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TECHNOLOGICAL INNOVATION AND EMERGING ECONOMY MULTINATIONALS: THE PRODUCT CYCLE MODEL REVISITED

Abstract

This paper assesses the continuing validity of three distinct propositions associated with the early versions of the product cycle model of Vernon (1966, 1979) or its extension to Third World Multinationals by Wells (1983, 1986). This is in light of recent developments in the role of rapidly evolving technological capabilities in the competitive emergence and evolution of MNCs from emerging economies (EMNCs). The first product cycle proposition states that these firms have limited scope for innovation, which consists of imitation and adaptation of the innovative activities of the technologically leading companies as standardisation proceeds in the product life cycle. The current evidence rejects this proposition on the basis of the narrow scope of innovation it allows, which is inconsistent with the broad range of technological capabilities of EMNCs that result from their unique learning experience. The second product cycle proposition is that innovations are almost always located in the home country of national firms. This hypothesis remains generally valid in the case of EMNCs since the home country is the single most important site for their innovation. However, the product cycle model's focus on demand factors in the home country in determining innovation is a narrow view. Innovation generally relies on a firm-specific learning process that interacts with growth of demand, the peculiarities of domestic and foreign production conditions, and technological capabilities. Moreover, the home country is not the most significant site for their technologically sophisticated or knowledge intensive production which is in advanced economies, dominant centres or international centres of excellence. In the third product cycle proposition, the purpose of international operations is to exploit internationally their unique home country-derived technological advantages. This proposition would need to be broadened to consider competence exploration or the 'creative blending' of competence exploitation and competence exploration in the international expansion of EMNCs. The concepts of localised technological change and technological accumulation, therefore, assume increasing current relevance over the product cycle model in explaining innovation in EMNCs. These concepts will doubtless become more significant as EMNCs further evolve and follow firm-specific, cumulative and differentiated technological trajectories.

Keywords: emerging multinationals; product cycle model; innovation; multinational corporations; emerging economies

1. INTRODUCTION

Arnold and Quelch (1998) argued that the changed lexicon from 'less developed countries,' 'newly industrializing countries,' or even 'Third World countries,' towards 'emerging markets' reflects the shifting role of these countries from significant sources of cheap raw materials and labour towards significant sources of sales, revenues, profits and growth for multinational companies (MNCs). As such, they regarded emerging markets as a major growth opportunity in the evolving world economic order, bringing into rapid reverse the views Drucker (1974) previously expressed. The new role of emerging markets closely relates to their growing importance as home bases of MNCs associated with the rapidly evolving innovative capacities of their firms. This is a significant feature of the general trend towards the internationalisation of business which has been common to firms of all countries.

The labels attached to these rapidly growing MNCs in international business research has similarly evolved over the last 30 years from 'Third World multinationals' (Heenan and Keegan, 1979; Ghymn, 1980; Wells, 1983), 'new multinationals' (Lall, 1983), 'multinationals of the South' (Khan, 1986), and 'newly industrialising economy (NIE) multinationals' to 'dragon multinationals' (Mathews, 2002), 'unconventional multinationals' (Li, 2003), 'emerging multinationals' (Goldstein, 2007; Economist, 2008) and 'emerging market enterprises' (Luo & Tung, 2007). To Salehizadeh (2007), there are 19 countries which simultaneously satisfied certain key economic measures and various educational, social, health and demographic indicators for classification as emerging economies while also being home bases for MNCs included in the world's 'Top 100' or 'Developing Top 100' company lists compiled by UNCTAD.¹ Some MNCs from emerging economies (EMNCs) are challenging some of the world's most accomplished and established MNCs in a wide variety of industries

and markets (van Agtmael, 2008; Guillén & García-Canal, 2009, 2012; Ramamurti & Singh, 2010).

The current paper's starting point is the twin propositions of Cantwell and Tolentino (1990) concerning Third World Multinationals. Their first proposition holds that the steady expansion in the technological competence of Third World firms mirrors the gradual upgrading of the domestic industrial structure of their countries and advancing stages of national development. Secondly, the upgrading of the technological capacity of selected Third World firms is allied to their cumulative emergence and evolution as MNCs. The existence and accumulation of technological capabilities are an important determinant as well as an effect of the pattern and growth of their international production activities.

With these propositions in mind, the purpose of the current paper is to rekindle the debates between different schools of thought on the role of innovation in the cumulative emergence and evolution of EMNCs in a modern context. These are the product cycle model (Wells, 1977, 1983, 1986; Lecraw, 1977), the theory of localised technological change (Lall, 1983) and the theory of technological accumulation (Cantwell and Tolentino, 1990; Tolentino, 1993). In revisiting the debates between the alternative theories explaining innovation in EMNCs, the focus will be on assessing the continuing relevance of three particular propositions associated with the extension of the product cycle model to Third World Multinationals by Wells (1983, 1986). This is in light of recent developments in the rapidly evolving technological capabilities of EMNCs. The source of information on technological capabilities of emerging economy firms and EMNCs is the academic literature in the fields of innovation, international business and international management published over the last five years or so.

We specifically examine the following three product cycle propositions pertaining to firms based in emerging markets and EMNCs. First, these firms have limited scope for innovation, which consists of imitation and adaptation of the innovative activities of the technologically leading companies as standardisation proceeds in the product life cycle. Secondly, the home country is almost always the locus of innovation for these firms. Their distinctive competitive advantages over firms and MNCs based in developed countries derive from, and respond to, the peculiar nature of their home markets. Thirdly, the goal of their international operations is to exploit internationally their unique home country-derived technological advantages.

We assess current evidence on how EMNCs have followed an independent technological course that results from their own unique learning experience. We also illustrate examples of EMNCs that have become genuinely innovative, though this may still represent exceptions to the general trend. Although most of them are unlikely to develop as fast as their Japanese counterparts who draw on frontier technologies, the increasingly more significant and complex technological innovation of EMNCs is forcing a re-examination of the fundamental propositions of the product cycle model of Vernon (1966, 1979) or its extension to Third World Multinationals (Wells, 1983, 1986). After a review of the theories explaining innovation in EMNCs in Section 2, we examine the current validity of each product cycle proposition in Sections 3 to 5. In each case, attention is drawn to the underlying accumulation of technological advantages as a means by which EMNCs have transformed the significance and the character of their international economic activity. Section 6 sets out the conclusions and the implications for the current theoretical debates.

2. THE THEORIES EXPLAINING INNOVATION IN MULTINATIONAL COMPANIES BASED IN EMERGING ECONOMIES

Wells (1983, 1986) provided the clearest articulation of an explanation of the innovative capacities of Third World Multinationals by extending the framework of the product cycle model of Vernon (1966). To Jenkins (1986), Wells (1983) "...presents a useful synthesis of what may be described as conventional wisdom on Third World TNCs..."(p. 459). This, however, tended to restrict the scope for innovation that was allowed for on the part of Third World firms.

The model of localised technological change advanced by Lall (1983) supposes that Third World enterprises have a broad scope for innovation. The idea of localised technological change, which can be traced to Atkinson and Stiglitz (1969), Rosenberg (1976), Nelson and Winter (1982) and Stiglitz (1987), is implicit in the theory of technological accumulation. The model of localised technological change suggests that firms from developing countries have the capacity to follow an independent technological course apart from that of the developed countries. This is either by means of indigenous technological creation, adaptation of foreign technology or the revival of techniques which were used previously in developed countries. Lall (1983) distinguished five types of manufacturing technology of Third World MNCs: the provision of capital goods; production execution functions; linkages establishment functions; technical training and skill transfer functions; and the establishment of local research, development, engineering and similar R&D functions. A firm sometimes develops a technology which is outdated amongst more advanced country firms, but which advanced country firms have 'forgotten' as it falls outside the parameters of their current learning experience, and which they cannot easily retrieve even if it is the most appropriate for Third World production conditions.

In the product cycle view, such form of technological change is not considered since innovation is seen primarily in terms of the creation of radically new products in a high income developed country. Products and industries are believed to become standardised as an industry matures and the location of production shifts away from the country of initial innovation. In the structure-conduct-performance paradigm of industrial organisation theory, price competition becomes steadily more important relative to product differentiation as product standardisation proceeds, barriers to entry decline and the industry becomes more 'competitive'.² New entrants gradually gain market shares at the expense of the previous international leaders as a competitive fringe of firms catch up, imitate and adapt the innovative activities of the technologically leading companies. In this case, the expansion of Third World MNCs need not derive from any technological or other oligopolistic advantages. Rather, they stem from the use of low-wage, labour-intensive production processes and low wages to managers who are nonetheless adept at organising in accordance with the requirements of Third World markets and production conditions. Therefore, the distinctive features of Third World MNCs derive from, and respond to, the peculiar nature of their home markets.

Although Wells (1983) claimed that Third World MNCs are essentially based in such standardised product sectors with low R&D expenditures and low product differentiation, he did not preclude local innovation. He suggested that Third World MNCs may have advantages that come from adapting foreign technology to the circumstances of smaller plants and smaller firm size, as well as a technological advantage in their ability to utilise locally available natural resources efficiently rather than imports. According to Wells, the downscaling of foreign technology in the manufacture of traditional products and the use of local resources as novel inputs in the production process still amount only to a limited

innovativeness on the part of Third World MNCs because these activities are usually confined to the tail end of the product cycle. Furthermore, there is presumably no reason why the developing country affiliates of American or European MNCs cannot imitate and copy the technological improvements achieved by Third World firms, since they are viewed only as a different way of adapting an essentially foreign technology and product development.

It is true that innovation has assumed a rather different form in the case of EMNCs. Without a firm reliance on research & development, production engineering, learning by doing and using and organisational capabilities have a greater weight, although there are exceptional EMNCs in which research also has an important role to play. The innovation of these firms has tended to be less scientifically refined than those of developed countries and has not generally involved frontier technologies. The different type of innovation pursued by EMNCs requires an empirical investigation that looks at technology creation broader than the sphere of research and patenting activity. This led Cantwell and Tolentino (1990) to realise the usefulness of the theory of technological accumulation in analysing the international growth of manufacturing firms from quite different environments, and at different stages of technological development and capacity. Due to the localised nature of technological change, firms based in emerging markets and EMNCs have acquired an innovative capacity that is not easily copied by the affiliates of industrialised country MNCs located in developing regions. Furthermore, there is every reason to believe that their abilities in technological accumulation will continue to expand. Some EMNCs are operating in sectors whose products are far from standardised, associated with their increasing capacity to follow firm-specific, cumulative and differentiated technological trajectories and to generate genuinely unique innovation.

3. CURRENT TRENDS IN THE CHARACTER OF INNOVATION OF EMERGING MARKET MULTINATIONAL COMPANIES

An aspect of the current literature has tended to focus on the ways in which a broad range of firms and MNCs based in emerging economies undertake “resource constrained innovation” or “frugal innovation” (Chang-Chieh & Jin, 2010; Ray & Ray, 2010, 2011; Petrick & Juntiwassarakij, 2011) to match emerging market opportunities. Drawing on Christensen's work on disruptive innovations, Ray and Ray (2011) explained how the frugal use of resources achieved through a new combination of existing component technologies, product design and organisational practices enabled Tata Motors of India to create Nano, the world's cheapest car, with unique price–performance requirements demanded by markets at the middle or the bottom of the income pyramid (BoP). Some innovative firms in Asia have become MNCs on the back of disruptive products developed specifically to address mass market consumer needs in emerging economies (Chang-Chieh et al., 2010).

Accordingly, scholars have sought to re-examine the distinctive characteristics of the innovation models of indigenous firms in emerging economies and local subsidiaries of foreign MNCs when serving the needs of emerging markets (Petrick & Juntiwassarakij, 2011; Petrick, 2011). Such differences have led to product offerings catering to different market segments with foreign MNCs continuing to focus on the relatively well-to-do consumers in emerging economies. By contrast, indigenous firms and firms and value chains based in China and India and other developing countries predominate in meeting the unique affordability and acceptability criteria required to meet the essential needs of mass markets at the BoP. These firm-specific advantages enable EMNCs to hold their own against foreign competitors in their home market as well as against firms in other low-income emerging economies where their advantages have propelled them to expand. The higher degree of

success or competitiveness of EMNCs in these markets led Kaplinsky et al., (2009) to argue of a disruption of global corporate and locational hierarchies of innovation. This arises because although some MNCs based in developed countries see the potential for innovation in emerging markets, their business models and organisational structures are traditionally designed for the development of advanced products for the affluent few at the top of the economic pyramid (Zeschky et al., 2011). Accordingly, they may resist disruptive concepts, encounter difficulty in developing ideas in unfamiliar settings or lack the processes necessary for absorbing outside innovation, let alone convert them into global businesses (Washburn & Hunsaker, 2011).

Other recent evidence highlight the role of emerging economies not only as significant sources of economic growth and markets but as significant lairs of technological and managerial innovation, similar to the role adopted by Japan from the 1950s onwards (Economist, 2010). As a case in point, Ayyagari et al., (2011) demonstrated the pervasiveness of innovation in over 19,000 firms across 47 developing economies, which included public and private firms, and small- and medium-sized enterprises. These companies carry out a broad range of innovations, which encompass the introduction of new products and technologies, knowledge transfers, and new production techniques. Firms in emerging markets are also transforming their strategies to catch up with established MNCs in developing markets and/or technology. Developing customised products, services or business models or buying and absorbing technology from MNCs are not as effective as innovation-based differentiation, developing core technologies and new products that are delivered at low cost with excellent customer service (Xudong Gao, 2011). Luo et al., (2011) showed how some emerging economy 'copycats' paths have traversed unique trajectories

along a continuum from duplicative imitators to creative imitators and ultimately to novel innovators.

Ramamurti and Singh (2010) maintained that EMNCs possess a broad range of firm-specific advantages (FSAs), namely: products suited to emerging markets; production and operational excellence; privileged access to resources and markets; adversity advantage; and traditional intangible assets. The importance of each of these FSAs varies according to the five types of internationalisation strategy they envisaged EMNCs to pursue: natural-resource vertical integrator, local optimiser, low-cost partner, global consolidator and global first-mover. They argued that, with the exception of EMNCs pursuing the global first-mover internationalisation strategy, "... many EMNEs belonged to mid-tech industries that were mature or declining in the West but booming in emerging economies – a setting in which late-movers arguably have an edge over first-movers." (p. 401). This raises the question of the extent to which current evidence attest that firms in emerging markets and EMNCs have limited scope for innovation, which consists of imitation and adaptation of the innovative activities of the technologically leading companies as standardisation proceeds in the product life cycle.

We draw on recent evidence concerning North-South trade. Lu (2007) considered industrial heterogeneity in R&D productivity and incorporated this into their quality-ladder model of North–South trade. They demonstrated that product-cycle dynamics prevail in medium-tech industries but remains static in others. There is ongoing innovation of high-tech industries in the North with no migration of product lines. By contrast, medium- and low-tech industries migrate South via foreign direct investment to exploit low production costs, with the South eventually replacing the North as the dominant exporter. At a later stage, medium-tech industry production returns to the North with the introduction of a new

product by Northern innovators. This is reminiscent of the previous role of Japan as an excellent imitator by refining and improving existing technologies developed by the United States and other advanced nations (see Onkvisit and Shaw, 1983). Japan, in turn, played a pre-eminent role in the economic and political development of Korea and Taiwan, of which Cumings (1984) provided a historical narrative using a product cycle framework. In analysing disaggregated bilateral trade data between the United States and eight Asian Pacific economies, Carolan and Singh (1998) found evidence of significant changes in the pattern of trade over the 1962–1992 period attributed to product cycle or other trade dynamic effects. This is collaborated by Feenstra and Rose (2000) who ranked countries and commodities using disaggregated American import data. They found that countries habitually began to export goods to the United States according to an ordering, and goods were similarly exported in order. They regarded their findings to be consistent with a product-cycle theory of international trade and correlated with productivity and growth rates. However, the primary limitation arising from all these studies which render consistent the international trade evidence with product-cycle dynamics is they have often left untested the product-cycle theory against an explicit alternative hypothesis.

Furthermore, Ghadar and Adler (1989) had explained within a product cycle framework the ways in which the Europeans and Japanese have challenged and, in some cases, surpassed the United States in the invention of new products associated with discontinuous innovation. However, it would be misleading to suggest that the comparative advantage of industrialised countries such as Japan has systematically shifted to the current emerging economies. Chow (1990) has shown that growth of manufactured exports from the newly industrialised countries (NICs) has proceeded along with the growth of Japan's exports in similar product categories but at different stages of the product cycle or of

technology sophistication. Rather than replacing the exports from Japan, the evidence showed that NICs were merely supplying some complementary manufactured products to the industrialised countries.

Not surprisingly, there are studies that oppose the product cycle view. Bernard and Ravenhill (1995) invalidated the product cycle theory as an explanation for East Asia's industrialisation. Davidson (1979) concluded that innovative activity tends to be concentrated in industries which intensively use a nation's relatively expensive factors of production. If such innovation results in exports, trade patterns could emerge which directly conflict with Heckscher-Ohlin expectations but it offers an alternative explanation for the Leontief paradox. The analysis of the post-war industrial development of Japan supports the view that the sectors in which a country enjoys the greatest potential for innovation and in which investment is most beneficial are not necessarily those sectors in which Japan had an existing comparative advantage (Pasinetti, 1981).

Therefore, it remains to be seen whether the product cycle model is more important relative to other factors in explaining why firms in developed countries retain a comparative advantage in innovative industries, while a variety of EMNCs have gained comparative advantage in particular industries due to the possibilities of standardisation. An extended product cycle model can perhaps better explain the existence of exceptional EMNCs pursuing global first-mover strategies, whose strengths derive from operating at the global technology frontier and strong brands. It may also explain the role of patents in explaining the growth of exports of Indian pharmaceutical firms with strong skills for process innovations (Chadha, 2009). However, on balance the current evidence rejects the first product cycle proposition because of the narrower scope of innovation it allows, which is

inconsistent with the broad range of technological capabilities of EMNCs which results from their unique learning experience.

There are two other current trends closely related to the changing nature of innovation in emerging markets that deserve mention. The first concerns the considerable number of MNCs based in advanced economies whose local R&D units, innovation subsidiaries or non-traditional alliances in emerging economies are succeeding in undertaking resource-constrained innovation or frugal innovation (Zeschky et al., 2011; Pogrebnyakov & Kristensen, 2011; Chen et al., 2012). A process of 'reverse innovation' has also often taken place as further technological advances to their initial innovation to meet the particular needs of emerging markets propelled the growth of business opportunities globally, including in advanced economies (Washburn & Hunsaker, 2011; Dille, 2012). This inspired Trimble and Govindarajan (2012) to argue of changes in the global dynamics of innovation. The research-related investments by EMNCs in developed countries are another form of 'reverse innovation' (see section 5). These represent various forms of reversal of the kind of innovation predicted by the product cycle model of Vernon (1966), which consists of technological breakthroughs in advanced economies embodied in revolutionary new products geared towards high-income markets before trickling down to lower-income mass markets.

The second concerns the significance of technological innovation along with strategic and organisational innovation in defining the success of firms in developing economies and EMNCs. Bonaglia et al., (2007) indicated how Haier (China), Mabe (Mexico) and Arçelik (Turkey) pursued global growth through accelerated internationalisation combined with strategic and organizational innovation. Since affordability and sustainability are replacing premium pricing and abundance as innovation's current drivers, Prahalad and Mashelkar

(2010) portrayed in a broader sense how enterprises in emerging economies, particularly in India, are practicing three types of “Gandhian innovation”: disrupting business models, modifying organisational capabilities and creating or sourcing new capabilities. The phenomenon has challenged the continuing validity of prevailing Western paradigms (Bruton, Ahlstrom, & Obloj, 2008; Cappelli et al., 2010; Chen & Miller, 2010; Prahalad & Mashelkar, 2010). Chakravarthy and Coughlan (2012) indicated that companies need product and business-system innovations to fully leverage the opportunities afforded by emerging markets. The former provides customers with affordable products and the latter facilitates market reach, justifies price premiums or builds brand loyalty. Focusing on product innovation by Tata Motors of India with the Nano, Ray and Ray (2011) discussed how choices regarding the use of technology, product design and organisational methods for new product development enabled the firm to meet the challenges of innovation for India's masses. This involved the integration of suppliers in component design which substantially lowered costs and improved product features valued by mass markets. Chang-Chieh et al (2010) expressed similar views with the need for critical R&D and managerial practices. Bhattacharya and Michael (2008), Ghemawat and Hout (2008) and Gao (2011) outlined some of the strategies adopted by EMNCs and established MNCs to enhance their competitiveness vis-à-vis each other or local firms in world markets. There are product-cycle influences in some of the six-point strategies that Bhattacharya and Michael (2008) identified to be essential in enabling local companies in emerging markets to beat relentless competition from MNCs (including EMNCs) or vice versa. This include customising products and services to meet local needs; emphasising scope economies; developing business models to overcome market-specific obstacles; gaining from low-cost labour and training in-house to overcome shortages of skilled employees; and scaling rapidly by becoming national

ahead of regional rivals. However, other strategies are less influenced by the product cycle: using created or purchased latest technology effectively; and investing in top management talent.

4. THE INFLUENCE OF THE HOME COUNTRY ON THE INTERNATIONAL EXPANSION OF EMERGING MARKET MULTINATIONAL COMPANIES

The second product cycle proposition is that innovations are almost always located in the home country of national firms. This stems from the view of Vernon (1966) that the home market (i.e. the United States) is the source of stimulus for the innovating firm and also the preferred location for the actual development of the innovation. Vernon (1979) extended the analysis to consider the impact of different national environments on the generation and development of innovation. However, since innovation is regarded as a discontinuous process of significant technological breakthroughs in scientific research, both versions of Vernon's product cycle model preclude developing countries as a source of innovative stimulus for domestic firms.

In extending the product cycle model to explain Third World Multinationals, Wells (1983, 1986) argued of the role of the home country in the international growth of Third World manufacturing firms. Indeed, their domestic markets are an important source of stimulus for innovating firms in emerging markets and EMNCs and are also the preferred location for the actual development of the unique innovation undertaken by EMNCs. There is ongoing general support for the second product cycle proposition. However, the home country is not the most significant site for their technologically sophisticated or knowledge intensive production which is in advanced economies, dominant centres or foreign centres of excellence (see next section).

There are a number of ways in which the current literature has recognised the significant role of the home country in the emergence and evolution of EMNCs. The crucial role of the home country is self-evident in the generation and development of a broad range of country-specific advantages (CSAs) advantages based not solely on relative abundance of low-cost skilled and unskilled labour or vast natural resources or access to large home markets. Rugman (2010) argued that CSAs largely define the expansion abroad of EMNCs. This may be a function of the evolutionary stage of EMNCs rather than any fundamental difference with Western MNCs (Ramamurti and Singh, 2010). Moreover, the exploitation of CSAs may require associated firm-specific advantages (FSAs) or CSAs may only be extended to some national firms (such as state-owned firms). These may render CSAs idiosyncratic and uncommon to all firms located in a country (Lessard and Lucea, 2010). Furthermore, FSAs are rooted in the distinctive CSAs of their home countries, and both vary according to the type of internationalisation strategies pursued by EMNCs (Ramamurti and Singh, 2010).

The home country also determines domestic technological innovation in emerging markets, as the product cycle model predicted. Using R&D investments, availability of technology institutes and the number of working patents owned by the country as proxy measures for technology innovation, Mishra (2007) recognised the vital role of country-specific factors (such as market structure, patent laws, and fiscal incentive system) along with firm-specific factors (such as organizational structure and culture) in influencing technology innovation in India. Ray and Ray (2010) provided insights into the unique model of home country-inspired innovation of the Centre for Development of Telematics, an indigenous enterprise from India in the telecommunications sector. They described the role of the company's labour-intensive but capital-sensitive processes in shaping and managing

technology development and diffusion to meet the unique demands of mass markets in emerging economies. They identified three critical factors in the company's 'resource-constrained innovation': entrepreneurial leadership and vision; modular designs to meet user demands of affordability, functionality, and operability through architectural innovation; and exploitation of the local knowledge base and the creation of local innovation clusters. It may be tempting to conclude of the continuing relevance of the product cycle model's focus on demand factors in the home country in determining innovation. This is a narrow view of innovation, which rather generally relies on a firm-specific learning process that interacts with growth of demand, the peculiarities of domestic and foreign production conditions, and technological capabilities (Cantwell, 1995).³ Krishnan and Jha (2011) clearly exemplified this view. They examined the multi-dimensional aspects of the innovation strategies of domestic market leaders in India. It comprises exploration and exploitation, internal and external sources, technology-push and market-pull, and product and process innovation.

The business group embeddedness of national firms based in emerging economies provides further evidence of the influence of the home country on capability creation and international expansion of domestic firms. In studying the benefits that Tata Motors Ltd. attain as part of the Tata Business Group, Becker-Ritterspach and Bruche (2010) demonstrated that business group affiliation enable access to internal and external resources and capabilities necessary in the creation of internationally exploitable assets. It also attenuates the risks involved in creating and exploiting assets through international expansion.

The instrumental role of the state in supporting the international expansion of government-linked companies is self-evident, with Ahmad (2008) providing a recent analysis

of the Malaysian case. Similarly, Arbix and Caseiro (2012) emphasised the role of the new state activism in Brazil, primarily in financing and the implementation of industrial policies, which supported the creation of large national groups with a global presence.

The deregulation of the Indian economy has influenced the kind of innovation strategies which enabled Indian firms to become market leaders (Krishnan and Jha, 2011). Chittoor et al (2009) investigated how Indian pharmaceutical firms, facing discontinuous institutional changes in their domestic environment due to economic liberalisation and intellectual property reforms, undertook organisational transformation. These motivated internationalisation by easing access to foreign markets and increasing potential domestic competition (Gubbi et al., 2010). The internationalisation of technological and financial resources, as components of organisational transformation, fostered the internationalisation of their product markets which in turn positively affected their performance. This is unlike the predictions of the product cycle model where the impetus for the shift from exports to international production by technologically leading firms lies in external factors associated with the export markets. This includes protectionist barriers and the rise of a competitive fringe of local firms as a result of gradual learning.

5. EXPLOITATION OF FIRM-SPECIFIC COMPETENCIES AND EXPLORATION OF NEW PATTERNS OF INNOVATION AND WAYS OF PENETRATING MARKETS

We assess in this section the third product cycle proposition relating to EMNCs. The purpose of their international operations is to exploit internationally their unique home country-derived technological advantages. There are three strands in the current literature which clarify the alternative explanations of the international expansion of EMNCs, which

differ in the extent of their emphasis rather than an exclusive focus: competence exploitation, competence exploration, and both competence exploitation and exploration.

Representative of those in the first strand are notable books on EMNCs published in the last five years. Van Agtmael (2008) and Guillén & García-Canal (2012) assessed the growth paths of the most prominent EMNCs who have become the world's market leaders in a number of industries. Similarly, Ramamurti and Singh (2010) sought to understand how firms originating in six emerging markets and operating in various industries establish global presence in the contemporary economic environment.

The second strand comprises literature which emphasise exploration rather than exploitation of ownership-specific advantages in the international expansion of EMNCs. This is evident in Mathews (2002) and Luo and Tung (2007) who brought forth a springboard perspective to describe EMNCs whose latecomer position on the world stage use international expansion as a means to acquire strategic resources and mitigate domestic institutional and market constraints in the home country. Child and Rodriguez (2005) and Rui and Yip (2008) advanced a similar position in their development of the strategic intent view. Kedia et al., (2012) enhanced understanding of the role of the pursuit of knowledge in influencing the location and entry mode choices of EMNCs.

The third strand of the current literature accords more importance to the 'creative blending' of competence-exploiting and competence-creating activities (Cantwell & Mudambi, 2005), which may be more intimately interlinked than recognised within the complex and integrated intra-firm networks of the MNC. The analytical boundaries between exploitation of firm-specific competencies and exploration of new patterns of innovation and methods of accessing markets have blurred as a result. To achieve innovation's current 'holy grail' of affordability and sustainability, Prahalad and Mashelkar (2010) emphasised

how the capabilities of Indian firms — their competencies, knowledge, and skills — are exploited, modified or created in what they call “Ghandian” innovation. At one end of this spectrum, some companies have disrupted business models using existing capabilities, but at a low cost. Some other companies have modified capabilities or even created entirely new capabilities at the other end of the spectrum. Krishnan and Jha (2011) have expressed similar views on the role of innovation in the leadership positions attained by local firms in India. They convincingly demonstrated the high degree of ambidexterity of local market leaders in exploring and exploiting in parallel, an approach required to provide speed of response. Learning achieved from tapping external sources for knowledge and ideas are integrated with internal sources of innovation. Market exploration, particularly the development of products, services and business models have allowed the companies to meet affordability criteria of the mass market. Competence-exploiting and competence-creating capacities of EMNCs are also enhanced given their membership in business groups (Becker-Ritterspach & Bruche, 2010) and linkages to global supply chains or international strategic alliances (Lall, 1983, 1986; Piramal, 1996; Pradhan & Abraham, 2005).

In their study of the international operations in Europe of two Indian pharmaceuticals, Ranbaxy and Dr Reddy's, Kedron and Bagchi-Sen (2012) illustrated how the need to exploit and augment ownership-specific advantages influence the decisions of EMNCs to operate in advanced countries. They provide selected examples of acquisitions, alliances and partnerships established by these two companies in Europe, each of which is motivated primarily by the goals of asset exploitation or asset augmentation, or both. From their origins as generic manufacturers, Dr Reddy's and Ranbaxy have been able to set in motion through their multiple European operations a repetitious cycle of earning (e.g. asset exploitation through generic sales) and learning (e.g. asset augmentation through

acquisition of product pipelines, technology) to achieve market growth in that continent. Their earlier European operations have helped to support their current entries into new markets, which will in turn facilitate future entries across the value-chain (e.g. upstream into R&D). Goldstein (2010) described lucidly how two factors drive the international expansion of the state-owned Brazilian oil company, Petrobras: the exploitation of traditional firm-specific competencies, and the exploration of new patterns of organizational innovation and ways of accessing markets. Zahra et al. (2011) introduced the opportunities presented for 'organisational unlearning' when examining the market entry of young and aggressive EMNCs in developed countries. It sets the stage for multifaceted learning as a platform for the development and exploitation of their entrepreneurial capabilities for competitive advantage.

Offshore R&D units provide further evidence of the importance of the 'creative blending' of competence-exploiting and competence-creating activities in the international expansion of EMNCs. Liu et al., (2010) and Liu and Chen (2012) are examples of early work in the direction of showing the importance of knowledge creation and sharing as part of the international expansion of technological activities of firms based in Taiwan and China. Poon and MacPherson (2005) adopted a resource-based view to illuminate the technology and/or innovation acquisition processes of Taiwanese and South Korean firms in the United States. This reflects a strategy of resource renewal and expansion, while a reverse product cycle model which emphasises incremental innovations explain further technological resource acquisition. Also relevant is research involving the strategic decisions of firms in emerging economies to seek and acquire external scientific expertise actively in a process of open innovation. Kafouros and Forsans (2012) showed how the acquisition of external scientific

knowledge from abroad rather than from domestic sources has a beneficial impact on both in-house R&D and financial performance of Indian companies.

On balance, the evidence seems to suggest that the third product cycle proposition would need to be broadened in light of competence exploration or the 'creative blending' of competence exploitation and competence exploration in the international expansion of EMNCs.

6. CONCLUSIONS

We specifically examined the continuing validity of three distinct propositions associated with the early versions of the product cycle model of Vernon (1966, 1979) or its extension to Third World Multinationals by Wells (1983, 1986). This is in light of recent developments in the role of rapidly evolving technological capabilities in the competitive emergence and evolution of EMNCs. The first product cycle proposition states that these firms have limited scope for innovation, which consists of imitation and adaptation of the innovative activities of the technologically leading companies as standardisation proceeds in the product life cycle. The current evidence rejects this proposition because of the narrow scope of innovation it allows, which is inconsistent with the broad range of technological capabilities of EMNCs that result from their unique learning experience. The higher degree of success or competitiveness of EMNCs relative to foreign competitors in their own home markets as well as against firms in other low-income emerging economies led Kaplinsky et al., (2009) to argue of a disruption of global corporate and locational hierarchies of innovation. Furthermore, a process of 'reverse innovation' has also often taken place as further technological advances to the initial innovation undertaken by established MNCs to meet the particular needs of emerging markets propelled the growth of business

opportunities globally, including in advanced economies. This inspired Trimble and Govindarajan (2012) to argue of changes in the global dynamics of innovation. The research-related investments by EMNCs in developed countries are another form of 'reverse innovation'. These represent various forms of reversal of the kind of innovation predicted by the product cycle model of Vernon (1966), which consists of technological breakthroughs in advanced economies embodied in revolutionary new products geared towards high-income markets before trickling down to lower-income mass markets.

The second product cycle proposition is that innovations are almost always located in the home country of national firms. This hypothesis remains generally valid in the case of EMNCs since the home country is the single most important site for their innovation. Their distinctive competitive advantages over firms and MNCs based in developed countries derive from, and respond to, the peculiar nature of their home markets. However, the product cycle model's focus on demand factors in the home country in determining innovation is a narrow view. Innovation relies on a firm-specific learning process that interacts with growth of demand, the peculiarities of domestic and foreign production conditions, and technological capabilities. Moreover, the home country is not the most significant site for their technologically sophisticated or knowledge intensive production which is in advanced economies, dominant centres or international centres of excellence.

In the third product cycle proposition, the purpose of international operations is to exploit internationally their unique home country-derived technological advantages. This proposition would need to be broadened to consider competence exploitation or the 'creative blending' of competence exploitation and competence exploration in the international expansion of EMNCs.

Perhaps the most important theoretical conclusion is the increasing relevance of the concepts of localised technological change and technological accumulation over the product cycle model in explaining the current role of rapidly evolving technological capabilities in the competitive emergence and evolution of EMNCs. The concepts of localised technological change and technological accumulation allow for a broader scope of innovation than the product life cycle, recognise demand and supply factors as determinants of innovation, and acknowledge the 'creative blending' of competence exploitation and competence exploration as motives of international operations. These concepts will doubtless assume further significance as EMNCs further evolve and follow firm-specific, cumulative and differentiated technological trajectories.

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NOTES

¹ These are Argentina, Brazil, Chile, China, Czech Republic, Hong Kong, Hungary, India, Israel, Korea, Malaysia, Mexico, Poland, Russia, Singapore, South Africa, Taiwan, Thailand and Turkey. In defining emerging economies, Salehizadeh (2007) excludes 50 nations which the UN defines as Least Developed Countries (LDCs) and which the World Bank lists as 'Low-Income', and an overwhelming majority of the 30 member states of the OECD (i.e. the advanced/industrialised economies).

² We can explain shifts in comparative advantage between North and South using various dynamic theories of comparative advantage. They explain such shifts more formally than Vernon's product cycle model or its extension to EMNCs. Klein (1973) considered the MNC while Nelson and Norman (1977) showed the Impact of technological change on improvements of the original basic design of products; as well as technology stabilisation on product obsolescence. Jensen and Thursby (1986) analyzed the steady-state, open-loop Nash equilibrium of a game in which a Northern monopolist devotes resources to new product development and a Southern planner diverts resources into reverse engineering to learn the process technology. A steady-state equilibrium technology gap exists, which may be explained by optimal strategic behaviour of decision-makers in a product cycle model. Chien-Fu Chou and Shy (1991) drew more qualified conclusions using a multi-product two-country overlapping generations model of trade and innovation. Given a low level of innovation (imitation) in the South, firms in the North innovate at a level which guarantees a long-term technological gap between the North and the South. However, a high innovation level in the South leads to a situation where the South can catch up the North in a finite time. Chui et al., (2001) also considered the capacity of the South for imitation using an endogenous growth North-South model with Southern stages of development.

³ Present or anticipated market signals (as predicted by the product cycle model) and evolving technologies determine innovative activities (Mowery & Rosenberg, 1979; Atkinson and Stiglitz, 1969). Gomory (1989) provides a congruent view in indicating the alternative ways in which innovative technologies become commercial products: by descending the ladder of science or the product cycle. The alternative ways embody discontinuous and continuous processes of innovation, respectively. Werker (2003) integrated market

evolution, Dosi's concept of technological paradigms and Winter's concept of technological regimes in a product life cycle model.