

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TNC can deal with contractually, or as a last resort, supply the necessary services itself. In some cases, the services of a global provider may also be procured by the TNC.

These activities that merely support the core profit-making activities of the firm are likely to have externalities beyond those normally associated with economic activity. Some of the externalities are likely to be positive, such as those related to the expanded provision of healthcare and education, while others related to e.g. infrastructure are likely to provide both positive and negative externalities. For example, the building of a logging road might lead to the destruction of traditional forms of life, and increases in prostitution and other social problems. Furthermore, the conditions under which such goods are provided suggests that they are likely to be available only on an exclusionary basis, and possibly for a limited duration. In this case, the interplay between the TNC as an institutional entrepreneur, and the other rulemaking actors, is likely to influence whether governments can achieve their broader development aims, particularly in the presence of institutional voids.

## **5. Conclusions**

TNCs operate under the reality of legal pluralism, and their efforts to manage this pluralism inform us about the question of what is at stake when firms and governments commit to particular institutional arrangements. The operational rules of the game are the result of an ongoing process of negotiation, whereby TNCs acting as institutional agents shape the institutional structure in which they operate. This results in a great plurality of mechanisms for organizing cross-border transactions, as well as a much broader footprint of the influence of TNCs in the global economy.

Economic activity in global value chains crosses countries at all levels of development, and given that major geopolitical shifts are underway with the strengthening of the G-20 and G-77 economies, the resulting complexity and plurality poses substantial governance challenges. This complexity is in part due to the spread of economic activity, although in economic terms, the global economy is still more regional than global (Rugman and Verbeke, 2008). Importantly, it is also due to the fact that in the post-war era, the global economy has shifted

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towards a post-Westphalian era (Kobrin, 2001), where nation states have relinquished responsibility in some issue areas, while reasserting themselves in others (Hurrelmann, Leibfried, Martens and Mayer, 2007).

As the footprint of TNC activities expands beyond the ownership boundary, how TNCs shape existing institutions and create new ones lies at the centre of trying to understand how they contribute to the complexity and volatility of an interconnected global economy. At the same time, the methods TNCs employ to control such uncertainties, is an important factor shaping the pluralistic space of transnational governance.

We have suggested in this paper, that our understanding of some of the governance structures developed and employed by TNCs is enhanced by the study of the medieval institutions that facilitated long-range trading. Much of our understanding of the role of repeated contracting, bilateral and multilateral reputation mechanisms, and the enforcement of collective sanctions, is derived from a record of historical relationships that took place in the presence of profound information asymmetry, an inability to communicate and to monitor, and an inability to internalize the difficult transactions.

Similar conditions prevail in the contemporary global economy in some developing and emerging economies, where governance deficits either on account of government failure or the failure of civil society imply that the transaction costs in such markets are prohibitively high. In the case of commercial relationships, such problems might be alleviated by clientelistic relationships and repeated trading (McMillan and Woodruff, 1999). However, in other cases, the governance deficits extend to essential public services, without which TNCs find it difficult to carry out their value adding activities.

Since such deficits do not concern the primary value adding activities of the firm, they leave few opportunities or incentives for TNCs to establish long-term bilateral or multilateral relationships. In the best case scenario, TNCs can support the emergence of credible contractual partners in emerging markets, and to assist the host country in achieving a better equilibrium where public or private entities are able to provide public services in sufficient quantity and quality. By doing so, TNCs can thus become partners in line with the new development paradigm

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(Lundan and Mirza, 2010), but their interests are limited to facilitating the sustainability of their own value adding activities.

Conceived of as institutional entrepreneurs, the contribution of TNCs extends far beyond technological knowledge transfer, or traditional political influence activities. The diversity of both market demands and changing societal expectations result in a broad range of strategic options that necessitate the development of new kinds of capabilities and institutions. In the course of this process, the moral underpinnings of the global economy are being built from the bottom up, as well as from the top down. The development of a variety of new institutions by TNCs, their transferability, and their impact on the host country, offer fruitful avenues for further research that can continue in the spirit of John's inquisitive and inclusive form of scholarship.

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# Making globalization moral?

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Seev Hirsch\*

John Dunning made a substantial contribution to our understanding of the role played by globalization in general, and transnational corporations, in particular, in promoting economic growth and efficiency in the post World War II era. In his late years, Dunning wrote extensively about the unsolved problems which globalization appears to have spawned, particularly the growing inequality both between rich and poor countries, as well as within them. These difficulties have been aggravated by the failure to establish a global governance system capable of resolving the contradictions inherent in a world characterized by sovereign nation states on the one hand, and a global economy whose welfare depends more and more on inter-state cooperation, on the other.

**Key words:** globalization, inequality, governance

The title of this essay “Making globalization moral?” is a paraphrase on the late John Dunning’s book *Making Globalization Good*.<sup>1</sup> Dunning himself used a more appropriate set of terms to describe the relationship between global capitalism and morality to which he devoted two chapters in the posthumously published volume, *New Challenges for International Business Research*.<sup>2</sup> The first chapter was titled “In Search of a moral Ecology” and the second “Corporate Social Responsibility”. Both chapters seek to address the difficult question, which, in Dunning’s words, “may perhaps be the main question in the early 21st century...how best to achieve the economic benefits of globalization, while protecting the social needs and cultural aspirations of local communities” (Dunning, 2011, p. 2).

The importance of this question is highlighted by the fact that about 80 per cent of the human race lives under the economic system Dunning terms “global capitalism”, a system that has been instrumental in increasing the global output of goods and services at an unprecedented rate since the end of the Second World War. Yet, in Dunning’s words, “To be sustainable in the long run, any economic system must be judged by its ability to deliver economically

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<sup>1</sup> Dunning (2003).

<sup>2</sup> Dunning (2011).

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efficient and socially acceptable answers to three questions: 'What to produce?', 'How to produce?', and 'How to distribute the benefits arising from global economic activity?'. The global capitalist economy, supposedly characterized by competitive open markets, free flows of goods, services, capital, technology and information, is claimed to be better able than any other economic system, to satisfy at least two of these specifications: "what to produce?" and "how to produce?". Doubts and reservations about the system relate to the way its benefits are being distributed and to its ability to cope with future challenges.

The geographic spread and the impressive growth of output achieved by the global capitalist system demonstrates, on the face of it, its superiority, as long as one considers only what Dunning calls the physical environment. The evaluation becomes less clear, once we introduce the human environment, which includes human aspirations for dignity, for choice, for learning opportunities, for security, for a sustainable environment, as well as minimum health standards. These needs are not automatically catered for by the institutions of global capitalism. In fact, they are not even satisfied in the environment of a single national State i.e. an environment where the Government can take care of some of those human needs which the global markets fail to address, by making appropriate rules, laws and even by taking direct action. I have in mind primarily the needs associated with the third question, namely the distribution of the benefits arising from economic activity, as well as social standards which, even well functioning markets, are not always able to provide.

Dunning notes that the institutions of capitalism are better equipped to produce private than public goods, and that the relative importance of the latter is increasing over time. Moreover, the shortcomings of the capitalist system become even more pronounced in a world characterized by extreme variations in the level of economic development. In such a world, different societies have inevitably different priorities regarding the questions posed at the beginning, "what to produce?", "how to produce?" and "how to distribute the benefits?". The mechanisms that are able to reconcile equitably and efficiently between these conflicting priorities have yet to be developed.

The violent demonstrations which have taken place whenever the so-called leaders of the global economy sought to convene and

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exchange views on its functioning prove time and again that there is no generally acceptable answer to these three questions. While the demonstrators and their supporters appear to regard the performance of the system so dismal that they advocate its complete abandonment, Dunning offers the view that the system might be salvaged by suitable reforms. Dunning (2003) contains essays written by a distinguished panel of economists, political thinkers, business leaders and practitioners as well as religious thinkers who were asked to address the following questions:

- (i) How far, and in what respects, does the current stage of responsible global (or globalizing) capitalism fall short of its economic potential, social acceptability, and long term sustainability?
- (ii) To what extent can its deficiencies be attributed to a dearth or misuse of moral capital or an inadequacy of incentive or control mechanisms to minimise moral failure?
- (iii) What might be done to upgrade the moral component of and the mindsets and behaviour of individuals, and the ethical mores of the institutions of Responsible Global Capitalism (RGC) – and of the system itself – without sacrificing its several economic and social benefits, and most noticeably, the freedom of choice and life styles it offers to its participants?

The answers given to these questions are summarized in chapter 12 of Dunning (2011), which carries the title “In search of a global moral architecture”. Ideas of how the global system might be improved by the adoption of the principles of corporate social responsibility are discussed in the chapter that follows.

The conclusions which follow from the discussion are not optimistic. Even if the recommendations concerning the moral ecology of the institutions making up the global economy are voluntarily adopted by them, there remains a vital missing ingredient – an effective global government capable of assuring the stable functioning of the global economy. In the absence of such a government, transnational corporations (TNCs), national and regional governments, the World Trade Organization, the International Monetary Fund and other supra-national organizations, the NGOs and other institutions participating

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in the global economy cannot guarantee the stability of the system or prevent the recurrence of the recent economic crises.

The inherent instability engendered by the existence of giant global TNCs can only be neutralized by a global government. Only a global government is capable of controlling the decisions of the global TNCs and make them adopt policies which will conform to global interests. This point is illustrated by the following example which examines the implications of the entry and exit decisions of global TNCs. TNCs will presumably choose to locate its value adding activities in countries which subscribe to global capitalism. This means that the TNCs is ultimately free to move out when local conditions cease to satisfy its requirements. Thus, the TNC poses a threat that constrains the ability of the host government to legislate, make rules and regulations, impose taxes and take other decisions that may be unacceptable to the TNC. The threat need not be explicit. Both the TNC and the government know that it exists. Moreover, the TNC in question need not be foreign. It might as well be locally controlled. Like foreign based TNCs, it can choose to relocate when local conditions do not suit it. Thus, in the absence of a global government it is difficult to conceive of an economic system which will assure a socially acceptable distribution of economic goods, bads and the resources required to produce them.

Dunning was of course aware of this dilemma when he stated “There is currently no supranational form of governance which can correct or lessen inter-country social injustices arising from the global market place, in the same way as national governments can and do, help to mitigate the effects of intra-country injustices. Nor is it clear that there could be a universally agreed consensus of the contents of global social justices. Because of this, I do not foresee any easy or comprehensive answer to this particular moral dilemma of RGC and it worries me a great deal when the words and actions of well meaning individuals and NGOs often give the impression that this is so” (Dunning, 2003, p. 18).

So, what is to be done? A less optimistic person than John Dunning might have given up on global capitalism, and would perhaps have sided with those who demand its dissolution, without really offering an alternative. Always the pragmatist, he prefers not to throw the baby with the bath water. Rather than insisting on a perfect solution he is



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looking for an acceptable compromise, reminding his readers that “the objective we set ourselves has not been to consider alternatives to RGC, as an economic system – however commendable such a quest might be. Rather it has been to consider ways in which its structure, content and effects may be made more morally acceptable, more democratic and more socially inclusive. In particular, we have been interested in identifying whether the idea of a universal or global ethic to ensure a more acceptable RGC has any merit in it. Or, even if it is accepted as a laudable objective, is it likely to have any practical effect in a world in which so much political, ideological and cultural diversity exists?”.

In his last book, John Dunning has taken on the task of outlining a system which obliges decisions makers to be aware of the consequences of their decisions not just for their own institutions but also for other parts of their environment. This awareness should help establish moral standards, a moral ecology which will be ultimately adopted by those in charge of the institutions comprising global capitalism: Governments, corporations, NGOs and supra national organizations.

He is hopeful that responsible global capitalism can prevail with the help of the following principles:

1. Enlightened self interest,
2. Adoption of the maxim “Do to others what you want done to you”,
3. Adoption of teachings of the major monotheistic religions.

“Enlightened self interest” is a euphemism for long-term self-interest. A firm endangers its future if it adopts policies which disregard the negative effects of present decisions on its long-term chances of survival. Decisions affecting the environment, wage policy, training policy, pricing policies often fall into this category. The moral content of these decisions is self evident and ignoring future implications simply constitutes poor management. Upgrading of the quality of management is thus likely to introduce moral considerations into the decision-making process.

“Do to others what you want done to you” has somewhat different connotations. In this case, higher moral principles will be adopted by decision-makers in the expectation of reciprocal behaviour by their counterparts. Reciprocity can indeed be a powerful motivator,

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especially if the economic power of the parties in question is of similar order of magnitude. It is interesting in this context to consider a much earlier version of the reciprocity principle. It is said of the Jewish Sage, Hillel, who lived about 2000 years ago, that he was asked to summarize the Law, while standing on one foot. His replied, "Do not do unto others, what you do not want done to you. All other laws are mere extensions of this one". Hillel's formulation of the reciprocity principle is slightly different from that of Dunning's. Hillel's focuses on what NOT to do; Dunning on affirmative action. The merits and demerits of these strategies need not concern us further. At this point, it is sufficient to note that they are different, and may lead to different outcomes.

Adoption of moral codes promulgated by the three monotheistic religions may at first glance seem naïve or out of place in the context of the discussion of globalization. But then Dunning notes that the moral doctrines preached by the three religions are quite similar and that they command the loyalty and devotion of millions of followers. Explicit exhortations on moral or environmental issues by religious leaders gathered in formal periodic meetings might well be heeded by leaders of the institutions which make up the global economy.

In Dunning's own words, "One proposal which I first put forward in a lecture given in 1998 is for an annual or biannual meeting of a group of the world's religious and spiritual leaders – rather like that of the Group of Eight in the economic domain – to be convened. The brief of the Group would be to identify, promote and monitor a set of common ground rules and enforcement mechanisms for ethical underpinnings of RGC; and to provide information about, and undertake research into, the interaction between moral and ethical values, cultural diversity and the content and consequences of RGC. An alternative course of action (which I have recently come to prefer) might be for the UN to set up a high level Commission on the Ethics of Global Capitalism on this subject" (Dunning, 2003, p. 33).

I would like to conclude this essay by reading to you two passages from the leader of the Economist newspaper of 7 November 2009, which commemorated the twentieth anniversary of the fall of the Berlin Wall:

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“For Western liberals, even ones who believe in open markets as unreservedly as this paper, that means facing up to some hard facts about the popularity of their creed. Western Capitalism’s victory over its rotten Communist rival does not ensure it an enduring franchise from voters. As Karl Marx pointed out during globalization’s last great surge forward in the 19th century, the magic of comparative advantage can be wearing - and cruel. It leaves behind losers in concentrated clumps (a closed tire company for instance), whereas the more numerous winners (everybody driving cheaper cars) are disparate. It makes the wealthy very wealthy: in a global market, you will hit a bigger jackpot than in a local one. Above all politics remains stubbornly local. All that economic integration has not been matched politically. And to the extent that there is a global guarantor of the current system, it is America, a country which as globalization works, will continue to lose relative power. Thanks to its generosity in exporting the secrets of its success, it now has China close to its shoulder and other emerging giants are catching up...”

The leader concludes with the following exhortation:

“Recognizing the political shortcoming of globalization should redouble Western Liberals’ determination to defend it: to close the gap in the right way. That involves a myriad of things, from promoting human rights to designing better jobs policies....But it also requires defending the enormous benefits that capitalism has brought the world since 1989 more forcefully than the West’s leaders have done thus far. And above all perhaps, taking nothing for granted”.

John Dunning might have expressed this idea somewhat differently. I have no doubt, however, that he would have agreed with it whole heartedly.

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# GUIDELINES FOR CONTRIBUTORS

## I. Manuscript preparation

Papers for publication must be in English.

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Articles should not normally exceed 12,000 words (30 double-spaced pages). All articles should have an abstract not exceeding 150 words. Research notes should be between 4,000 and 6,000 words. Book reviews should be around 1,500 words, unless they are review essays, in which case they may be the length of an article. Footnotes should be placed at the bottom of the page they refer to. An alphabetical list of references should appear at the end of the manuscript. Appendices, tables and figures should be on separate sheets of paper and placed at the end of the manuscript.

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Dunning, John H. (1979). “Explaining changing patterns of international production: in defence of the eclectic theory”, *Oxford Bulletin of Economics and Statistics*, 41 (November), pp. 269–295.

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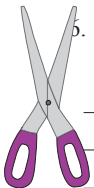
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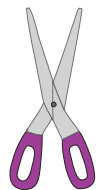
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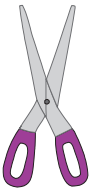
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