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## **SUBSIDIARY TYPES, ACTIVITIES, AND LOCATION: AN EMPIRICAL INVESTIGATION**

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MICHAEL J. ENRIGHT

VENKAT SUBRAMANIAN

Venkat.Subramanian@vlerick.com

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MICHAEL J. ENRIGHT

University of Hong kong School of business

VENKAT SUBRAMANIAN

Vlerick Leuven Gent Management School

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**Contact:**

Venkat Subramanian

Vlerick Leuven Gent Management School

Phone: ++32 16 24 88 13

E-mail: Venkat.Subramanian@vlerick.com

## ABSTRACT

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The present paper extends the literature on the functions of foreign subsidiaries in the strategies of multinational companies in two ways: (a) by using a series of activities to induce subsidiary roles and (b) by investigating the firm-specific and location-specific determinants of subsidiary roles. Cluster analysis of responses of multinational subsidiary managers in the Asia-Pacific support a four-fold subsidiary typology. Categorical modeling on the resulting subsidiary types showed that several firm-specific and location-specific variables such as firm size, nationality, host market size and the level of host market openness have an impact on subsidiary mandate.

**Key words:** Subsidiary Roles, Typologies, Firm-specific factors, Location-specific factors

## INTRODUCTION

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What determines a subsidiary's role within a multinational corporation? This is an important research and managerial issue in international business research, and relates to how the multinational enterprise organizes and manages its international operations. Given the ever-increasing globalization trends, subsidiary roles and mandates over time have changed from being independent stand-alone operations to more integrated and interdependent networks (Frost, Birkinshaw & Ensign, 2002; Ghoshal & Bartlett, 1991).

A growing stream of research in this vein focuses on the nature of national subsidiaries and the roles that subsidiaries play in the strategies of multinational enterprises (Birkinshaw & Hood, 1998). A number of researchers have used typologies to identify the salient features that distinguish subsidiaries (Bartlett & Ghoshal, 1986; Gupta & Govindarajan, 1991; White & Poynter, 1984; for example). While much of the early research has been conceptual, some researchers have tried to validate subsidiary typologies empirically (Birkinshaw & Morrison, 1995; Harzing, 2000; Leong & Tan, 1993; Taggart, 1997, 1998).

While this work has greatly added to our understanding of national subsidiaries, important theoretical and empirical gaps remain. In theoretical terms, apart from the overall strategy type, there may be other firm-specific factors that may be relevant to subsidiary roles, such as its nationality, size and experience in a specific geographic region (Yip, 1995). Further, location has also has important effects on what the subsidiary actually does (Dunning, 1998; Ghemawat, 2007; Ricart, Enright, Ghemawat, Hart & Khanna, 2004). In empirical terms, the limited verification that is available primarily tends to focus on the links between MNC strategy and subsidiary types. Though this is clearly an important factor, MNC strategy by itself is not usually the only relevant contingency that can determine subsidiary types. One problem with a strategy driven approach is that the suggested strategy types would limit the subsidiary types that may be found in the MNC. Further, the empirical validation of subsidiary typologies and roles is rather limited and researchers have implored for more cross-country evidence to identify roles and determinants. Hedlund and Ridderstale (1997) argued that the empirical grounding of subsidiary typologies has been "sparse and impressionistic" and Ghoshal (1997) claimed the field tends to be "unencumbered by ... the discipline of empirical verification".

This study aims to contribute to the literature on MNC configurations by conducting a joint examination of firm-specific and location-specific determinants of subsidiary types. To examine the determinants of subsidiary roles within the multinational enterprise, the paper induces a subsidiary typology based on the specific activities performed within the subsidiary. This is to move away from

generating subsidiary typologies based on strategy typologies, and generate a typology based on actual dispersion of subsidiary activities. In a second stage, we attempt to identify the effect of several firm- and location-specific variables on type of subsidiary found in a particular national market. This paper uses a survey conducted across multiple Asia-Pacific countries of MNC subsidiaries that allows a more detailed investigation of activities and roles of subsidiaries based in different host countries originating from multiple home countries.

## THE DETERMINANTS OF SUBSIDIARY TYPES: LITERATURE BACKGROUND

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Researchers in international business have offered two major theoretical explanations for types of MNC subsidiaries. The first explanation is based on the different strategy typologies of MNCs that have been offered over the years. Much of the early literature on the subsidiaries of multinational firms tended to focus on the types of overall strategies and organizations multinationals employed, such as Perlmutter's (1969) geocentric, ethnocentric, and polycentric; Porter's (1986) global and multidomestic; Prahalad and Doz's (1987) global, multidomestic, and multifocal strategies; and Barlett and Ghoshal's (1989) multinational, global, international, and transnational formulations. The common origin of these typologies is addressing the key imperatives of an international strategy – namely global integration versus local responsiveness. An international business, operating across national markets, must exploit its unique firm-specific advantages that are transferable across national boundaries. On the other hand, since the MNC is operating in multiple country locations, it must also be responsive to the demands imposed by local market and factor conditions. In each case, the firm's strategy and organization had clear implications as to how the multinational configured and coordinated its operations, and therefore as to the types of subsidiaries found in the firm. For example, a "multidomestic" strategy may have a large number of subsidiaries that are relatively autonomous and less integrated with the parent and other subsidiaries; an "international strategy" will have a majority of subsidiaries more controlled centrally but also less integrated laterally with the other national subsidiaries; and a "global strategy" is likely to have some subsidiaries with world mandates and working in relatively autonomous fashion, while at the same time integrated with the parent and the other subsidiaries. Subsidiary typologies and roles, in this argument, were second-order effects deriving primarily from an overall strategy choice of the MNC.

A second theoretical origin of subsidiary roles has been the process view of the MNC. Johanson and Vahlne (1977) and Stopford and Wells (1972) provided the initial arguments describing how subsidiary roles may evolve over time, as the MNC matures and learns more about operating across borders. Overseas subsidiaries were initially set up as export offices, which sometimes evolved into 'miniature replicas' and branch plants (White & Poytner, 1984) as they tried, in many cases, to address protectionist barriers. Later they took on more wide ranging responsibilities in the form of mandates to sell to neighboring, regional and eventually global markets. The product-life cycle hypothesis of Vernon (1979) in an international context implied that the role of the subsidiary was first to adapt the MNC's key technologies to local markets, and then to be an 'observer' by sending information to the parent about changes in local tastes. In effect, what this process literature indicated is the evolution of subsidiary roles (as an outcome of the MNC's international evolution) (Malnight, 1995, 1996). As with the strategy perspective, the process perspective also implied that subsidiary roles are developed as an outcome of the evolution of the MNC's international operations, once again leading to second-order effects for subsidiary roles.

A number of empirical studies have tried to verify these typologies. Much of the work that has been done has used a top-down approach, motivated by theory, to identifying subsidiary roles. The typical empirical study would attempt to validate a particular typology or a general typology induced from literature or a typology generated along some important strategic and organizational dimensions. Harzing (2000), Leong and Tan (1993) attempt to verify the Bartlett and Ghoshal (1986) typology. Roth and Morrison (1990) explored the Prahalad and Doz (1987) framework to identify subsidiaries either focusing on global integration, local responsiveness, or pursuing a multifocal existence. Others such as Birkinshaw and Morrison (1995) induce typologies from literature. Further, researchers have offered subsidiary typologies based on different dimensions considered to be relevant in discriminating subsidiaries. These dimensions have ranged from geographic and product scope of the subsidiary mandate (White & Poynter, 1984), subsidiary's position in the integration-responsiveness framework (Jarillo & Martinez, 1990; Roth & Morrison, 1990; Taggart, 1998), subsidiary's position with respect to resource flows (Randoy & Li, 1998), subsidiary autonomy and decision making (Taggart, 1997), or inflows and outflows of knowledge at the subsidiary level (Gupta & Govindarajan, 1991) (see Paterson & Brock, 2002 for a review, and Table 1 for a summary).

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Insert Table 1 About Here

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## THE DETERMINANTS OF SUBSIDIARY TYPES: RESEARCH GAPS AND RESEARCH QUESTIONS

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While our understanding of national subsidiaries has greatly improved from the early strategy and process origins, there are a number of gaps to be addressed. The traditional approach, as we have seen, has been to induce one from the literature (Birkinshaw & Morrison, 1995 for instance). Using the strategy typologies developed in a theoretical manner raises particular issues. Enright and Subramanian (2007) have argued that such a traditional approach to typology development, one that is based on theory is characterized by a number of challenges. The traditional approach is to assume a monothetic perspective, whereby it is assumed that all the firms in the population possess all the attributes in some systematic manner, and the dimensions along which subsidiaries vary (scope variables, for instance) are mutually exclusive. However, such sweeping assumptions are rarely made explicit and their implications examined.

There is also a need for empirical work that addresses a wider range of host countries and home countries that try to elucidate why subsidiaries have particular roles in particular locations. While the several studies have added to the stock of empirical knowledge, some have questioned whether sufficient research is available to make empirical claims (Ghoshal, 1997; Heldlund & Ridderstale, 1997). Much of the literature has seen studies undertaken on a limited sample space. Jarillo and Martinez (1990), Taggart (1997), (1998) and White and Poynter (1984) focus on subsidiaries based in a single country. The tendency is also to focus on subsidiaries of parent companies from a single country or a small number of countries (as identified by Paterson & Brock, 2002).

A significant amount of the work on subsidiary types has used cases or data from relatively small or peripheral economies (inter alia Canada, Sweden, Spain and Scotland), which may not reflect the entire range of subsidiary type alternatives. Case studies, while being useful starting points for theory building, suffer from some well-known problems. Such 'fine-grained' methodologies are characterized by limited generalization, hypothesis generation and replicability (Hartigan, 1975). Subsidiary typologies that might be important in one setting might not stand up to broader examination. Case studies tend to be carried out on only the largest corporations, or only corporations in global industries, or only companies with a reputation for distinctive international strategies. The challenge of generalizing beyond such starting points can be substantial, particularly if specific cases color the research frame to the point where assertions and hypotheses become self-fulfilling.

In addition, a focus on subsidiaries from or in a particular nation or small set of nations may be subject to two additional biases, namely the bias inherent in the fact that subsidiaries placed in a particular location are placed there for reasons that might be location-specific (thus limiting the subsidiary types found in the location) and the bias inherent in the fact that firms from one home nation might have needs that differ from those of firms from other home locations (and thus might favor one type of subsidiary over another). Even subsidiaries placed in large countries like the United States or Japan may not reflect the totality of subsidiary type alternatives. Such countries, for example, are unlikely to become the host for low wage assembly manufacturing subsidiaries (MNCs from or subsidiaries operating in Canada, the UK, Spain, Sweden, Scotland have been the source of many studies).

A second feature of past studies is that they have a predominantly a top-down approach with subsidiary choices driven by the MNC's overall strategy. While it may be sensible to align the MNC's overall strategy and subsidiary roles, and can also be empirically validated (which, in fact, has formed the main focus of empirical works), it is neither a necessary nor a sufficient condition in explaining subsidiary types. For instance, Birkinshaw (1997) and Birkinshaw and Hood (1998) show that irrespective of MNC strategy, entrepreneurship at the subsidiary level may also determine its role. Others have argued for the location-specific factors that may influence subsidiary roles. After all, locations and firms have different attributes and one would expect that MNC subsidiaries with specific roles would operate in particular places to take advantage of those location-specific attributes (Dunning, 1998, 2000). Hence, there is a need to understand roles from the subsidiary's point of view rather than solely from the view of the corporate entity, i.e. from the node rather than the network. The first major research question of this paper, then is to identify subsidiary roles independent of strategy typologies, but based on what the subsidiary actually does. We employ a multiple host-country and home-country sample of firms to address some of the obvious biases identified earlier, as well as to test the determinants of such roles.

Such an approach also allows us to move away from a strategy focus and examine other determinants of subsidiary roles. This is important, because as the literature focused on verifying strategy based subsidiary typologies, the implicit assumption was that other determinants were not the focus. As a consequence, empirical studies seldom go beyond verification and explore other determinants. The second major research question of this paper, is then to examine the determinants of subsidiary roles identified when answering the first question.

The international business literature indicates that both firm-specific and location-specific factors influence the location of corporate activities (Enright, 2005a; Porter, 1986; Yip, 1995). Several general firm-specific factors have been suggested in the literature such as nationality, technological



capabilities, experience (Vermeulen and Barkema, 2002; Caves, 1996). While this may be the case, the effect of location itself has not featured prominently in international business research (Dunning, 1998, 2000). Location has been traditionally kept in the background, while firm level factors have formed the focus of research in the past. However, overlooking location itself as influencing subsidiary roles is a worthwhile line of research. Yip (1995), for example, identifies several factors that might affect the choice of location: “traditional country factors” such as production costs, tax rates, investment incentives, exchange rates and “strategic advantages” that depend on the overall configuration of the firm. In essence, the second research question examines the impact of several firm- and location-specific determinants of subsidiary roles.

### ACTIVITY-BASED TYPOLOGY

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To investigate the determinants of subsidiary roles, we firstly attempt to develop a subsidiary typology. In this study, we take activities as the unit of analysis when examining a subsidiary. Activities are increasingly considered the unit of analysis when examining firm strategy (Jarillo, 2003; Porter, 1985, 1996). An activity-based view of the multinational firm (Porter, 1986; Yip, 1995) focuses on the configuration and coordination of firm activities across nations and regions. Some consider activities as one of the three primitives at the firm level, the others being resources and knowledge (Ricart et al., 2004). Past empirical research on subsidiary typology has used all the three primitives as the unit of analysis, with some adopting a resource-based perspective (Birkinshaw, 2001; Birkinshaw & Hood, 1998; Paterson & Brock, 2002; for a review). A knowledge-based perspective is seen explicitly (Gupta & Govindarajan, 1990) or implicitly (Frost, Birkinshaw & Ensign, 2002; Randoy & Li, 1998). Others such as Birkinshaw and Morrison (1995) where a three-fold typology was induced from literature that was subsequently confirmed, and Jarillo and Martinez (1990), use an activity-based perspective to identifying subsidiary roles.

An activity view also is conducive to empirical analysis. Resources and knowledge are difficult to measure, given the intangible nature of many of the organization’s resources (Grant, 1996). On the other hand, the presence or absence of a particular activity is comparatively easier to measure (Ghemawat, 2006). Thus, an activity perspective may provide a more reliable way to study subsidiary roles. Specifically, some subsidiaries will be engaged in a narrow set of activities while other subsidiaries would be engaged in a broader range of activities, depending on firm characteristics, location characteristics (Porter, 1990), home-country characteristics (Yip, Johansson, & Roos, 1997) and the roles played by the subsidiaries within the multinational (Birkinshaw, 1997).

Defining subsidiaries through their activities is the converse of the approach taken in Birkinshaw and Morrison (1995), which used role in the multinational strategy to separate out subsidiaries and then showed how different subsidiary types were related to different activities.

## HYPOTHESES DEVELOPMENT

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Once we have generated subsidiary roles, we move to our next objective of identifying factors that have an effect on the roles. In particular, we investigate the effect of firm and location specific factors on the identified subsidiary roles. The impact of a set of generic firm and location specific factors, identified in the literature, are examined. We examine the impact of such factors on subsidiary types by generating hypotheses between the firm- and location-specific factors and possible subsidiary types.

### Firm-Specific Factors

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A number of firm-specific factors have been used in the literature but not linked directly to activities. Firm-based factors that may influence foreign investment decisions include the firm's resource base, its knowledge of international markets, its overall regional profile, and its nationality. The firm-specific factors and associated hypotheses refer to the overall MNC, i.e. the corporate level where the locus of decision making for overseas investments could reside.

Firm size is often used as a proxy for firm-specific resources (Hood & Young, 1979). As larger firms are likely to have greater resources with which to penetrate international markets and absorb the risks and uncertainties involved, firm size might be positively related to the likelihood that the firm will expand into international markets. Firm size may then relate as to whether the firm will be able to undertake investments in particular activities in unfamiliar host economies. Examining the impact of size, Birkinshaw and Morrison (1995) suggest that large firms may have a different propensity for certain types of subsidiaries than small firms even in the same location. In other words, firm size may have an influence as to whether the firm will invest in up-stream activities such as corporate management, research and development and production as well as downstream activities such as sales and customer service. In both cases, the size of the firm should be positively related to the probability of having such investments. This leads to the following hypothesis.

- Hypothesis 1: Firm size will be positively related to the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

The process perspective on subsidiary roles, observed earlier, informs that the MNC subsidiary roles develop as an outcome of past experience in operating in international markets. Firms may follow an incremental approach to internationalization as they increase their stock of knowledge on foreign markets and the assets needed to compete in those markets (Johanson & Vahlne, 1977, 1990; Stopford & Wells, 1972) and such incremental internationalization may influence the strategic posture and realized subsidiary typology of the firms. This leads one to expect that prior international experience would likely to have a positive effect on the type of activities and associated roles of subsidiaries. Higher levels of prior internationalization by the parent should then have a positive effect in greater involvement by the subsidiary in the scope and scale of activities undertaken by the subsidiary.

- Hypothesis 2: Prior experience in internationalization should have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

Past literature has also indicated that the investment behavior of multinationals to vary by nationality of the parent firm. A firm's 'administrative heritage' influences its investment pattern, while nationality itself is a key component of that heritage (Bartlett & Ghoshal, 1989). Several studies have found differences in the investment and the management styles among European, North American and Japanese multinationals (Caves, 1999; Egelhoff, 1984; Vernon, 1992; Yip et al., 1997). Thus we would expect firms of different nationalities to exhibit different types of investment behavior. In the present investigation, in which data is drawn from Asia-Pacific subsidiaries of North American, European, and Japanese firms, we would expect particular differences.

Japanese firms are distinctive with respect to the Asia-Pacific region is that they have a home base in the Asia-Pacific region. Given the fact that Japan is geographically and culturally closer to other Asian economies than are firms from Western countries, we would expect that Japanese firms might find it easier to set up and manage information intensive, knowledge-creating activities such as R&D than their foreign counterparts. On the other hand, we would expect that activities such as sales and service, which often are less difficult to transfer, would not necessarily differ from those of Western firms. We are left with the following hypotheses.

- Hypothesis 3a: Firm nationality will have a significant influence on subsidiary types.

- Hypothesis 3b: Japanese firms are more likely to have high knowledge creation, low knowledge utilization subsidiaries than their Western counterparts.

### Location-Specific Factors

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A number of features of national economies have been shown to influence foreign investment in general and foreign investment in different activities. For instance, UNCTAD's World Investment Reports argue that rank countries in terms of the ease of doing business and in general, the relative attractiveness of different locations to attract foreign investment from multinationals. More academic works Caves, (1996), Dunning (1998, 2000), Ghemawat (2007), and Ricart et al (2004) have identified several host economy characteristics that may influence the locations of FDI include the size and growth of the market, level of development, openness of the economy and tax rates.

In general, studies indicate that market size and growth rates would have an influence on the type of investment activities (Agarwal & Ramaswami, 1992; Kobrin, 1976; Root & Ahmed, 1978; Terpstra & Yu, 1988; Woodward & Rolfe, 1993). Firms have a strong attraction to establish sales, production, and customer service activities in large and growing markets (Dunning, 1993). Finally, market size and growth could also be positively related to the tendency to invest in research and development, perhaps in applied research and development activities to tailor products to local demands. These arguments result in the following hypotheses:

- Hypothesis 4: Market size will have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.
- Hypothesis 5: Market growth will have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

The level of development of an economy should also influence the types of subsidiaries found in an economy. The leading destinations for FDI have consistently been the countries from the developed world with as much as three-quarters of the annual FDI targeted into the developed world (UNCTAD). High levels of development, as measured by per capita income, can be positively associated with activities such as research and development given the need for advanced skills and capabilities. (Ghemawat, 2007; Porter, 1990; Ricart et al., 2004). The level of development may be inversely related to activities like production due to high input costs, but positively related to others, like sales and R&D, as labor costs and skill levels may be directly related to the level of development.

Together the implication is that the level of development will have a positive influence on activities such as research and development, with potentially a negative or ambiguous influence on activities such as production. The following hypotheses result:

- Hypothesis 6: The level of development of an economy will have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

Greater openness may reflect a generally friendly environment for information flows that may have implications for location of certain activities such as research and development. On the other hand, firms often invest in activities such as production in order to get around trade barriers (Caves & Mehra, 1986; Dunning, 1998; Root & Ahmed, 1978). This leaves us with the following hypotheses:

- Hypothesis 7: The level of the openness of the economy will have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

High tax rates on corporate profits should have a negative impact on a firm's willingness to sell into a given market and thus would be expected to have a negative influence on the tendency to invest in tax sensitive sales activities (Grubert & Mutti, 1991, 2000). Ghemawat (2007) argues that this is one of the country-specific factors that can influence the location of specific activities such as management. Multinational firms employ the arbitrage possibilities offered by varying tax rates through internal transfer pricing policies. On the other hand, incentives in the form of lower tax rates for firms that locate research and development, production and corporate support activities may encourage investments. However, tax breaks are likely to be more valuable in high tax environments. The hypotheses are then as follows:

- Hypothesis 8: Corporate tax rates will have a positive influence on the likelihood that subsidiaries will be differentiated in terms of activities and roles within the multinational firm.

## OTHER VARIABLES

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Numerous other variables were originally included in the analysis. These included measures of infrastructure, managerial capabilities, technological capabilities, transparency, capital market development, among others that proxy local factors on customers, competition, institutions, and infrastructure development. Unfortunately, the fact that the current dataset has only 12 host economies meant that all of these additional measures were highly correlated (0.70 or greater) with one or more of the variables listed above (mostly the correlations were with measures of levels of development). Thus these additional variables were excluded from the analysis as described below. In addition, in the modeling of firm- and location-specific factors, we included randomized firm- and location-specific effects to reflect the effect of any factors that may have an effect on subsidiary roles (more details on this in the methods section). Figure 1 shows the overall conceptual model and the resulting hypotheses.

## DATA, SAMPLE AND MEASURES

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To learn more about the roles of multinational subsidiaries, data was extracted from a large study of multinational corporation activities in the Asia-Pacific region. The Asia-Pacific is a major destination for multinational investment, as well as a region with economies that exhibit great variety in terms of size, levels of development, openness, tax rates, institutional factors, and capabilities. Despite this variety, multinational companies tend to manage the Asia-Pacific as a single region, as evidenced by the number of regional headquarters established in the region partly to coordinate region-wide activities (Enright, 2005b). In addition, since much of the foreign investment in the region is relatively recent, subsidiary types may be less bound by history than in North America or Western Europe (Enright, 2002, 2005a). Since the largest sources of foreign direct investment, both globally and in the Asia-Pacific region, are North America, Western Europe, and Japan, it was decided to focus on the foreign investment behavior of firms from these home locations.

Over 8,000 North American, European, and Japanese firms were surveyed about the nature and location of their activities in the region, their organization and management structures, and a series of related issues. The mailing list was compiled from business directories and chamber of commerce lists. After three mailings, 1,100 usable responses were obtained, representing a response rate of 13.8 percent. Data from the 450 of these firms, which identified themselves as

manufacturing firms, were extracted for the present analysis. The focus on manufacturing firms was partly motivated by the longer history of manufacturing investment in the region (Enright, 2002, 2005a). Further, the value chain activities of service firms are more difficult to discriminate when compared with traditional manufacturing firms (Stabell & Fjeldstad, 1998). 450 manufacturing companies times 12 economies meant there were 5,400 potential subsidiaries in the dataset. Removing firms with missing data, the Japan location for Japanese companies, and firm-location combinations with no subsidiaries left a total of 3,885 observations for 440 firms to contribute to the analysis.

The firms were surveyed concerning the activities performed in different subsidiaries in the Asia-Pacific. The investment location decisions for five different corporate activities were selected for investigation: sales, customer service, production, research and development, and management. Sales, production, and research and development are self-explanatory. Customer service activities can include call-in service, warranty service, and other related services. Management activities were defined to include management and support functions for which the subsidiary has a significant amount of autonomy.

The responses to questions that asked managers if their companies had significant sales, customer service, production, research and development, and/or management activities in Japan, South Korea, the Chinese Mainland, Taiwan, Hong Kong, the Philippines, Thailand, Malaysia, Singapore, Indonesia, Australia, and New Zealand. These economies represent the overwhelming majority of the output and inward foreign investment in the Asia-Pacific (Enright, 2002). Given the difficulty for individual managers to report what percentage each of the economies represented for each activity in the region or worldwide, it was left for the managers to decide what constituted "significant". The activity variables used in the present study are the binary variables SALES, SERVICE, PRODUCTION, R&D, and MANAGEMENT. In each case, the variable was given a value of 1 if the company had significant operations in that activity in a given economy and 0 otherwise. We also examined biases due to non-response, by conducting a shorter follow-up from a small random sample of non-respondents, and the responses did not show any systematic variances that were statistically significant.

In the second-stage analysis of subsidiary role determinants, the dependent variable, TYPE, is a multilevel categorical variable that specifies one of the four types of subsidiaries generated through the first-stage cluster analysis. The independent variables were designed to capture the influence of the firm-based and location-based effects described earlier. FIRMSIZE is the firm's total annual worldwide sales turnover reported in six ascending categories, ranging from "less than US\$100 million" to "greater than US\$10 billion." INTERNATIONAL represents the number of countries in which the firm was active reported in four ascending categories ranging from "two to

five countries” to “greater than 30 countries.” Nationality was captured by two dummy variables, EUROPE and JAPAN, with North American firms as the baseline.

The attractiveness of the market of an economy was captured by MARKET, the natural log of the economy’s GDP in US dollars in 2000. The overall state of development of an economy was captured by DEVELOPMENT, the natural log of GDP per capita in US dollars in 2000. Economic growth was captured by GROWTH, the average annual GDP growth rate in constant US dollars for the years 1990-2000. MARKET, DEVELOPMENT, and GROWTH were derived from data in World Bank (2001, 2002). The openness of an economy was captured in OPENNESS, defined as the trade to GDP ratio  $[(Imports + Exports)/(2 \times GDP)]$ . This variable was taken from the World Trade Organization (2001). The influence of the tax system on investment was captured in TAXRATE, the economy’s tax rate on corporate profits. This variable was taken from World Economic Forum (2001).

## METHODS AND RESULTS

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The results reported in this paper were generated in a two-stage process. In the first stage, statistical cluster analysis on the activities performed in the subsidiaries was used to generate a set of clusters representing different types of subsidiaries in the Asia-Pacific. In the second stage, categorical modeling was used to estimate the impact of firm and location-based features on the likelihood a subsidiary would be of one type versus another.

### Stage One: Cluster Analysis

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The typology of subsidiaries was generated by cluster analysis of survey responses concerning the activities performed in different subsidiaries in the Asia-Pacific. A disjoint cluster analysis was performed to statistically divide the national subsidiaries into non-overlapping groups to help determine the types of subsidiaries present in the Asia-Pacific region. The variables used to create the clusters were the responses to questions that asked managers if their companies had significant sales, customer service, production, research and development, and/or corporate management activities in Japan, South Korea, the Chinese Mainland, Taiwan, Hong Kong, the Philippines, Thailand, Malaysia, Singapore, Indonesia, Australia, and New Zealand.



Cluster Analysis Results: Cubic clustering criteria and pseudo F-tests indicated that the data is consistent with a four clusters or subsidiary types solution. The four-cluster solution corresponds to the roles of “Management and Development”, “Full Functional Subsidiaries”, “Production Bases”, and “Sales and Service Subsidiaries”.

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Insert Table 2 About Here

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The number of subsidiaries in each category was as follows: “Management and Development” - 388, “Full Functional Subsidiaries” – 1298; “Production Bases” – 1548; and “Sales and Service Subsidiaries” - 651. All subsidiaries have sales activities, though the “Sales and Service” subsidiaries are focused on this activity. “Management and Development” subsidiaries have the highest mean scores on support and R&D activities. Subsidiaries that are classified as “Production Bases” have production activities apart from the sales and service activities. Finally, “Full Functional Subsidiaries” have the entire range of activities.

Other cluster solutions were tried. The appropriateness of different cluster solutions, such as five-cluster and six-cluster solutions was tried. The five-cluster solution had overlaps with the four-cluster solution, while the six-cluster solution faced problems of interpretation in two of the six clusters. When the four-cluster solution was compared with the alternate five- and six-cluster solutions, we notice a decrease in the overall ‘tightness’ of the alternate cluster solutions. A loss in ‘tightness’ can also be inferred in the loss of F-values for the alternate solutions. Such approaches are also seen in Roth and Morrison (1990) and Birkinshaw and Morrison (1995).

## Stage Two: Categorical Modeling

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In the second stage of the analysis, categorical modeling was used to estimate the impact of firm-based and location-based variables on cluster membership (in this case the type of subsidiary). Categorical modeling is an analytical technique that allows the researcher to assess the influence of explanatory variables upon membership in a category. In this case, the analysis is used to determine which firm attributes and location attributes influence the probability a subsidiary will be of a certain type.

Categorical modeling analytical procedures: The categorical modeling procedure used in the present analysis computes response functions that compare the log of each response level probability to the probability of a baseline response level. The baseline response level used here is the “Sales and Service” Subsidiaries, identified as p4. The model fitted is a generalized logit model with multiple response levels. The total number of response functions is one less than the number of response categories. For the four response categories (subsidiary types) in the present analysis, the response functions are as follows:

$$\begin{aligned}
 F &= & F1 &= \log (p1/p4) \\
 & & F2 &= \log (p2/p4) \\
 F3 &= \log (p3/p4)
 \end{aligned}$$

where log refers to natural logarithms and p1 through p4 equal the probabilities of a subsidiary type being “Management and Development Subsidiaries”, “Full Functional Subsidiaries”, “Production Bases”, and “Sales and Service Subsidiaries” respectively. Since the response functions involve relative probabilities, it is not a matter of a given effect having a positive or negative impact on membership in a particular cluster (probability of a center being of a certain type), but rather a positive or negative impact on membership in a particular cluster relative to another (or probability of being one type versus probability of being another type), in this case relative to the “Sales and Service Subsidiaries” type.

In order to assess the influence of firm and location-specific features on subsidiary type, we would like to estimate a relationship of the following form:

$$T^*_{ijk} = \alpha + \beta'X_i + \gamma'Y_k + \xi_{ijk}$$

where  $T^*_{ijk}$  is the probability type of subsidiary that firm “i” has a subsidiary of type “j” in host country “k”.  $X_i$  is a vector of characteristics of firm “i”,  $Y_k$  is a vector of characteristics of host economy “k”, and  $\xi_{ijk}$  represents an error term.

In the present analysis however, each firm “i” appears twelve times (once for each economy). In addition, each host economy “k” appears 440 times (once for each firm). Thus one cannot assume that all the  $\xi_{ijk}$  terms are independent. In other words, one cannot assume that decisions of firm “i” whether or not to have a subsidiary of type “j” will be independent across all

firms “i” or locations “k”. In such cases (cases of clustered data), ignoring the potential correlations within firms and within locations can produce standard errors that are underestimated, test statistics that are overestimated, inefficient parameter estimates, and biased parameter estimates (Allison, 1991 and Agresti, 2002). In order to deal with the potential correlations within each cluster, a random effects mixed logit model was employed.

The model included explanatory variables and random effects for both firms and locations in an effort to determine the explanatory factors of the host economy that influences subsidiary type over and above the random host economy effect. The basic formulation was:

$$T_{ijk}^* = \alpha + \beta'X_i + \theta_i \mu_i + \gamma'Y_k + \eta_k v_k + \zeta_{ijk}$$

where  $X_i$  is a vector of characteristics of firm “i”,  $Y_k$  is a vector of characteristics of the host economy “k”,  $\theta_i \mu_i$  represents the random firm effect,  $\eta_k v_k$  represents the random host economy effect, and  $\zeta_{ijk}$  represents an error term. The specific relationship modeled was:

$$\text{TYPE} = a + b1 \text{ FIRMSIZE} + b2 \text{ INTERNATIONAL} + b3 \text{ NUMSUBS} + b4 \text{ JAPAN} + b5 \text{ EUROPE} + b6 \text{ MARKET} + b7 \text{ GROWTH} + b8 \text{ DEVELOPMENT} + b9 \text{ OPENNESS} + b10 \text{ TAXRATE} + \text{firm random effects} + \text{host country random effects}$$

A restricted maximum likelihood estimation procedure (REML) was employed to estimate the multilevel random effects mixed logit model.

*Categorical modeling results:* Table 3 reports the results for the multilevel random effects mixed model logit analysis for subsidiary type with the firm random effect and the host economy fixed effect.

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Insert Table 3 About here

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All of the estimates are generated simultaneously, but are placed into columns by type for clarity. Thus the columns all form part of the same model estimate, rather than separate estimates by type. Each estimate reflects that probability that a subsidiary will be of a certain type relative to

the probability it will be the type represented by the baseline response, which is the “Sales and Service” subsidiary.

FIRMSIZE has a strong, positive influence on the probability that a subsidiary will be a “Management and Development Subsidiaries”, “Full Functional Subsidiaries”, “Production Bases”, and “Sales and Service Subsidiaries”. Particularly strong results are found for the “Full Functional Subsidiaries” category. Thus hypothesis H1 is supported. The international experience of the firm has in the Asia-Pacific has a significant influence only on the subsidiary type “Production Bases”. This may indicate that investments in production are influenced by prior experience of managing geographically dispersed production. Hypothesis H2 is partially supported.

The subsidiaries of Japanese firms are more likely to be involved in activities that consist of “Management and Development” and “Production Bases” and less likely to be “Full Functional Subsidiaries” than North American firms. The subsidiaries of European firms are more likely to be “Production Bases” than the subsidiaries of North American firms. Hypotheses 3a and b are therefore supported.

The estimates for the impact of the market size are interesting. It has a positive influence on the likelihood that subsidiaries will be of the “Full Functional Subsidiaries” and “Management and Development” Subsidiaries. On the other hand, market size shows a negative effect on the likely location of a “Production Base”. Hypothesis 4 is therefore partially supported.

The parameter estimates for GROWTH and DEVELOPMENT are not statistically significant and hence hypotheses 5 and 6 are not supported. Openness has a predictable impact on the location of “Production Bases”. Multinationals are more likely to rationalize manufacturing investments in the presence of reduced tariff and non-tariff barriers to imports. On the other hand, an open economy apparently encourages free flow of information that may have an influence the location of a “Management and Development” subsidiary. Openness does not have a statistically significant impact on the likelihood of a “Full Functional Subsidiary”. Hypothesis 7 is therefore partially supported. The parameter estimates for TAX RATES are not statistically significant and hence hypothesis 8 is not supported.

## DISCUSSION

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The two-stage analysis yields a number of interesting results. The cluster analysis provides support for a four-part typology of subsidiary roles. In contrast to past studies (which also employ cluster techniques), this study uses the firm’s activities rather than some theoretically induced variable such as product and geographic scope, autonomy, integration and responsiveness, among

many others (See Table 1). This alternate approach shows that the data can identify patterns of subsidiaries with distinct roles. The cluster analysis results also show that a significant number of subsidiaries are “Production Bases”, which seems to be in line with expectations given the low cost base offered by the region and the huge amounts of FDI into these regions by multinationals. Further, the relatively low number of “Management and Development” subsidiaries may also be expected as the strategy setting and activities such as R&D may be located at other locations, including the firm’s headquarters.

The categorical modeling results indicate that firms of different size have different requirements of their subsidiaries. In particular, larger firms are more likely to have subsidiaries that span the several activities. This implies that larger firms in a sense distribute their important activities more broadly than smaller firms, which by implication retain the more important upstream activities such as corporate support, management and R&D at home, or at least in other regions than the Asia-Pacific.

The lack of significant results for the international experience of the firm (except that of “Production Bases” which has a small negative impact) and the number of subsidiaries a firm has in the Asia-Pacific region is surprising. One might expect that firms with different levels of international experience would have different profiles across their subsidiaries. Similarly, one might expect that firms with more subsidiaries in the Asia-Pacific might place their activities in the region differently from firms with only a few subsidiaries in the region. One reason for these results might be insufficient variance in the two explanatory variables. The mean of the international experience variable in the sample is 3.36 out of a possible 4.00. In other words, the method of identifying multinational firms for the analysis (directories of Chambers of Commerce and similar Corporate Directories) tended to identify firms with a great deal of international experience. Similarly, the mean number of subsidiaries a firm had in the region was 10.05 out of a possible 12, indicating that the vast majority of firms in the sample had subsidiaries in all or nearly all of the economies in the region. Thus even with a large number of firms, there may not have been enough variation to generate a significant impact. On the other hand, it could be that there is no significant impact of these two variables and that international experience does not influence subsidiary type.

The nationality results support the notion that firms from different countries will exhibit different behavior in their international operations. They suggest that activities such as R&D are easier to set up and maintain in foreign markets that are closer geographically and culturally than in more distant markets. Experience in the region also may be an issue. While many European firms have long experience in the Asia-Pacific, interviews of managers in the region suggest that North American firms have a longer and more extensive history in the Asia-Pacific than the European firms.

Although it was not possible to capture this history in the survey instrument, the interview results suggest that the comparative absence of “Management and Development” subsidiaries among the European firms when compared to North American firms, could be due to this history. Further, risk taking may also differ in different national cultures and firms from certain cultures may be more risk averse than others.

The results for market size indicate that larger markets attract a higher proportion of subsidiaries with roles such as “Management and Development” subsidiaries as well as “Full Functional” subsidiaries, while less likely for a production base. A large market is probably a proxy for the level and diversity of skills available that is necessary for the latter type of subsidiary, while a large market may also allow the multinational to locate the entire range of functions at this particular subsidiary. This may be because large markets may also be developed markets and hence manufacturing facilities may face a cost disadvantage. The results for openness would suggest that an economy’s overall openness has a strong influence on its ability to attract “Management and Development” subsidiaries. But the downside for countries that have high levels of openness may be that multinationals may opt to export to these country markets and concentrate production at other locations.

There are clear implications of the present results. If firms wish to follow the revealed preferences of their counterparts, they can use the present results to plan particular types of subsidiaries for particular economies. They would place “Management and Development” subsidiaries in relatively large economies, and in relatively open economies. Governments can use the present results to understand the types of subsidiaries they are more likely and less likely to attract given present circumstances. This could lead to policy choices to promote investments in one type of subsidiary or another. Of the variables that are under the control of government, openness would be one that some governments might choose to examine. Governments that wish to attract higher value adding subsidiaries, for example, should consider ensuring that their economies are relatively open. Governments in relatively small economies should recognize that they face challenges that they may need to overcome through policy measures.

## CONCLUDING REMARKS

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The functions of foreign subsidiaries in the strategies of multinational companies are receiving increasing attention in the international business literature. The present paper attempts to add to the growing literature on types of subsidiaries by using a series of activities to build a four-fold typology using a large international sample. Categorical modeling on the resulting subsidiary types shows that firm-based features (such as firm size and nationality) and location-based features (such as market size and openness) strongly influence subsidiary types.

The present paper makes a number of contributions. It develops an empirically derived typology rather than presuppose the existing of one or another type of typology proposed in literature. It shows that even relatively simple firm-specific characteristics can influence subsidiary types, suggesting that such effects need to be taken into account in research on subsidiary type and international strategies. The present paper also goes beyond much of the empirical work in the field to include the influences of geography by showing the significant influences on host and home country effects on subsidiary types. The significance impact of these influences calls into question the ability to generalize from studies of the subsidiaries of firms from a single home country or in a single host country.

Although the present work addresses a much wider range of host and home economies than most empirical work in the field, the relatively few host economies means that only a limited number of location-specific variables can be used in the analysis. Future work might entail examination of a broader range of host economies so a richer set of host economy variables could be employed. Another area for further work would be to use the configurations of subsidiaries found in the region to obtain insights into the range and types of international strategies found in the region. Still another would be to focus on individual firm activities and the influence of firm-specific and location-specific features on activity location. Investigations in the latter two directions are already underway.

Further work may also be undertaken on a sample that includes service multinationals, as increasingly services become a more significant part of foreign investment. Whether the results of this study will hold in that case is something difficult to speculate, as service firm value chains are more difficult to break down compared to traditional manufacturing firms. This study did not make any claims as to whether the subsidiaries can act their roles or how they can gain particular roles (such as management and development subsidiaries). It is hoped that these will further enhance our understanding of some of the critical attributes of the modern multinational firm.

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**TABLE 1****Empirical Studies of Subsidiary Typologies**

<b>Source</b>	<b>Basis of Typology</b>	<b>Sample</b>	<b>Methodology</b>	<b>Findings</b>
Roth and Morrison (1990)	Integration-Responsiveness framework	147 subsidiaries across 'global' industries	Survey; Cluster analysis	Three-group strategy typology confirmed
Jarillo and Martinez (1990)	Integration-Responsiveness Framework	50 Spanish subsidiaries	Interviews and Questionnaires; Principal Component Analysis	Three groups confirmed: Low I-Low R not confirmed
Birkinshaw and Morrison (1995)	Induced from literature on subsidiary roles	126 subsidiaries across 'global' industries	Survey; ANOVA	Three-group typology confirmed
Taggart (1997)	Autonomy and Procedural Justice	171 UK subsidiaries	Survey; Principal Component Analysis and Cluster analysis	Four-group typology confirmed
Taggart (1998)	Integration-Responsiveness Framework; Jarillo and Martinez (1990)	171 UK subsidiaries	Survey; Principal Component Analysis and Cluster analysis	Four-group typology of Jarillo and Martinez (1990) confirmed

## CONCEPTUAL MODEL AND HYPOTHESES

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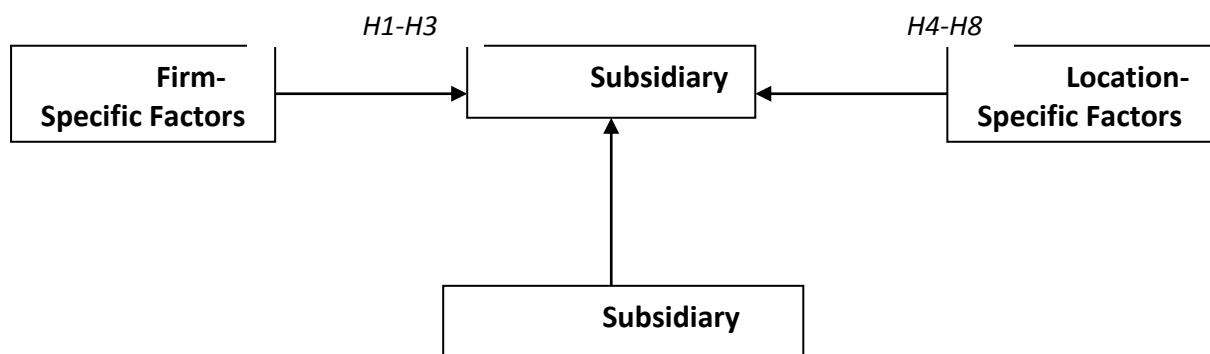


TABLE 2

## Cluster Statistics

Variable		Management and Development Subsidiaries	Full Functional Subsidiaries	Production Bases	Sales and Service Subsidiaries
Sales	Mean	0.6211	0.9892	0.9289	0.8449
	Std dev	0.4857	0.1033	0.2570	0.3623
Service	Mean	0.2474	0.9353	0.0000	1.0000
	Std dev	0.4321	0.2461	0.0000	0.0000
Prod	Mean	0.1186	0.6926	0.2726	0.0200
	Std dev	0.3237	0.4616	0.4454	0.1400
Support	Mean	0.8995	0.8159	0.0000	0.0000
	Std dev	0.3011	0.3877	0.0000	0.0000
RD	Mean	0.4227	0.2165	0.0601	0.0522
	Std dev	0.4946	0.4120	0.2377	0.2227
Frequency		388	1298	1548	651
RMS Std dev		0.4154	0.3477	0.2534	0.2002
Nearest cluster		2	1	4	3
Distance between cluster centroids		0.9938	0.9938	1.0349	1.0349



TABLE 3

## GLIMMIX Results

Variable		Cluster 1	Cluster 2	Cluster 3
Intercept	Estimate	* -19.4556	** -14.4850	** 12.7907
	T-VALUE	-2.92	-3.91	4.91
FIRMSIZE	Estimate	** 0.5415	**** 0.7181	* 0.3854
	T-VALUE	3.11	6.98	2.27
INTERNATIONALIZATION	Estimate	-0.4648	-0.2744	*** 0.9564
	T-VALUE	-1.74	-1.74	-3.79
JAPAN	Estimate	** 1.3655	0.1448	* 1.2036
	T-VALUE	2.67	0.42	2.31
EUROPE	Estimate	-0.1576	-0.1045	* 1.0908
	T-VALUE	-0.30	-0.34	2.21
Market	Estimate	* 0.6022	** 0.4552	**** -0.3879
	T-VALUE	2.33	3.17	-4.00
Growth	Estimate	1.1800	12.7615	-1.5241
	T-VALUE	0.10	1.94	-0.35
Development	Estimate	0.1652	0.0335	-0.0155
	T-VALUE	0.78	0.29	-0.20
Openness	Estimate	* 1.6464	0.4005	*** -1.1018
	T-VALUE	2.00	0.87	-3.65
Taxrate	Estimate	-2.3423	1.0572	2.5629
	T-VALUE	-0.42	0.34	1.26
Deviance		287	1290	735
Scaled Deviance		820	1963	1919
Pearson Chi-Square		265	1071	690
Scaled Pearson Chi-Square		755	1630	1800

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001, \*\*\*\*