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Subsidiary Strategies of MNCs in emerging economies: The case of Brazil

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Abstract
An increasing number of multinational corporations have established foreign R&D units in developed economies to internationalize their R&D activities. Recently, however, MNCs have decided to establish R&D subsidiaries in the so-called BRICS countries but their use and benefits has not been fully explored, particularly for R&D units located in Brazil. Since limited research investigated the subsidiary roles, innovation activities and contribution to MNCs, this phenomenon needs to be studied from a value chain perspective. Thus, the specific purpose of this manuscript is to explore patterns in how Swedish MNCs use subsidiaries in Brazil to initiate and establish their R&D activities. This manuscript addresses these issues by exploring how a group of Swedish MNCs: a) initiated R&D activities in Brazil; b) developed both internal R&D as well as open innovation practices and c) transferred back new technologies to corporate headquarters in Sweden. Our findings reveal MNCs employ different subsidiary roles from minimal R&D activities to globally integrated R&D units. Within this spectrum subsidiaries employ different R&D strategies to connect with local scientific- and market partners and contribute back differently to MNCs’ global R&D activities.

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Keywords: MNCs; R&D units; Sweden; Brazil; reverse innovation; reverse knowledge transfer

1. INTRODUCTION

R&D investments in foreign subsidiaries characterize MNCs’ attempt to adapt products to local market conditions and support manufacturing (Dunning and Narula, 1995). Particularly, investing in R&D allows MNCs’ subsidiaries to build products for other international markets and continuously increase their knowledge portfolio. Yet, foreign R&D units need to be embedded into the local system to influence intra-firm’s technology transfer to the parent company (Criscuolo, 2009). Foreign R&D units that seek to be embedded in the local innovation system need to establish partnerships and joint ventures with local universities, research centres to tap into new market, and technological opportunities and take advantage of public R&D funding (Chesbrough et al., 2011; von Zedtwitz and Gassmann, 2002). Limited
research has described how western MNCs conduct R&D, design innovation strategies and business models to compete in fast growing emerging markets (Ghemawat, 2011; Jones, 2010; Vijay Govindarajan et al., 2012). Most research has detailed the strategies MNCs use to benefit from R&D units in China or India (Bound and Thornton, 2012; Radjou et al., 2012; Schanz et al., 2011; Von Zedtwitz, 2004). These studies also highlight the characteristics of product innovations i.e. low price, durability.

Until now, however, limited research has explored R&D activities and dynamics in Latin American markets which are distinct than other emerging economies (Casanova, 2009). For example, Brazil shows increasing collaboration between industry, academia and government through incubation initiatives, public support and innovation networks (Ekboir, 2003; Etzkowitz et al., 2005). Also, Brazil has become an attractive market for national and global MNCs (Figueiredo, 2011). Increasingly, it has attracted the allocation of foreign subsidiaries and establishment of global alliances (Bagliieri et al., 2010). Fleury and Fleury (2011) show resources and national competencies were main drivers for the development of Brazilian’s MNCs. In Brazil, the availability of R&D resources have attracted not only the allocation of R&D units from developed economies but also from other emerging economies e.g. Russia, India. These findings have not yet explored distinct triggers and challenges for MNCs to globally connect their R&D units into the Brazilian innovation system or other Latin American markets.

This paper presents how Swedish MNCs embed R&D units in the Brazilian innovation system in their pursuit to expand the technological and strategic competences of their headquarters. We built this paper on previous research that examined patterns of communication and R&D operations of Swedish MNCs that open up global R&D units (Nobel and Birkinshaw, 1998; Zander, 1997). Moreover, extant research has explored how
Swedish Multinational Corporations (MNCs) i.e. ABB, Ericsson have established foreign R&D centres to acquire new technological skills, resources and expand their innovation initiatives (Nobel and Birkinshaw, 1998; Tell, 2008; Zander, 1997). Yet, the Brazilian setting offers a novel context to explore new internationalization strategies in an economically, demographically and geographically distinct context than other emerging markets e.g. China, India. Particularly, this manuscript explores: a) how Swedish R&D units from MNCs in Brazil conduct research and/or development activities to address the local technological expectations and technical specifications; and b) the knowledge flows emanating out of subsidiaries’ R&D activities to the Swedish R&D headquarter or other globally distributed units.

To answer these research questions, this paper uses an extension of the Bartlett and Goshal (1998) typology proposed by Rugman et al. (2011) which suggests MNCs subsidiaries cover different value chain activities. Particularly, this paper focuses on the dimension of support to innovation. This model facilitates the explanation of patterns from Swedish R&D units in Brazil. This manuscript benefits from data cultivated from seven R&D units, from Swedish MNCs, located in Sao Paulo and Curitiba, Brazil. In this exploratory research, we interviewed local R&D directors and asked how: a) initiated R&D activities in Brazil; b) developed both R&D within the R&D unit and with other Brazilian actors; and c) transferred back (or not) new technologies to MNCs headquarters in Sweden. The main findings based on this specific case are: i) we test Bartlett and Ghoshal’s (1998) model for R&D internationalization in Brazil; ii) we highlighted how the use of open innovation practices assist R&D subsidiaries to establish new partnerships, alliances and joint ventures in Brazil; iii) we showed how Swedish R&D units, located in Brazil, transfer scientific discoveries to MNC’s headquarter.
Broadly, this study contributes to the established literature on R&D internationalization (Bartlett and Ghoshal, 1998; von Zedtwitz and Gassmann, 2002) and innovation in emerging countries. Further, we discuss underlying problems when initiating R&D activities in BRICS (Brazil, Russia, India and China and South Africa) economies. Finally, we provide some evidence confirming the initial triggers to establish R&D units in BRICS economies are not cost reduction and/or resource availability. Indeed, the size of the market, proximity to leading R&D facilities and new area-specific technological discoveries are the main drivers to open new R&D units in BRICS economies.

The paper is structured as follows: In the next section we review the approaches contributing to a better understanding of R&D internationalization. The third section discusses our research strategy, which is followed by the data analysis. Section five discusses the innovation strategies of R&D units, in Brazil, for Swedish MNCs. The last section wraps up the paper with the conclusions, a brief discussion of the empirical implications of our work, limitations and suggestions for further research.

2. CONCEPTUAL FRAMEWORK

Recently, innovation activities of Latin American MNCs have captured the attention of numerous innovation management scholars (Amann and Cantwell, 2012; Casanova, 2009). Yet, these studies have been primarily centered on Brazilian, Mexican, Argentinian or Chilean firms (Aulakh et al., 2000; Figueiredo, 2011; Silveira et al., Forthcoming). Particularly, most of these studies have studied the internationalization activities of Brazilian firms (Fleury & Fleury, 2011) or some activities of foreign firms in Latin American markets (Ferigotti and Figueiredo, 2005; Khanna and Palepu, 2000).
MNCs, from developed economies, attempt to capture some benefits of increasingly growing emerging markets e.g. large market size, increasing purchasing power. Yet, the technological and innovation demands from emerging markets cannot be easily match with those technologies and products available in developed economies. In these emerging markets, innovations of particular nature that have received much interest in the current literature are those denoted frugal, jugaad, reverse or cost innovations (Lim et al., 2013; Radjou et al., 2012; Vijay Govindarajan et al., 2012).

With regard to the general literature on globalization of R&D, the role of R&D units promoting innovation activities and knowledge flows is key to benefit from the knowledge available in emerging markets (cf. Gerybadze and Reger, 1999; Granstrand, 1999; Patel and Pavitt, 1991). From this literature, we adopt a distributed view of R&D in MNCs where innovation activities are dispersed across the firm e.g. different business units, globally distributed labs. In our framework, we are particularly concerned with knowledge flows pertaining to R&D in MNCs. We are primarily interested in vertical knowledge flows between headquarters’ R&D and subsidiary’s R&D, although also horizontal knowledge flows between subsidiary R&D without much involvement from headquarters’ R&D should be recognized (Criscuolo, 2009).

The reason for the focus on vertical knowledge flows lies in the problem managing both ‘outward’ knowledge flows (i.e., from headquarter to R&D unit) as well as ‘inward’ knowledge flows (i.e., from R&D unit to headquarter). With regard to outward knowledge flows, our main concern is the process of R&D internationalization to emerging markets. More specifically, we are interested in whether internationalization of R&D units into emerging markets takes place through a process of replication of R&D practices and routines, or if local practices are allowed/stimulated to emerge without the provision of a central
guideline. Regarding inward knowledge flows, our main focus lies on disentangling what knowledge produced in subsidiary R&D is transferred and integrated (or not) into the corporate headquarter level for further utilization and possible diffusion throughout the MNC and other international R&D centres.

Innovation activities primarily denote the development process i.e., whether research (R) or development (D) is the focal activity. While the distinction between R&D has been discussed as problematic by some researchers (e.g., Balconi et al., 2010), others have argued in defence of the somewhat linear model from basic research to applied development. Justification for separating the two activities can be found in different purposes, types of knowledge, employees involved, managerial practices, and other features (Barge-Gil and Lopez, 2012). While research involves the acquisition of new knowledge, often more theoretical, the purpose of development is to introduce improvements in processes or products. The type of knowledge involved in research is oftentimes analytical and codified, while development involves more synthetic knowledge and tacit skills.

Framed somewhat differently, innovation activities involve both incremental innovations as well as radical innovations (Freeman and Soete, 1997; Garcia and Calantone, 2002). Thus, rather than looking at specific activities involved, the nature of innovation activities could also be demarcated by their outcomes in terms of their radicalness. Building on the notion of technological discontinuities, it has been argued that incremental innovations emanates out of continuous technological development, while radical innovations can be related to technological discontinuities (Tushman and Anderson, 1986). On the firm level, on the supply-side, the distinction has been made between competence-enhancing innovations and competence destroying innovations (Anderson and Tushman, 1990). From a demand-side perspective, focusing on the value innovations deliver to existing customers, Christensen
(1997) and others (e.g., Adner, 2002; Rosenbloom and Christensen, 1994) have suggested that innovations can be either sustaining or disruptive.

Relations of R&D units to the parent company have been a prominent feature in the literature on MNC management and organizations (Bartlett and Ghoshal, 1998; Holm and Pedersen, 2000; Ronstadt, 1978). According to Bartlett and Ghoshal (1998 p. 121 - 128), MNEs’ subsidiaries roles can be categorized in four categories based on the strategic importance of local environment for the MNE (strategic considerations) and the level of local resources and capabilities (organizational considerations). The four resulting roles are: strategic leader, contributor, implementer and black hole. First, the ‘strategic leader’ is a subsidiary located in a strategic market and with highly advanced internal competences. This form of subsidiary is important to detect emerging opportunities and threats that could affect the MNEs relevance. Second, the ‘contributor’ type of subsidiary is one that has advanced capabilities for production, sales, innovation but it is located in an unattractive market for the MNE. This group of subsidiaries are in an unpleasant position for the MNE because the availability of highly qualified resources, in a noncritical market, can create motivational problems with the qualified personnel, dismissing opportunities for future product and process innovations, etc.

Third, the ‘implementer’ is a type of subsidiary that operates in an uninteresting market for headquarters and has sufficient competences and skills to operate in the local market. This type of subsidiaries is allocated in emerging economies and east European countries. The relevance of these types of subsidiaries is to generate sufficient sales to justify their existence and support innovation activities. Finally, the fourth type of subsidiary is the ‘black hole’ that has a high strategic relevance for the MNC but the company has limited capabilities to conduct advanced activities e.g. production, innovation. Subsidiaries performing this role should try to move to the strategic leader role by receiving support to enhance their
capabilities and skills. A change in the role won’t be a cheap and fast activity due to the high requirements and expectations of developed markets. Some common activities include acquiring specific production or research units, open small centres or initiate collaboration projects with local universities and companies.

3. RESEARCH METHOD

This research employs an inductive embedded single case study design Yin (2009) to present the different forms of internationalization activities from Swedish R&D units in Brazil. The case study approach was chosen in this instance because the Brazilian setting, in compare to the Chinese and Indian (Govindarajan, 2012; Von Zedtwitz, 2004), is still poorly understood. In-depth enquires were made into the R&D practices used by seven Swedish MNCs to identify reliable constructs, propositions, logical arguments and assumptions. As suggested by Eisenhardt (1989), the use of a case study design is a useful instrument to build theory emerging from empirically valid observations and testable from measurable constructs. The selection criterion for our seven cases included those Swedish MNCs engaged in innovation activities ranging from the initial R&D activities to global R&D units. The companies that were studied in Brazil are: Electrolux, Ericsson, Scania, Alfa Laval, SKF, Tetra Pak, Dynapac (part of Atlas Copco). In this paper, we decided to exclude Saab and Semcon, due to these two MNCs did not currently have R&D units in Brazil. This decision allowed us to ensure internal validity and reliability of our findings.

The employed data-gathering method involved face-to-face open-ended interviews (McCacken, 1988) with one or more senior managers including regional directors and R&D directors of innovation units in Brazilian. Interviews lasted at least an hour, providing respondents plenty of time to explain the various activities. This research was conducted in 2012 and 2013 with interviews in Sao Paulo and Curitiba, Brazil. Here, interview guidelines
were set for gathering information on innovation practices, value chain activities and intra-technology transfer from R&D units to R&D headquarters.

For this paper, we adopted techniques for cross-case analysis (Miles and Huberman, 1994; Yin, 2009) to explain the R&D internationalization patterns of Swedish MNCs. We used analytical techniques of pattern matching to connect the various subsidiary roles with value chain activities (Rugman et al., 2011). This inferential approach was chosen for this research due to the high acceptance of Bartlett and Ghoshal (1998) for explaining the R&D internationalization. The aim was to bring forward different practices and match our data to explain the characteristics and differences between various kinds of Swedish MNCs. Finally, we triangulated and integrated the data and clarified the major value chain activities.

4. DESCRIPTION

In Brazil, Swedish R&D units help their parent MNCs to extend their research and technological portfolio by adapting or developing country specific products that can be nationally, regionally and globally commercialized. Our interviews with seven R&D subsidiaries reveals the initial rationale to initiate R&D activities was to satisfy specific product requirements and strengthened national quality regulations from a growing Brazilian market. Furthermore, the conducted R&D activities resulted in high quality outputs i.e. new products or services that generated new patents and scientific knowledge. All these recent changes reinforced the need to establish new mechanisms to capture all their insights and organize their outputs through global R&D involvement.

Yet, currently, some of these R&D units struggle performing some activities due to the limited innovation support from headquarters i.e. resources to conduct research projects; diminished expectations from the R&D headquarters i.e. believe advanced and qualified scientific knowledge is inexistent. This section highlights the activities conducted by: a) sales and manufacturing units
and b) R&D units and c) intra-firm knowledge flows to Swedish headquarters. Table 1 presents selected examples of how these three activities are conducted at Ericsson, Electrolux and Alfa Laval.

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Insert Table 1 about here

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4.1. Sales and manufacturing activities

According to the Swedish-Brazilian Chamber of Commerce (2012), the main reason for most Swedish firms to operate in the Brazilian market is the size and growth rate of the Brazilian market. The second reason is the affordable manufacturing cost and, the third, to attend customers that they already had in Brazil. Finally, this large survey reveals that out of 79 Swedish companies operating in Brazil, 21 produce 100% of the products commercialized in Brazil and, on the contrary, 18 do not have any production facilities in Brazil. Within these two extremes, 16 firms produce in Brazil from 70% to 99% of the products. Similarly, from our data, we noted that Swedish MNCs initiated their internationalization activities through sales offices and increased their relevance in Brazil through R&D activities.

For manufacturing activities some subsidiaries were primarily involved with some further product adaptation to local specifications and conditions. Also, these manufacturing activities lead to increasing opportunities to initiate R&D and begin with some research projects. For example, Alfa Laval does continuously perform process-improving and testing activities to satisfy the requirements from their increasingly demanding Brazilian customers. Table 1 presents some examples of the two value chain activities – production and innovation – for Swedish MNCs in Brazil.

4.2. Innovation activities
In Brazil, Swedish MNCs broadly adopted two different types of innovation strategies for developing new country specific products. On the one hand, firms such as Electrolux, Dynapac acquired local companies that had a small market value, low profitability and uncertain market future. This strategic decision allowed the acquired company to change and improve their innovation activities and becoming a leading brand in Brazil and with large opportunities to grow in Latin America. For example, at Electrolux, this strategy facilitated the establishment of a product development methodology, called the innovation triangle. This involves combining the areas of R&D, industrial design (IDC) and marketing. This innovation model has enabled the R&D of new products for the Latin American market by the Brazilian subsidiary.

On the other hand, MNCs like Ericsson, Alfa Laval, Tetra Pak and Scania opened their own R&D laboratories to develop specific process and products for Brazil. For example, Ericsson in 2001 decided to open Research Latin America [RLAM] innovation centre with an investment of approximately SEK 100 million for Latin America. For Ericsson, the lack of scientific resources and experience conducting R&D in Brazil reinforced the need to collaborate with Brazilian universities and suppliers. This activity helped to compensate the lack of R&D experience. For MNCs like Ericsson, although the growing market sales was the main motivator to operate in Brazil, the country regulations and specifications helped to speed up the process to begin investing in R&D activities. This decision resulted in nationally customized products and a balance research portfolio. For example, the Research director at Ericsson told us “We have been doing at least D [for Development] for 34 years plus, we have been here since 1970 because of some local regulations that forced telecom vendors to implement some local requirements, that’s where it all began back in early 70’s … And with this creativity, this ability to solve problems in an outside the box way has lead us to start
R&D activities in global D activities early 90’s in one technological domain which is charging ... So this is in the very heart of what we do still today”.

Scania’s R&D unit, although it is not a global R&D centre, the collaboration with universities represented an alternative strategy to compensate the lack of available engineers necessary for adapting the trucks to the growing local needs, and specifications, increasing international competition, Scania’s global product structure. The collaborations with local Brazilian universities e.g. University of Sao Paulo allowed Scania’s R&D units to identify new market opportunities and developing a local product competence necessary to adjust and improve the performance of their trucks far from the parent firm.

In a lesser extend other Swedish MNCs i.e. SKF and Dynapac (part of Atlas Copco) are beginning with research activities due to the increasing Brazilian and Latin American market demand and increasingly relevant governmental tax incentives for R&D. For example, although in Dynapac’s pneumatic tyred rollers was developed in Brazil during the 80’s and 90’s and being the industry leader for pneumatic tyred rollers between 1997 -2006, these subsidiary was not considered as a potential subsidiary for increasing research activities. Not until 2006, it received the global design software that can boost the production and design of new products. Currently, this increasingly growing subsidiary is responsible for producing new construction equipment, contributing to Atlas Copco research activities, immersed in a growing research community –Sorocaba centre of technology –.

Finally, for innovation activities, we found some subsidiaries had established global innovation centres responsible for advance research in some product categories i.e. top-load washers (Electrolux) or charging systems (Ericsson). Globally, these R&D units were leading in their specific research field and managed to produce products that have global impact. Although these innovation activities cannot be considered as incremental or radical product or
process introductions, the new external collaboration patterns with universities, and suppliers and less dependence on Swedish researchers shows the increasing relevance of innovation activities for these R&D units.

4.3. Knowledge flows to headquarter

Global R&D centres could contribute to MNCs headquarters primarily with new scientific patents, product or process specifications, and market knowledge. First, patents emerging out of global R&D units are used by the MNCs for new product categories; create new knowledge; or protect a technological domain. Similarly, global R&D units provide with insights for new product or process categories that could help to gain market share at the headquarters’ market or in other R&D subsidiaries.

Ericsson, explains that the knowledge flow to the headquarter are as following: “of course we can work for the Brazilian market, the same that we did back in the 70’s, what we do is global R&D, meaning that when we do it someone else does not do the same thing. And then we export what we do to the central corporate unit that sells what we do anyone in the planet … if we consider the number of projects we had carried on and the number of patents that we had generated, the hit rates is extremely high. So are we successful with the transfer? I would say yes. It’s very hard with the type of research that we do to make a direct relation between one apply research project and one tangible product”. Finally, foreign R&D units provide future market insights, for the Brazilian and Latin American market, for specific product categories, materials or scientific knowledge that could be difficult to identify without local scientific researchers.

5. ANALYSIS
The framework from Rugman et al. (2011 p. 273) suggests “an MNC may operate several businesses in one country, administered according to different organizing principles … As a result, different businesses within a single national subsidiary may have different roles, even in a single value chain activity. However, it should then still be possible to position usefully each of those businesses in the classification scheme”. In this section, we discuss how Swedish R&D units in Brazil conduct three value chain activities – sales, production and innovation– based on the four different subsidiary types suggested by Bartlett and Ghoshal (1998).

The sales activity is explored to a lesser extend due to all subsidiaries have an strategic leader role for the their MNCs. Following, this section presents this categorization (see table 2) and excludes the administrative activity because this activity is mainly present at the head office in Sweden.

5.1. Sales

The mainstream internationalization theory suggests firms move to new markets to benefit from resources, market, efficiency and strategic asset advantages (Dunning, 1993). Our information reveals Swedish MNCs opened sales offices to benefit from increasing market growth opportunities in Brazil and other Latin American countries. The most attractive countries for expanding in Latin America are: Argentina, Chile, Colombia, Uruguay, Peru and Mexico. Moreover, Swedish subsidiaries have develop a core competence for regional sales due to the increasing pressure from head offices to increase the market share and increasing national and international competition. Since sales in the Brazilian market and other Latin
American Economies are relevant for the Swedish headquarters and the subsidiaries have established commercialization channels, and are recognized brands in Brazil, all subsidiaries are considered as strategic leaders for this value chain activity.

5.2. Production activities

Due to the large Brazilian and Latin American market, which have different technical specifications, natural characteristics and consumer preferences, Swedish MNCs have assigned different levels of production involvement and capability development to their subsidiaries. Results from the survey (Swedish-Brazilian Chamber of Commerce, 2012) highlighted 94 per cent of Swedish MNCs in Brazil plan to conduct investments within 2013; particularly in personnel and infrastructure. The decision to invest large resources in production facilities and begin manufacturing activities is not a straightforward decision for MNCs, due to Brazil does not represent a country with cheaper or largely available qualified personnel for production i.e. engineers. Following, we detail how each subsidiary is perceived in each subsidiary role.

First, Ericsson shows a ‘black hole’ role due to its high relevance for the production of charging devices. But it does not possess the sufficient production and technological competence to produce the charging devices and/or other products commercialized in Brazil. Second, Alfa Laval presents the ‘implementer’ role due to the low competence of the organization to manufacture sophisticated machines e.g. heat transfer, separation and fluid handling machines that are commercialized in Brazil and Latin America. Furthermore, currently, it does not possess the competences to develop the machineries. This role is certainly acknowledge in other established frameworks as the technology transfer unit (Ronstadt, 1978).
Third, Scania, Electrolux, Tetra Pak and SKF feature the ‘strategic leader’ role as the contribution of these manufacturing facilities have a large importance for the MNCs market share in Brazil, Latin America and globally. For example, Scania has manufacturing facility capable to produce European standardized trucks –Europe 5–, engines and different parts for national and Latin American distribution. This production offers Scania the possibility to commercialize products in fast growing Latin American economies i.e. Argentina, Chile and Peru. This group of subsidiaries has the most advanced subsidiary role of because it has a high strategic relevance for the Swedish MNC and it shows an advance competence to produce products.

Finally, Dynapac is a subsidiary with highly advance competences for the manufacturing of compaction, milling and paving equipment. However, its contribution to the headquarters’ manufacturing portfolio is not valued yet. This strategy is widely adopted by Atlas Copco that uses their subsidiaries primarily as local contributors (Bartlett and Ghoshal, 1998) or home base exploiting unit (Kuemmerle, 1999) to gain a competitive advantage in production.

5.3. Innovation activities

Similarly, for innovation activities, Swedish subsidiaries in Brazil have different roles. First, Ericsson, Tetra Pak and Scania have a ‘black hole’ role due to high relevance of realizing incremental innovation in their products to satisfy specific local demands. The Brazilian geography demands distinct satellite systems from Ericsson and highways require advanced specific adaptations from Scania that can only be locally addressed. However, these two companies have limited scientific competences to address these market needs. Although Ericsson still has a large R&D physical infrastructure and Scania has a large production facility, both MNCs had to adopt open innovation strategies with Brazilian universities and suppliers to compensate the lack of internal scientific and technical resources required to
address local market needs (Chesbrough and Appleyard, 2007). Due to this lack of absorptive capacity of innovation activities subsidiaries have the role of black hole.

Second, Dynapac and SKF have the ‘implementer’ role due to their recent initiation with innovation activities and closer collaboration with head offices to adopt global R&D standards. Primarily, this strategy was adopted to benefit from their established manufacturing competences and desire to produce new products that can satisfy the Brazilian market. Until now, their innovation activities were limited to adaptations, development support, which did not require established innovation units.

Third, Electrolux shows a ‘strategic leader’ role for innovation activities. Until now, it has managed to become the global research centre for top-load washing machines, which allows it to conduct all the necessary research for the World for one specific product category. Similarly, this activity allowed it to transfer some patents to the Swedish MNC, contribute to global R&D activities and other global R&D units e.g. India, USA.

Finally, Alfa Laval shows a ‘contributor’ role because the Swedish MNC does not see the relevance of a Brazilian subsidiary to initiate R&D activities for new machinery or processes that are developed in Europe or USA. However, it has built the development capability to help its Brazilian customers to identify alternative uses for new products or materials in previously unexplored areas. Without this competence Alfa Laval would have not been able to understand, address and identify new process or material opportunities for its large customers like Petrobras.

6. DISCUSSION

Following, we relate our findings focused on Swedish R&D units in Brazil to some broader work focused on R&D roles. Until now, the literature on R&D internationalization has
focused on developed economies (Bartlett and Ghoshal, 1998; Nobel and Birkinshaw, 1998; Zander, 1997) where R&D subsidiaries are principally searching connections with recognized universities, research centres to harness new possibilities for disruptive innovations (Christensen, 1997). Similarly MNCs like GE or Pepsi Co have strived to conquer the growing market in India (Vijay Govindarajan et al., 2012), we observed these established practices in our sample of R&D subsidiaries in Brazil. This is primarily due to the growing market in Brazil and Latin America a stable innovation system (Casanova, 2009; Ekboir, 2003; Etzkowitz et al., 2005; Fleury and Fleury, 2011), specific technological requests and high purchasing power.

In more recent literature, another key activity of R&D units is to address local innovation needs i.e. developing new products or services, offering process adaptations for emerging economies, etc. (Ghemawat, 2011; Vijay Govindarajan et al., 2012). Ideally, some of these discovered product offers could allow for intra-firm and inter-firm knowledge sharing and knowledge-combination across cultural boundaries (Gupta and Govindarajan, 2000). This emerging literature suggests that the headquarters’ innovation activities that dominated the early work on international business remain present and important (cf. Gerybadze and Reger, 1999; Granstrand, 1999; Patel and Pavitt, 1991). However, many subsidiaries in emerging countries have to work in country specific scientific or technical needs where processes of standardization are elusive; that is, they promote innovation challenges that resist any form of standard incremental innovation that is common in developed economies (Amann and Cantwell, 2012). In these instances, the internationalization literature is leveraged to understand the roles of production and, up to some extend, R&D in China and India (Radjou et al., 2012; Schanz et al., 2011; Von Zedtwitz, 2004). However, research has not provided sufficient studies about R&D activities in the emerging Brazilian innovation system and other Latin American countries. Some of these internationalization activities are clearly present in
Swedish subsidiaries in Brazil, although in several different forms. For Swedish MNCs that leverage R&D activities, local development capabilities are employed to satisfy local requirements e.g. technical specifications, preferences and provide country customized products or services.

The discussed R&D activities explained in this paper could be named as ‘tropicalized innovations’ that due to the different technical specifications and preferences have to be adapted to the Brazilian and Latin American context to be successful. Tropicalized innovations represents a new term to refer to the effort from MNCs to adapt their products or services to some emerging Latin American markets that do not only share similar climate but most important consumer preferences. For this type of adaptations, we noted the subsidiaries’ need to collaborate with universities, national suppliers and other innovation actors to harness the local scientific and technological knowledge; as an attempt to reduce the internal lack of scientists and engineers at the subsidiaries. At a lesser extend, tropicalized innovation for MNCs with initial R&D facilities represents the test and/or manufacture products without investing large resources on R&D to develop disruptive innovations (Christensen, 1997; Vijay Govindarajan et al., 2012). Although some of these subsidiaries have a key role on manufacturing highly advanced products and/or testing machines, their contribution to headquarters’ R&D or other subsidiary activities was not substantial. Finally, tropicalized innovation, for some R&D subsidiaries combine a mix of activities dedicated to new product development and advance development that will depend on the target segment and spectrum of products for the local market. Ideally, successful achievement of these activities will gain the attention of the headquarters that will decide to give a larger R&D role to Brazilian R&D unit. Similarly, this group of subsidiaries will harness their stronger connections with local scientific and technological partners to compensate the lack of R&D capabilities.
Research highlighted the complexity of bonding subsidiaries to new emerging markets, making the decision to open up new R&D unit more resistant to MNCs. Using Bartlett and Ghoshal (1998) subsidiary model, this article has highlighted different patterns to initiate and expand subsidiaries’ role in an emerging market – Brazil –; and showed the relevance of conducting R&D in local markets through initial collaboration with local universities, suppliers, research centres.

7. CONCLUSIONS

R&D internationalization in emerging markets implies that companies should attempt to benefit from the increasing opportunities available in BRICS economies (Vijay Govindarajan et al., 2012). This paper has focused on the production activities; innovation roles; and intra-technology transfer to MNCs’ R&D headquarter from seven Swedish subsidiaries in Brazil.

Here, we adopted various insights from established literature streams (Bartlett and Ghoshal, 1998; Ghemawat, 2011; Zander, 1997) and combined theoretical and empirical insights to discuss MNCs strategies to integrate their subsidiaries in the Brazilian innovation system.

For some Swedish MNCs, it may well be that bridging across heterogeneous countries and institutional logics are so difficult that it may reduce innovation opportunities. As innovation in BRICS economies becomes more popular, MNCs face a growing number of international competitors with equal access to growing markets (Amann and Cantwell, 2012). Currently, production and R&D adaptation in local economies have become a competitive necessity and it no longer automatically confers competitive advantage. Currently, R&D activities in BRICS economies are a powerful force for understanding local needs and future trends. So, to earn returns from R&D internationalization in emerging markets, MNCs must ensure their collaboration with local scientific and technological partners, hire scientists and engineers and receive the support from headquarters. MNCs’ should adapt to fast-changing trends in BRICS
countries and the fear of growing competition with local and global competitors. The companies that successfully profit from R&D internationalization will be those that adapt their innovation processes and organizations in line with the new opportunities offered by emerging markets. In other words, R&D in MNCs should be a dynamic and global process that co-evolves with changes in global markets, which themselves are partly driven by the rapid growing possibilities offered by R&D subsidiaries in BRICS countries (Awate et al., 2012; Silveira et al., Forthcoming).

This manuscript proposes an initial evaluation of Swedish subsidiaries in Brazil; particularly the focus was on innovation activities. However, it also presents limitations with the depth of this research. An open question is whether this effect will be seen in R&D units from other European and global MNCs to the same degree. Further research should much deeply explain the triggers and blocking mechanisms of R&D units in Brazil; the open innovation strategies R&D units use to connect with Brazilian scientific and market partners; and the impact of R&D units in global innovation outputs. A careful analysis of these questions will help us to explain the emerging phenomenon of R&D internationalization in BRICS economies and design better strategies to profit in these rapidly growing markets.

References


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Table 1. Swedish MNCs activities in Brazil

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<tr>
<th>Company Name</th>
<th>Categories</th>
<th>Quotations</th>
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<tr>
<td>Electrolux</td>
<td>Sales and/or manufacturing activities</td>
<td>Electrolux Brazil develops products only for the Latin American Market. 90% for Brazil, 10% for other countries. I’d say that 99% of the products that you saw in the showroom were developed by the innovation triangle in Brazil and let’s say that 50% of what we have outside of Brazil (in Latin America) was develop by the Brazilian team. In Latin America we will sell the side-by-side refrigerator. We just buy it from North America. We are selling, in the Latin American Markets some refrigerators that come from China. We’re putting our aesthetic but we are not developing the refrigerator itself we will buy it from the suppliers. For example, here in Curitiba we have AD [Advance Development] for top-load washers. So, new technologies, features all the technology that you need for top-load washers is developed by a team in Curitiba with some collaborations around the World. But the main team is here AD that is a global area but with people located in different countries. So, Electrolux does not have AD development in Sweden for everything, we have nowadays AD for every product category but spread through out the World.</td>
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<td></td>
<td>Innovation activities</td>
<td>Yes, we [Brazilian R&amp;D centre] have global patents also. All R&amp;D centres provide patents and then we decide where we will patent. For example, this only in Brazil, China and Europe .... So, we have an strategy to patent innovations. We decided to try to innovate more and listen more the consumers to growth, change products and to have more acceptable products. This very simple history, way of making innovation starts in Brazil, 12 years ago, more or less. The process that we developed here in Brazil now has been created [adopted] globally much better than here, because they have much processes and synergies around the world.</td>
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<tr>
<td></td>
<td>Contribution to headquarter</td>
<td>At the very beginning there was political pressure … if you want to sell goods in Brazil then you need to do R&amp;D. But there is a moment in time that you really need to show your capabilities. I would say there is this combination of delivering results, reasonable price for what we deliver, flexibility of our workforce, creativity, etc. But the market was there to support us; I would say like this, if the Brazilian market was not that strong maybe we would not be here. But in any way you need to deliver, the market itself is not a condition to have R&amp;D activities, I mean this is really expensive, this is really you know big business and we need to deliver.</td>
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<tr>
<td>Ericsson</td>
<td>Sales and/or manufacturing activities</td>
<td><strong>Research:</strong> Then we started doing R, applying the research activities close after development for wide-line networks, software for mobile networks: CDMA, TDMA and then in 2008 we started again diversifying our activity portfolios, more through multimedia, with TV media activities, charging for mobile networks. <strong>Development:</strong> in development we work more or less with 20% of the people in-house Ericsson and 80% of the people would be those partners,</td>
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or institutes or whatever ... So they are basically a competence center, right? And at least I never saw something similar in other part of the world. Not saying that there is not a similar one but I’ve never seen

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<th>Contribution to headquarter</th>
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<td>Yes, they are extremely good. And how we do it, we have three people in Ericsson that try to mediate the corporate technological interest from Ericsson and the skills of universities we have in Brazil. One thing you should know, we have deposited 50 plus patent applications in PCT the Patent Corporation Treaty ... So, I said we had more than 50 patent applications in PCT of which I would say 11, 12 had been granted. Which is something I’m really proud of.</td>
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| Brazil is not only a pure sales organization, we have some R&D, and then we try to see the equipment and the process, and sometimes we have a joint venture with some institution to develop some process and then we go for investigation, this go and that etc. looking for sell equipment. |

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<th>Sales and/or manufacturing activities</th>
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<td>We have been on market for some years and then we tried to learn adapt our equipment, then you have to understand about the process, and for ethanol for instance we have a lot of institutions very qualify in Brazil and they know about everything. And also the supply of equipment that's our case are more or less relate with them to learn because if they want to increase the yield and if they want to increase the temperature or decrease the temperature, we have to learn about the process, then we have to participate in some development, tests, etc.</td>
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<th>Alfa Laval</th>
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<td>Normally R&amp;D for us is when we have one application and then we try to evaluate results ... Our strategy here is very limited to the applications. We see opportunities in Brazil, and we are trying to do something, I think we are very proud to have been developing some applications, some things or some cooperation, but we cannot do more. Sometimes the costumer approaches us. Ok, I have a new bacteria I want the process, what do you think about? What are we going to think, or our people say ok, we have this equipment we could apply that but we need some research. But the central research is in Sweden</td>
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<th>Innovation activities</th>
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<td>Again, we are trying to adapt our equipment in the whole process. Sometimes we need modification in the equipment. This we make it together with our central unit or headquarters. Because something we are not able to do here because of material or because of quality. And the second thing is about development in the process itself. So sometimes, then we go for a lot of IPT, USPI, private or public institutions, teachers that have some ideas and we try to apply together with the customer</td>
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<th>Contribution to headquarter</th>
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<td>We develop ideas, we develop concept but we are not a product centre. We are going to have the first product centre now that is going to be in Petropolis for boilers.</td>
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Table 2. Subsidiary roles of Swedish R&D units in Brazil

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<th>Value chain Activities</th>
<th>Subsidiary roles for Brazilian context</th>
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<tr>
<td></td>
<td>Black-hole Implementer Strategic leader Contributor</td>
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<tr>
<td><strong>Innovation</strong></td>
<td>(1) Ericsson, Scania, Tetra Pak</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>(2) Ericsson</td>
</tr>
<tr>
<td><strong>Sales</strong></td>
<td></td>
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</table>

(1) Strong locational advantages, but weak competences; (2) weak locational advantages and competences; (3) strong locational advantages and competences; (4) weak locational advantages, but strong competences