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Developing an analytical framework for study of emerging country multinationals' operations management

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The rise of emerging country multinationals (EMNEs) is opening new perspectives for the study of international operations management (IOM). Research may address issues which are inexistent when the object of study is long-established developed country multinationals (DMNEs). One of the issues that may be noticed, and will be studied in this article, has to do with the design and implementation of new international operations networks. In contrast to DMNEs, internationalisation of EMNEs is strongly influenced by two further factors: country-of-origin effects and role in global production networks. Therefore, studies of EMNEs' international operations networks must embrace two other analytical levels besides the network level: the strategic level of the headquarters and the operational level of the subsidiaries. The analytical framework in this study has been developed through the use of constructs and concepts from both IOM and international business literatures. Such framework applied to three Brazilian multinationals leads to relevant insights on the internationalisation of EMNEs as well as the design and implementation of international operations networks for such late-moving firms.

Keywords: internationalisation; international operations management; international operations networks; emerging country multinationals

1. Introduction

The rise of emerging country multinationals (EMNEs) is opening new perspectives for the study of operations management in general and international operations management (IOM) in particular. The main reason is that, so far, IOM theorising has been essentially inspired by developed country multinationals (DMNE) which followed internationalisation paths different from the ones which are being followed by EMNEs. The distinctiveness of the path followed by the latter is justified by three factors. First, the internationalisation of EMNEs is clearly influenced by the characteristics of the institutional environments where they were born (Peng, Wang, and Jiang 2008). Second, they usually grow as part of Global Production Networks (GPNs) led by DMNEs, what creates specific drivers and constraints for their international expansion. Third, their competitiveness in international markets stands out from their production and operations competences (Fleury and Fleury 2011), instead of the Marketing and R&D competences which supported DMNEs.

The design and management of international operations networks is an issue of particular interest. Although it has been covered in literature in what regards DMNEs, there is no study focusing on EMNEs until the moment. Research towards that focus may be relevant for two reasons: (1) it would reveal the strategies of new entrants into international markets; on the other hand, studies on DMNEs will find them managing mature international operations networks, seeking their optimization; and (2) it may reveal the likely impact of country-of-origin effects and connection to GPNs on the design of international operations. These are the foci of this article.

More specifically, we seek answers to two questions: are EMNEs international operations strategies and management influenced by contextual factors, namely country-of-origin effects and role in GPNs? If so, what is the impact of these factors on their (internal) international networks?

To address those questions we draw not only on the IOM literature but on the International Business (IB) literature as well, profiting from the overlaps and complementarities in those theoretical approaches. In addition, we develop an analytical framework which looks at a company's IOM according to three analytical levels: the parent company and its strategic context (from now on Level 1), the internal network of subsidiaries (Level 2) and the level of individual subsidiaries (Level 3). The framework is elaborated following Whetten (1989), for whom the development of theoretical

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frameworks must consider four blocks related to the ‘what’ (variables, constructs, concepts to be used); the ‘how’ (how do they interrelate); the ‘why’ (which are the reasons that justify the relationships among constructs, variables and concepts) and the ‘who’, ‘where’ and ‘when’ (that represent the specificity of the approach that is being built to address the phenomenon and its boundaries). For illustration purposes, the framework is then applied to three Brazilian multinationals. Data collection involved interviews at headquarters and subsidiaries in Europe (Portugal) and China, as well as the gathering of secondary data from various sources.

We conclude by showing how the rationale of EMNEs internationalisation is influenced by previously mentioned factors: country-of-origin effects and role in the GPN. We also underscore the co-evolutionary process that associates upgrading in the GPN to the enhancement of international network operations capabilities. From the theoretical standpoint, this article contributes through the development of an analytical framework that merges IOM and IB literatures. Finally, by revealing the challenges associated with design and implementation of operations networks in the early stages of internationalisation, it provides advice for managerial practice.

2. Literature review

There are three streams of literature that contribute for this study: IOM with focus on international operations networks, IB with focus on Country-of-Origin Effects and GPNs as well as the recent findings concerning Emerging Country Multinationals. We shall describe each one in more detail further ahead.

2.1 International operations networks

Within this stream of literature, there are two relevant approaches for this study: the first, revealing how multinational companies design and manage their international manufacturing networks, the second, focusing on subsidiaries and the different roles they may play. The third and last approach takes an encompassing look at specific firms.

2.1.1 First stream – focus on the network of subsidiaries

The research developed at the Institute for Manufacturing, University of Cambridge, has been setting the agenda for the study of international operations networks, a concept introduced by Shi and Gregory (1998) and then developed by Miltenburg (2009) and recently, by Friedli, Mundt, and Thomas (2014). These authors start by expanding Hayes and Wheelwright’s (1984) concepts for individual, stand-alone plants, the factory manufacturing system, into international manufacturing networks. By considering, for analysis, factories’ geographic dispersion, coordination mechanisms (both horizontal and vertical) and functional characteristics as dimensions, the authors identify seven types of network configurations related to four types of capabilities (Figure 1).

Miltenburg (2009), then draws on Shi and Gregory (1998), aiming at creating an integrative framework (Figure 2) to describe and explain a multinational company’s global manufacturing strategy. The elements of his framework are: generic international strategies, manufacturing networks, network manufacturing outputs, network levers, network capability and factory types; they are called manufacturing strategy’s objects. This framework systematically examines the relationship between the operational level (factories), the intermediate level (the network) and the strategic level (the company’s global manufacturing strategy). Therefore, as Shi and Gregory (1998) propose that different configurations lead to different capabilities, Miltenburg (2009) adds that different configurations reflect different global manufacturing strategies.

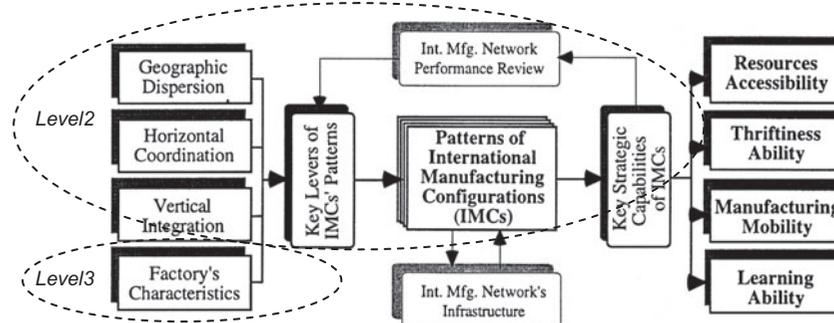


Figure 1. International manufacturing networks and analytical levels.
Source: Adapted from Shi and Gregory (1998).

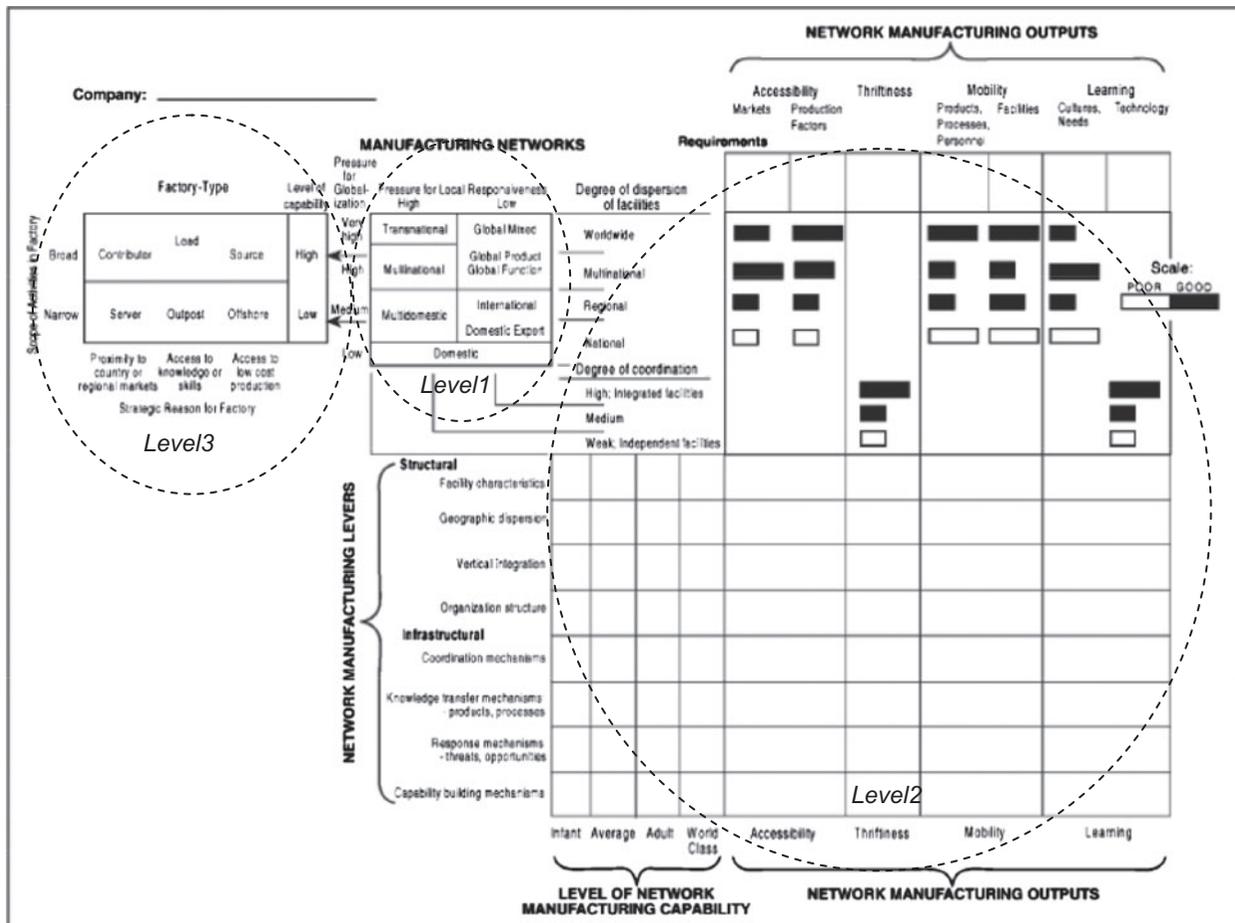


Figure 2. International manufacturing strategies and the analytical levels. Source: Adapted from Miltenburg (2009).

Zhang and Gregory (2011) extended the international manufacturing network concepts to look at engineering networks, which are also present along a company’s value chain. Arguing that value creation mechanisms exist beyond traditional production activities, the authors propose a framework to analyse and manage global engineering networks.

Finally, Feldmann et al. (2013) draw on the previous studies to analyse what happens to the configuration of an international operations network when a subsidiary changes its strategic role (upgrading or downgrading). Focusing on the relationship between the intermediate level (network) and the operational level (factory), the authors show that changes in the role of one subsidiary are likely to lead to systemic realignments within the whole network (Figure 3).

2.1.2 Second stream – focus on subsidiaries

In 1997, Ferdows realised that each subsidiary plays a role within the multinationals’ internal networks: server, contributor, source, offshore, lead and outpost. To make the most of foreign factories, the author recommended that raising each one to more strategic roles should make up a management goal. He points out that the set of subsidiaries should be deemed as a network; however, he does not get to explain it clearly how to do so. Vereecke and Van Dierdonck (2002) tested Ferdows proposed model only to find strong empirical evidence. At the same time, they added new insights, one of which refers to the role effectively played by the subsidiary: the headquarters’ and subsidiaries’ managers perceptions may differ substantially.

Finally, Vereecke, Van Dierdonck, and De Meyer (2006), using network analysis techniques, studied knowledge flows between subsidiaries and headquarters, identified different roles and classified subsidiaries as isolated, receiver, hosting network player and active network player, according to their respective relevance in the network.

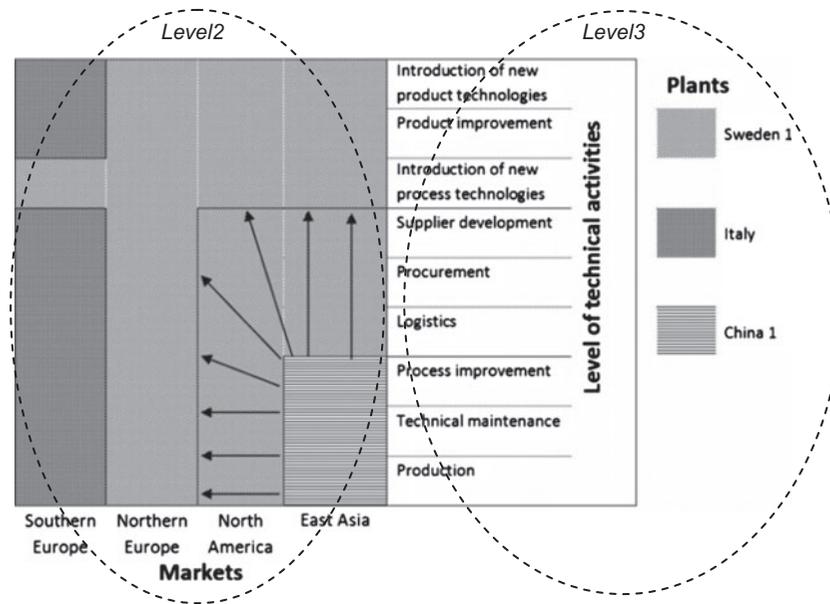


Figure 3. Changes of plant roles and the analytical levels.
Source: Adapted from Feldman et al. (2013).

2.1.3 Third stream – focus on specific firms

The last stream focuses on experiences of selected companies, describing how their network of factories was built and managed. Mair (1994) describes Honda's Global Flexifactory Network, which has the objective to increase production flexibility capabilities, especially in highly competitive and short product life cycle industries. Mair stresses the importance of the factories to be logically operated as networks, constituting a bridge between the micro-flexibility of people and machines and overall corporate flexibility. A second case is Ericsson's Model Factory Concept (MFC), described by Rudberg and West Martin (2008), which highlights the coordination efforts required by the factory network. Ericsson devised a proprietary international operations model in order to achieve the best transnational managerial solution (Bartlett and Ghoshal 2000), seeking optimisation of three dimensions: global efficiency, flexibility and innovation.

2.2 International business

As previously mentioned, there are two issues from the IB literature that deserve a specific review: Country-of-Origin Effects and GPNs.

2.2.1 Country-of-origin effects

Nations engender competitive advantage through a combination of factor endowments, unique cultural traits and deliberate policy options (Sethi and Elango 1999). Three sets of elements: (1) both economic and physical resources and industrial capabilities, (2) cultural values and institutional norms and (3) national government economic and industrial policies shape the propensity towards internationalisation readiness and decisions. Resources and capabilities create drivers influencing firms' strategies. Among the BRIC countries, Brazil and Russia are rich in natural resources, while China and India have large populations and insufficient natural resources. That favours the development of nature-based companies in the former countries and assembling type of industries in the latter. Values and norms are associated with the informal and formal institutions of a country. At the macro level, the business ecosystems, where firms operate, can be more or less conducive to internationalisation. At the micro level, organisational culture is heavily influenced by the nation's cultural environments. Depending on what types of values and norms prevail, organisations may lean towards entrepreneurship and risk-taking or conservatism and risk aversion. China and India are considered nations which cultivate entrepreneurship, while Brazil is taken as more conservative and risk-averse. Finally, governmental policies are clearly an important factor affecting emerging country firm's internationalisation. For example, the international expansion of Chinese multinationals has been supported by the government through the 'Go Global' policy, among

other initiatives. Contrarily, both Brazilian and Indian institutions have conservative postures in regards to the importance of their firms moving abroad.

2.2.1 Global Production Networks

Usually, emerging country firms engage in GPNs, what influences its propensity for internationalisation and its entry strategy in international markets. Fleury and Tereza Fleury (2007) proposed the competence-based positioning framework to analyse the influence of the link to a GPN in regards to the firm's strategic positioning. The authors admit that, in GPNs, firms occupy one of six different positions depending on their core competences: (a) manufacturers (key competence is production and operations management); (b) developers (R&D); (c) integrators (systems engineering); (d) service providers (service operations management); (e) logistics providers (logistics) and (f) technology suppliers (providers of specialised knowledge for industry). Evidently, their argument assumes that every firm must master the whole set of organisational competences but there are core competences which provide strategic leverage to the firm.

2.3 Emerging country multinationals

The third stream of literature to be reviewed concerns the findings so far identified in regards to the specifics of those multinationals. We will highlight two of them, related to value chain configuration and generic strategies.

2.3.1 Value chain configuration as a competitive advantage

By internationalising their activities, EMNEs have the opportunity to configure and coordinate them in such a way as to improve its operational competences so as to deliver more value (e.g. through higher quality or more responsive service) at equal or lower cost. New value chain configurations can also provide new opportunities for learning at the operational level. Thus, value chain configuration can be an important contributor to profitable innovation and global competitiveness (Srai 2013). Table 1 presents the different drivers for value chain configuration comparing the cases of DMNEs and EMNEs.

An important point highlighted in the table above is the strong influence of GPNs in the role, positioning and configuration of EMNEs.

2.3.2 Generic internationalisation strategies

Ramamurti and Singh (2009) observed that EMNEs are not a homogeneous group by any means and identified five generic strategies. Table 2 as follows:

The table above highlights the influence of Country-of-Origin Effects in the internationalisation strategy of EMNEs.

Table 1. Different value chain configurations.

DMNEs	EMNEs
<ul style="list-style-type: none"> • Were born in countries with highly educated people and sophisticated markets; find economically interesting to move production abroad, keeping high value adding activities at home • Are mature multinationals, having a long experience in international operations management • Have well-developed managerial systems and process so they opt to disperse operations even when gains are small • Exert the governance role in GPNs 	<ul style="list-style-type: none"> • Operate in resource-abundant or low-cost countries; it is not interesting to move production abroad • Are late-movers, immature multinationals, conscious that they will not succeed if they follow their predecessors strategies; seek for differentiation and innovation in what concerns value chain configuration • Do not have well-developed managerial systems and processes and so they tend to disperse operations only when pay-offs are high • Start as participants of GPNs and struggle to move up the value chain to reduce vulnerability

Source: Adapted from Fleury, Fleury, and Borini (2013).

Table 2. Foundations of internationalisation by EMNEs.

Generic internationalisation strategy	Home country – based competitive advantages	Reasons for internationalisation	Examples
1. Local optimizer	<ul style="list-style-type: none"> • Ability to optimise products for home market by making them ultra-cheap and easy to use • Customer insight on how to trade-off price and product features 	<ul style="list-style-type: none"> • To introduce products optimised for the home market into other emerging markets 	<ul style="list-style-type: none"> • HiSense, Mahindra & Mahindra, Tata Motors, Shoprite, Marcopolo
2. Low-cost partner	<ul style="list-style-type: none"> • Ability to leverage home country's talent to engage in labour cost arbitrage despite adverse business environment • Project management skills 	<ul style="list-style-type: none"> • To diversify the low-cost locations from which customers in high-cost countries can be served • To move up the value curve by getting closer to key customers in developed countries 	<ul style="list-style-type: none"> • Wipro, Infosys, TCS, GVK Bio, WEG, Sabo
3. Global consolidator	<ul style="list-style-type: none"> • Production and project execution excellence in capital-intensive process industries • Late-mover advantages in scale, organisational processes, and technology • Strong position in large and growing home market, resulting in strong cash flows 	<ul style="list-style-type: none"> • To build scale and lower cost • To acquire complementary technologies and capabilities • To improve (turn around) the performance of acquisitions abroad 	<ul style="list-style-type: none"> • Tata Steel, Hindalco, South African Breweries, Lenovo, Wanxiang, Cemex, Haier
4. Natural-resource vertical integrator	<ul style="list-style-type: none"> • Privileged access to natural resources • Privileged access to large home markets 	<ul style="list-style-type: none"> • To enable forward integration to secure markets • To enable backward integration to meet growing domestic demand for natural resource – based products 	<ul style="list-style-type: none"> • Gazprom, Lukoil, Norilsk, Vale, Anglogold, PTT • Petrobras, Oil & Natural Gas Commission, Indian Oil, China National Offshore Oil Corporation, Chinalco
5. Global first-mover	<ul style="list-style-type: none"> • Large home demand that helps local firm(s) launch in an emerging industry • Sometimes aided by home country leapfrogging to latest technology (e.g., wireless telephony or renewable energy) • Sometimes significant state support 	<ul style="list-style-type: none"> • To acquire key missing technologies and capabilities necessary to compete in new emerging industries • To acquire global customers, scale, and reach 	<ul style="list-style-type: none"> • Embraer, Huawei, ZTE, Suzlon Energy, Dr. Reddy's Pharmaceuticals

Source: Ramamurti and Singh (2009).

3. Research questions

The literature on international operations networks, for dealing exclusively with DMNEs, does not take into consideration Country-of-Origin Effects as well as the likely impacts of the firms' affiliation to GPNs in the operations of their international networks. In the case of EMNEs, even if we recognise that Country-of-Origin Effects is a moderating factor while position in GPN is a strategic choice, both may be influential in the design and management of international operations networks. Therefore, we ask:

Recognizing that EMNEs' strategies may be influenced by COEs and GPNs, do these factors influence the way in which they design and implement international operations?

Another characteristic of EMNEs internationalisation is that they rely on production competence as their ownership competitive advantage (Dunning 1993; Fleury and Fleury 2011), differently from DMNEs. For being located on countries where resources (labour and/or natural resources) are abundant and markets are growing favouring the maintenance of operations at home country, their motivations to establish international operations networks may be distinct from those characterising DMNEs. However, when developing international networks, emerging country firms will be challenged to succeed in more competitive settings. Therefore, we ask:

Since EMNEs core competence is production, how do they manage international operations to upgrade and succeed in international markets?

4. The development of the analytical framework

4.1 The analytical levels

For a better understanding, IOM studies in EMNEs must consider three analytical levels. Figure 4 shows that:

Level 1 (strategic/macro – inter-firm network) – It is where the strategic process is run; the EMNE is influenced by Country-of-Origin Effects and its role in GPNs;

Level 2 (tactical/meso – intra-firm network) – It embraces the parent (headquarters) and affiliate companies (subsidiaries); that's where the international operations networks are embedded, configured in order to achieve the network mission;

Level 3 (operational/micro – subsidiary and host country networks) – It is the set of individual foreign subsidiaries with predefined roles; each one is expected to deal with host country effects and interact with local operations networks.

4.2 The integrative framework

The EMNE should organise its international operations in three steps as per the arguments exposed in the literature review:

- (1) To define the mission of the international operations network;
- (2) To design and implement the network by defining subsidiaries location/dispersion and roles, as well as coordination mechanisms and processes; and
- (3) To manage the international operations, by activating, monitoring, controlling and evaluating the performance of the network.

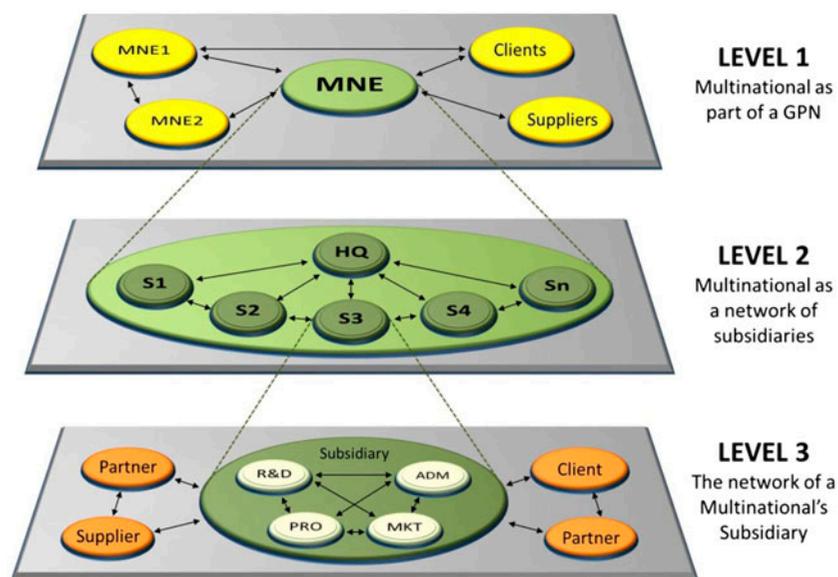


Figure 4. A multinational company's external and internal networks in three levels.

4.2.1 Step 1: Defining the network mission

The network mission is driven by the generic strategy assumed by the EMNE, which in turn is constrained by the role played in the GPN and influenced by country-of-origin effects (Figure 5). As previously proposed, EMNEs may play one main GPN role, the most common as manufacturers.

4.2.1.1 *Network mission.* Zhang and Gregory (2011) admit that the network mission can be: (1) efficiency-oriented, when it seeks economies of scale/scope, international operations synergies, the leveraging of expertise or precious resources on a global scale, and the sharing and reuse of existing solutions; (2) Innovation-oriented when it seeks customer intimacy, technology leadership, and market/technology-driven innovation, learning across disciplines or organisations; or (3) Flexibility-oriented when it seeks flexible work approaches, mobile engineering resources, reconfigurable network structures and local responsiveness.

In Table 3, the network missions associated with different EMNEs internationalisation strategies are analysed in regards to the likely influences arising from GPN and country-of-origin effects. Although some links may be observed in relation to the above taxonomy, those influences lead to a specific set of network missions.

4.2.2 Step 2: Designing the international operations network

The network mission guides the EMNE in the design of the international network, which involves the location and dispersion of subsidiaries with specific roles, the establishment of flows (of information, knowledge, materials, people and finance) among the units, and the governance and coordination mechanisms (Figure 6).

4.2.2.1 *Geographic dispersion.* Although dispersion is usually drawn by forces external to the company, especially new market opportunities, there is a full range of options from domestic to multinational manufacture (Shi and Gregory 1998). Domestic means that all production is carried out in a single country serving both home and export markets. Regional approaches set up factories and networks located in a particular geographical region, usually sharing similar cultural value systems. Multinational approaches, with trans-regional dispersion, involve factories located in several countries and continents.

4.2.2.2 *Subsidiary role.* Each subsidiary has a pre-defined role within the intra-firm network. Ferdows' six types of subsidiary roles (offshore, source, server, outpost, contributor and lead) are still predominant in literature; each type develops distinct sets of competences. Rugman, Verbeke, and Yuan's (2010) classify those competences as production, innovation, marketing and administrative.

4.2.2.3 *Governance/coordination.* Once a business moves beyond a conventional single domestic operation it is obliged to establish authority structures and international coordination mechanisms, which refer to linking or integrating the production and distribution facilities in order to achieve the firms' strategic objectives or its network mission (Meijboom and Vos 1997; Shi and Gregory 1998). For Zhang and Gregory (2011), governance refers to

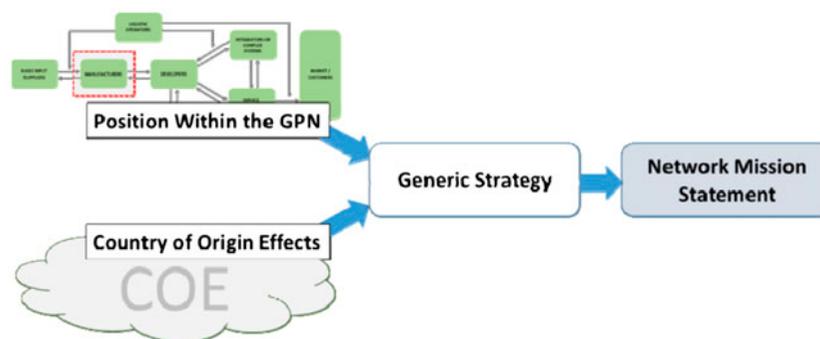


Figure 5. Strategic process defining the network mission.

Table 3. Types of network missions defined by the strategic process.

Generic strategy	Country-of-origin enablers	GPN effects	Network mission	Examples
1. Local optimizer	Large and demanding local markets	Not relevant; has to build its own network	Offshoring (efficiency)	Tata Nano AirBartel
2. Low-cost partner	Large and skilled low-cost labour market;	Joins DMNE-led GPNs in upstream positions	Follow leading companies (flexibility – upgrading)	Sabo, Embraco, Namac
3. Global consolidator	Large market and input supply in traditional industries	'Inherits' the position previously taken by the acquired companies	Global efficiency	Mittal, Tata Steel Cemex WEG, Votorantim
4. Natural-resource vertical integrator	Nature-rich home country; oligopolistic conditions	Aims to build its own GPN (downstream)	Connecting home-country operations to global markets (outbound logistics and services) Global efficiency	Petrobras, Vale, Marcopolo, Lukoil (Getty), Tata Motors
5. Global first-mover	large and rapidly demand in a new industry	May start by joining DMNE-led GPNs but soon is able to build its own network	Learning Innovation	Embraer Suzlon Huawei

Table 4. Embraer establishing the network mission.

Period	International strategy	Country of origin effects	CbPF-GPN	Main network mission
1969–1994	Exports	SOE, Imports substitution	Manufacturer	Capability building
1994–2001	Global 1st mover	Privatisation	Manufacturer	Resource searching
2001–	Global 1st mover	Financial support for sales	Integrator	Market presence

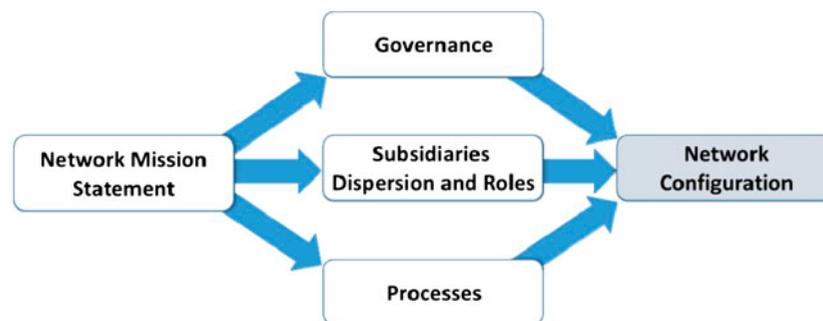


Figure 6. Configuration process of the International operations network.

the mechanisms that direct and control the network, including authority structures, performance measurement and coordination mechanisms. In principle, there can be two generic orientations: multidomestic (weak coordination and more independent factories) and global (strong coordination and more interdependent factories, from either designed system structures or operations processes).

4.2.2.4 *Operations processes.* Processes are structural elements regarded as the dynamic levers of operations networks, in opposition to the static levers such as geographic dispersion, coordination and the individual factories. The

organisation of the flows of material, information and knowledge between factories in the network may involve standardised, tailored, or ad hoc processes.

4.2.2.5 Network configuration. Configuration means the combination and interaction of all elements which define the network: geographic dispersion, governance, operations processes and subsidiary roles. These elements are defined as part of the design of the network and represent the potential contribution to the accomplishment of the network mission. For Shi and Gregory (1998) seven possible configurations emerge: regional uncoordinated, home exporting, regional exporting, multidomestic, glocalised, global-integrated and global-coordinated.

4.2.3 Step 3: Managing the international operations

Ideally, the design process would result in a network with the precise capabilities required by the mission statement. However, both the complexity of the design process and the emergence of unpredicted factors external and internal to the firm will call for a management system. This management system will have to cope with two main sources of uncertainty: unplanned host country effects and the dynamics of local operations networks.

4.2.3.1 Unpredicted host-country effects. Like in country-of-origin effects, host country effects stem from three sets of elements: (1) both economic and physical resources and industrial capabilities, (2) cultural values and institutional norms and (3) national government economic and industrial policies. The predictable host-country effects are supposed to have been handled in the design phase (step 2).

4.2.3.2 Local operations network. The relationships between foreign subsidiary and host-country networks may present different strategic relevance for EMNEs. Host-country networks encompass local supply chains (to enhance manufacturing capacity and/or engage in the local operation of GPNs), local wholesalers and retailers (for sales and distribution) and universities and research centres (aiming at enhancing the innovative capacity of the subsidiary and the EMNE). *A priori*, EMNEs will be more eager to profit from those relationships in developed rather than developing countries.

A natural consequence of the location in foreign countries is that the multinational becomes part of an environment which is difficult to decipher and behave, what is dubbed as Liability of Foreignness. That leads to the notion of actual subsidiary role.

4.2.3.3 Actual subsidiary role. Birkinshaw and Hood (1998) argue that the use of the term 'role' to describe the contribution of a subsidiary is mistaken as it would imply that the subsidiary's actions and behaviours are predetermined by the headquarters' assignment. The authors maintain that subsidiaries usually show initiative due to the two factors mentioned above: relationships with local networks as well as drivers and constraints associated with the local business environment.

4.2.3.4 Network capability. Network capability is the ability, derived from the network configuration, to deliver key outputs that accomplish the network mission. Fleet and Shi (2005) and Singh Srani and Gregory (2008) used a classification of network capabilities as cost efficiency, customer responsiveness, resource accessibility, agility, learning, risk management and manufacturing mobility.

In order to develop a single integrated framework, all the constructs previously mentioned are structured as shown in Figure 7.

5. Application of the framework in three illustrative cases

In order to illustrate the IOM integrative framework's applicability, three Brazilian multinationals will be analysed accordingly: Embraer, WEG and Embraco. They were chosen due to the following:

- They are successful emerging country multinationals, with subsidiaries in developed regions (Europe and US) as well as in other developing countries, such as China, meaning these companies operate in diverse institutional environments;
- In regards to Country-of-Origin Effects, Embraer was founded as a state-owned enterprise, a governmental project spin-off, while the others are private enterprises;
- As to the GPN role, according to the competence-based positioning framework, Embraer is categorised as an integrator (of complex systems products), while the other two are manufacturers.

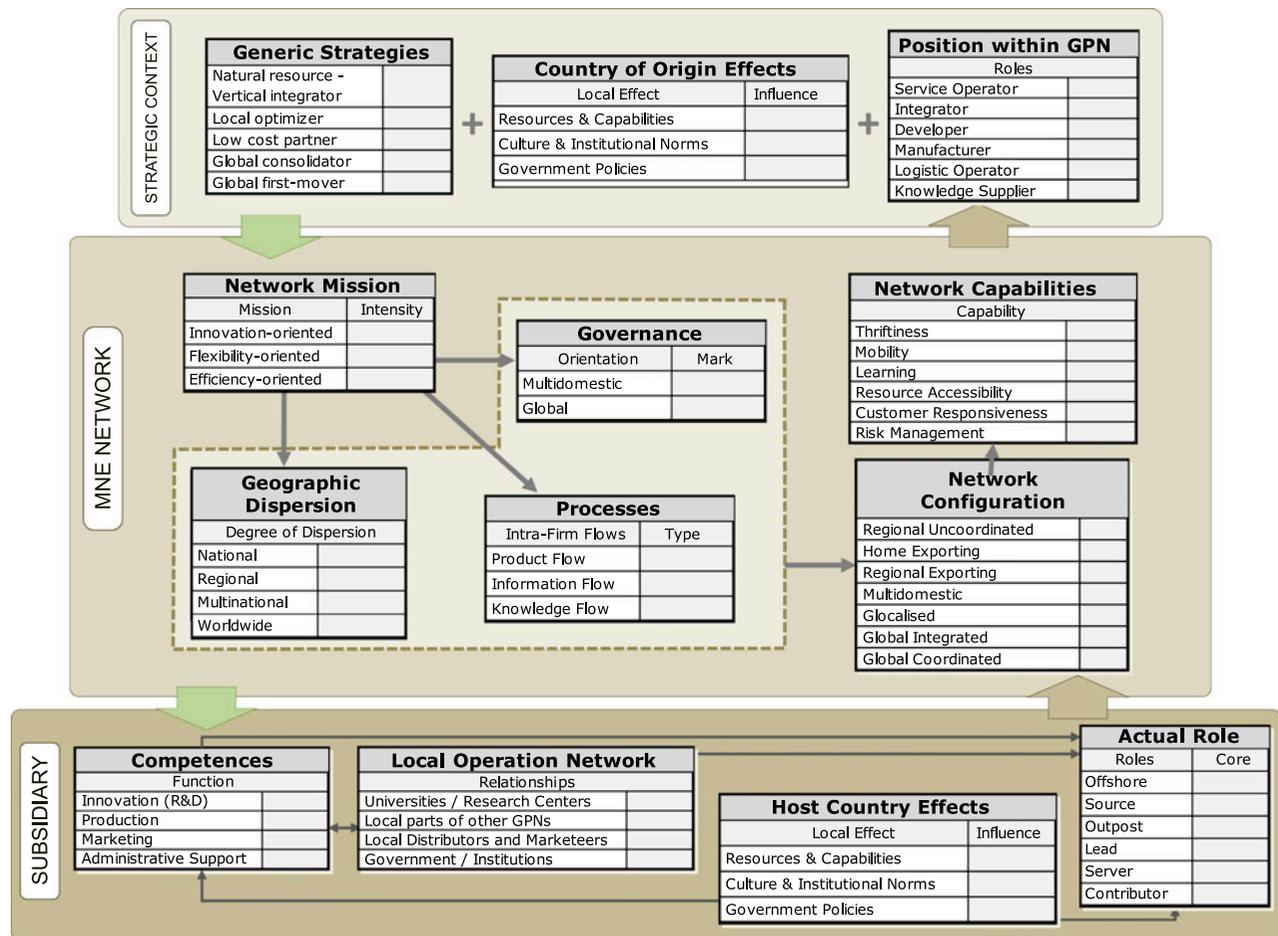


Figure 7. IOM integrative framework with networks in three analytical levels.

Data collection involved interviews at both subsidiaries and headquarters. We visited subsidiaries first, in China and in Europe (Portugal). Using a semi-structured questionnaire prepared to focus on level 3 and asking for complementary information about levels 2 and 1, we held interviews with the general managers of the subsidiaries, which lasted from 2 to 3 h. Afterwards, we visited the headquarters, located close to Sao Paulo (Embraer) and in the south of the country (Embraco and WEG). Using a semi-structured questionnaire focusing on level 1 and asking for complementary information about levels 2 and 3, we interviewed the international operations incumbent (who was accompanied by the local plant manager or other who had already been manager of a foreign subsidiary). The interviews lasted from 2 to 3 h. Secondary data were also extracted from reports and websites, published articles, cases prepared by academic institutions and the specialised media.

5.1 EMBRAER: from local manufacturer to global player in a high-tech industry

Embraer is the world's third largest commercial aircraft manufacturer, with more than 5000 airplanes produced up to 2013 and 19,000 employees in eight countries besides Brazil: USA (full-fledged subsidiary), France (sales and client support), Portugal (two plants for maintenance facilities and components production), China (manufacturing plant and client support), UK (sales and client support), Singapore (logistics hub), Ireland and United Arab Emirates (sales offices). Embraer's business units include commercial aircraft, executive jets, and defence and security. The design and implementation of Embraer's international network changed over time, as follows.

5.1.1 1969–1994 – Local producer of a global product

As to Level 1, Embraer was founded in 1969 as a state-owned enterprise, to produce airplanes for the development of inner country regions, under the doctrine of national sovereignty. In a period when the imports substitution industrialization was at its peak, Embraer was part of a major national developmental project and, as such, it had support from the government as a client for both civil and military products. In addition, it had the support of a research centre and a school that provided highly skilled engineers, and when exports started, public banks created a financing scheme to make feasible the global commercialization of Embraer's products.

Since the development of its first airplane, the company has negotiated with large DMNEs for the acquisition of engines and avionics. Simultaneously, it was involved in partnerships with mid-sized Italian and American manufacturers for the local production of airplanes under licence, as well as supplied a large American manufacturer with structural components. Therefore, Embraer was an active participant of GPNs since its foundation; however, its role was that of a relatively modest purchaser from the global suppliers of the aeronautics industry.

Embraer's strategy was initially focused on domestic demands, but as airplanes are global products, exports started in the late 1970s. To make that strategy feasible, Embraer created an international network dedicated to commercialization and after-sales services located in the US and France.

Therefore, in the first stage of its history, Embraer was an isolated, vertically integrated aircraft manufacturer, assembling key modules imported from developed countries and exporting small regional airplanes to selected regions. That strategy together with the centralisation of operations in the home country defined a relatively simple mission for its international network (Levels 2 and 3): supply acquisition and inbound logistics associated with commercialization and after-sales services.

Embraer could be considered as an example of a local optimiser (Ramamurti 2009), which exported to niche markets in developed countries as well. Embraer's international network configuration could be categorised as home exporting manufacturing (GMC1) according to Shi and Gregory (1998).

The strength of local demand and support led Embraer to embark on risky projects. One of these failed and led the company to a feeble financial position in the early 1990s, when it was privatised.

5.1.2 1994–2001 – From local producer to leader of a global production network

As to Level 1, as Embraer was privatised in 1994, the government withdrew all direct support, maintaining indirect influence through a 'golden share' stake. Nevertheless, it remains as Embraer's major client in the defence area, as it happens with other major global companies in the aeronautics industry. Consequently, country-of-origin effects were reshaped at that time.

After privatisation, the acquiring private group gave Embraer a new strategic intent, shifting its corporate mission from technology-oriented to market-oriented, introducing a new entrepreneurial culture and organisation. Embraer's difficult financial situation compelled the new administration to seek risk-sharing partners for the design and manufacturing of a new product, the ERJ-145 regional jet. As a result, the company created a network with four partners from Spain, Chile, Belgium and US, which were previously ordinary suppliers. On the other hand, Embraer continued to be a modest purchaser of global suppliers to the aeronautics industry.

The ERJ-145 was extremely successful, despite the fierce rivalry with Bombardier of Canada, thus turning Embraer into an integrator and leader of its own global production network in the aeronautics industry.

At Level 2, the risk-sharing partnership gave Embraer governance over an international operations network. The new mission for its international network became the coordination of the risk-sharing partners with tailored processes for the flow of information and knowledge, and standardised processes for the flow of parts and components to feed home-country assembly lines.

That arrangement provided extraordinary competitive edge after the 9/11/2001. Embraer's network flexibly cushioned the company during the crisis that followed the tragedy: while its rivals succumbed one after the other, Embraer was able to manage its international operations and emerge as a new global player in the industry.

At Level 3, Embraer increased the number and the size of organisational units dedicated to supply acquisition and inbound logistics associated with commercialization and after-sales services. In sum, Embraer kept a GMC1 – Home Exporting configuration after the development of the ERJ-145 airplane.

5.1.3 2001 – present – A global player in the aerospace industry

At Level 1, in the 2000s, Embraer gradually consolidated as a global first-mover (Ramamurti and Singh 2009) in regional aviation. The innovative characteristics of its products, associated with its previous experience with decentralised global operations, allowed the company to assemble and coordinate a much more complex international network for the production of its new jet, the ERJ-170, now involving renowned DMNEs like GE and Mitsubishi. At the same time, this GPN made possible for Embraer to diversify by creating the executive jets business unit.

Privatisation and the subsequent success of Embraer in international markets resulted in increasingly tense relationships with government as the latter exerted pressure over the company to localise its supply chain, what was not realised due to the stringent rules of certification in the international aeronautics industry.

At level 2, the network mission became increasingly complex as the network gradually expanded and new business possibilities emerged: instead of resource-seeking, it became market presence (Shi and Gregory 1998) or market seeking (Dunning 1993). Political negotiation entered the agenda, as exemplified by selling commercial aircraft in China and military aircraft in the USA. Embraer subsidiaries were established in China, Europe and US, each one with a different role.

The Chinese subsidiary was established essentially to seize a market opportunity. Opened in 2005, the outpost affiliate was the outcome of a long negotiation process, where Embraer had some support from the Brazilian government in the negotiation with the Chinese. As a direct condition of host country, Embraer formed an association with AVIC, a huge Chinese state-owned enterprise. The agreement resulted in the Harbin plant assembling the ERJ-145 on a CKD system despite the pressure of the Chinese government to have the ERJ-170 in the production line. That plant produced a total of 39 ERJ 145 until 2009, when production came to a halt due to disagreements with the Chinese government. At the Chinese subsidiary, competence in sales was regarded as priority, especially in dealing with state-owned companies. Competence in production was limited to assembling the difficulties posed by the local institutional environment preventing Embraer from setting up a local network of players, with consequent production setbacks. Currently, there are only plans to produce executive jets in the subsidiary.

The Portuguese subsidiary began with the partial acquisition of OGMA, a local SOE of maintenance services for both commercial and military aircraft; it was meant to open doors to the European market. Subsequently, a greenfield plant for the production of structures and airframes was put in place; the creation of a research centre is set to be the next step. Although located in the same country, both subsidiaries have independent roles.

Similarly to the Chinese, the Portuguese subsidiaries have difficulties in setting up local networks for their operations, given that the host country bears little tradition in the aerospace industry. Instead, Embraer seeks partnerships with companies from other European countries.

Embraer's most recent investments have been made in its US subsidiary, a plant designed to assemble executive jets, housing an R&D centre, and also with the aim of enhancing commercialization and after-sales services activities.

Consequently, Embraer evolved to a global-integrated manufacturing configuration (GMC3), according to Shi and Gregory (1998). But it has a regional orientation in what concerns sales and maintenance. This configuration leads to resources accessibility and learning ability capabilities to guarantee market presence; its network mission. Tables 4 and 5 synthesise that evolution.

The international network put in place allowed the company to change towards GMC3 – Global Integrated configuration. In other words, the main assembly process was kept in-house (in Brazil), while the assembly of subsystems was transferred to the risk-sharing partners, for subsequent shipment to Embraer's main assembly plant. This restructuring is consistent with the new corporate strategy devised by the headquarters: becoming a complex product systems integrator and a global first-mover.

In its current stage, new strategic options consolidated Embraer's GMC3 configuration: the opening of new international markets, as well as new strategic business units (executive jets). One key evidence is the decentralisation of the final assembly: commercial jets in the Chinese subsidiary (now switched to executive jets) and executive jets in the American subsidiary.

Table 5 shows the relationship, over time, between (1) the main mission for the network, which is the outcome of the strategic process, (2) the network configuration designed in order to deliver the capabilities that have the potential to satisfy the mission, and (3) the most important strategic role a foreign subsidiary has in the network. It is possible to see the coherence and alignment between them, even though for now it is not possible to determine the exact extent of the fit. In the first stage of its life, subsidiaries were not important for the satisfaction of the mission, that's why the American subsidiary had then a low strategic role. That is rapidly changing as Embraer intensifies international expansion.

Table 5. Embraer designing the network.

Period	Main network mission	Configuration	Main network capability	Most important role of a subsidiary
1969–1994	Capability building	GMC1	Learning ability	Server
1994–2001	Resource searching	GMC1	Resource accessibility	Contributor
2001–	Market presence	GMC3	Resource accessibility	Lead

5.2 WEG: from low-cost supplier to global consolidator of industrial equipment

WEG is one of the world's leading electric motors manufacturers, operating in nine countries besides Brazil: Argentina, Mexico (3 plants), USA, India, South Africa (2), Portugal, Austria, Germany and China (4). Commercial offices are located in 28 other countries, with 1250 authorised repair shops in all continents. The company is structured in five business units: electric motors, energy, transmission and distribution, automation, and coatings. Headcount is over 28,000, 20% of which working abroad. The longitudinal account of WEG's IOM evolution is as follows:

5.2.1 1961–1990 – WEG's foundation in the wake of the Imports Substitution Industrialization

At Level 1, coinciding with the period when imports substitution industrialization was at its peak in Brazil, WEG was founded in 1961 by three entrepreneurs, with the mission to produce domestically universal electric motors at lower prices. The company received some support from the government to start business, as well as special funding for R&D.

Located in southern Brazil, WEG developed a strong organisational culture, embracing participative management principles with decisions made by committees. WEG has displayed a global mindset right from the start. The Exportation Department (later renamed to International Department) was created with the mission to open new markets, and export even when returns were low: the objective was to learn how to serve sophisticated foreign markets and thus, reshape the company's strategies. The R&D department was also created to increase learning capacity.

At Levels 2 and 3, WEG adopted a vertically integrated operations structure, from foundry, coating and assembling to sales and distribution. It started exports through distributors and then established commercial offices, the first of which in the USA. Their role was to supply large clients while distributors' was to supply retailers.

Therefore, in the first period of its history, WEG was isolated from GPNs, manufacturing for domestic markets, exporting, initially to modest markets and then to more demanding ones. WEG's configuration would then be categorised as Home Exporting Manufacturing (GMC1), because it centralised manufacturing at home country and operated a global logistic system for the distribution of products and acquisition of supplies.

5.2.2 1990–2003 – From home-exporter to low-cost partner

At Level 1, in the early 1990s, with the new wave of globalisation, WEG was ready to expand exports to a wide range of segments, from universal to make-to-order models. At that time, WEG reinforced its position as a key supplier to hydraulic pumps GPNs, what led Ramamurti (2009) to classify it as a low-cost partner. WEG kept international operations under the responsibility of its international department.

At Levels 2 and 3, WEG's newly established network mission was to trade in preferential markets and, simultaneously, provide dynamic responses to global clients, seeking better positioning in GPNs. The company's own value chain became dispersed in many countries to gain access to resources, markets and strategic capabilities, meeting corporate needs. However, WEG kept the production process centralised at home to reduce duplication of manufacturing facilities. The company shifted to a global-integrated manufacturing configuration (GMC3), associated with capabilities of resources accessibility and learning ability (Shi and Gregory 1998) while accomplishing the market presence mission.

5.2.3 2003 – present – From low-cost partner to global consolidator

At Level 1, in the 2000s, WEG started to acquire foreign plants, targeting at large institutionally stable markets. Enhancing manufacturing competence to world class, its generic internationalisation strategy shifted towards global consolidator, gaining scale and lowering costs, while acquiring complementary technologies and capabilities. WEG's acquisitions were generally associated with the movement of incumbent electric motors producers from developed countries (like ABB and Siemens), which withdrew from certain product lines to concentrate on higher value-added ones. All this reinforced WEG's position in GPNs as a preferred supplier with facilities located in developed countries.

Table 6. WEG establishing the network mission.

Period	International strategy	Country of origin effects	CbPF-GPN	Main network mission
1961–1990	Exports	Imports substitution policy	Manufacturer	Market presence
1990–2003	Low-cost partner	Trade liberalisation	Manufacturer	Dynamic responses
2003–	Global consolidator	Declining effects due to growing internationalisation	Manufacturer	Global competitiveness

As to Level 2, the network mission was redefined to combine efficiency and flexibility through a balance between cost minimization and dynamic responses to customers. This is why dispersion expanded worldwide due to the large number of regions and countries where subsidiaries became present. International expansion led WEG to implement a profound change in its organisational structure: aiming to increase coordination and synergy between the foreign and Brazilian plants, subsidiaries now have to report to one of the five specific business units while the International Department has now become responsible for sales only. Processes related to flows among organisational units are both standardised and ad hoc due to products and business units specifics. Nevertheless, decision-making is always based on participative practices, a cornerstone of WEG's managerial model.

As to Level 3, WEG's plant network has been under construction since the early 2000s, blending acquisitions and greenfield investments. In all subsidiaries, WEG's participative model has been implemented, China included. The role of subsidiaries varies according to markets served, but their technological capabilities are being gradually improved. Subsidiaries located in developed countries are considered as Global Mandates or Lead subsidiaries.

Therefore, WEG's new configuration can be categorised as global-coordinated (GMC4): network capabilities combine manufacturing mobility and thriftiness ability, to accomplish the mission of global competitiveness.

Tables 6 and 7 summarise the longitudinal evolution, starting with the strategic process that includes the internationalisation strategy and the role in the GPN.

5.3 Embraco: from low-tech local producer to low-cost partner in white goods industry

Embraco is specialised in cooling solutions and world leader in the hermetic compressor market, accounting for 25% of residential applications. It also serves the commercial applications market (16% of the European market) and the replacement market. It directly employs around 9,600 people, 500 of which are engineers engaged in technological developments that resulted in 1,277 patent letters. Its subsidiaries are located in Italy (acquisition 1992), China (Beijing – joint-venture 1995; and Qingdao – greenfield 2012), Slovakia (greenfield 1999) and Mexico (greenfield 2010). In the USA, Embraco has a sales office and in Russia it distributes its own products in order to comply with local legislation. The longitudinal account of Embraco's evolution is as follows:

5.3.1 1971–1990 – The local producer of a global product

At Level 1, Embraco was founded in 1971, as a joint effort of three local white-goods manufacturers, aiming at replacing imported compressors, the major component of a refrigerator. Financial resources banked by the three founding companies were supplemented with governmental resources, to ramp-up production and initiate R&D activities.

Located in Southern Brazil, Embraco was initially licensed by Danfoss, a Danish manufacturer. In 1981, Embraco established its R&D department and signed a cooperation agreement with a local university, a fruitful partnership that lasts until today. In regards to internationalisation, Embraco began exports to Latin America in 1977. Ten years after, already acknowledging the potential Chinese market, it opened a commercial office in Beijing.

Therefore, in the first period of its history, Embraco was a vertically integrated compressor manufacturer serving primarily its three founding firms and the domestic market, exporting its surplus and investing in technological development. Embraco's network configuration would then be categorised as home exporting manufacturing (GMC1) because it

Table 7. WEG designing the network.

Period	Main network mission	Configuration	Main network capability	Most important role of a subsidiary
1961–1990	Capability building	GMC1	Thriftiness	Server
1990–2003	Resource searching	GMC3	Resource accessibility	Contributor
2003–	Market presence	GMC4	Manufacturing mobility	Lead

had no international manufacturing activities, centralised manufacturing in the home country and operated a modest international logistic system (for the distribution of products and acquisition of supplies).

5.3.2 1990–2000 – Connection to GPNs of large white goods manufacturers

As to Level 1, in the early 1990s, Embraco registered its first patent and soon afterwards it started to use its own technology in a highly vertically integrated production system. Concurrently, the American Whirlpool, one of the world's largest producers of home appliances, acquired one of the three Embraco's founding firms, becoming its main shareholder and changing the GPN governance. That change associated with its technological emancipation and the new competitive pressures arising from the opening of the Brazilian market to international competition, made Embraco start its internationalisation process.

Embraco's international operations network started with a plant acquired in Italy, close to Milan, serving regional customers and gaining access to new technology. The high-cost and labour unrest in that plant, led Embraco to invest in a greenfield plant in Slovakia, the two operations undertaking complementary roles. In 1988, Embraco established a commercial office in China though manufacturing activities started in 1995 only. To be able to operate in China Embraco joined a local partner, Snowflake, an SOE controlled by the Beijing municipality, a joint-venture subject to strict surveillance of governmental institutions. Embraco Snowflake is dependent on the parent company in terms of technology. In the other areas: production processes, supplier development and supply chain management, purchasing, it is autonomous. Chinese operations started as offshoring and gradually moved to server and contributor. That movement was motivated, especially by the increasingly demanding Chinese market in what concerns quality, cost and innovation: the local market requires new products at rate much faster than Brazil demanding joint work (parent and subsidiary) to follow the pace; in this case, Embraco-China plays the role of a contributor. The Chinese operations widened Embraco's geographical scope, serving the Pacific Basin and Europe: Sharp in Japan, Electrolux in Australia, Bosch and Liebherr in Germany, besides Haier and others in China.

Therefore, in the second period of its history, Embraco established subsidiaries to serve specific regions, leading to a configuration that is categorised as regional exporting manufacturer (GMC2). Embraco's international network is focused on regions but its products reach the global market based on the coordinated operations network and global product development.

5.3.3 2000 – present – Focus on innovation and low-cost production for global markets

At Level 1, challenges derived from the environmental sustainability issue and the rise of new competitors led Embraco to shift its competitive priorities, reinforcing investments in both product and process innovation, and internal organisation. Although still relying on its former GPN, Embraco is trying to become a global first-mover. R&D activities are concentrated in its headquarters, profiting from the relationship with a local university. For the production of its breakthrough type of compressor, Embraco assigned the Mexican plant for assembly (thus serving the North American manufacturers), while the electronics components will come from a new plant that is being installed in China.

Embraco organises its subsidiaries aiming at (a) being close to its clients; (b) seeking global efficiency; and (c) being close to technology centres. Thus, the network mission may be stated as primarily efficiency-seeking and innovation-seeking. That leads to a low number of plants operating at high scale distributed in three world regions: EU, Asia and USA. Coordination follows a global pattern and the company utilises different mechanisms to integrate operations. Besides the formal SAP and knowledge management systems, Embraco adopts programmes which systematically rotate managers among plants, locate its top executives abroad (VP Engineering and VP Sales in Italy; VP Manufacturing in China) and bring foreign managers to occupy top positions in the HQ. The R&D group dedicated to engineering processes has been moved to Italy, not only due to proximity to technological centres but also to profit from that strategic position in regards to time zones aiming at the coordination of global projects running around the clock. For the development of such projects, the Chinese subsidiary hired a large team of engineers.

Embraco recently changed the governance structure of its international network by introducing a hierarchical arrangement among subsidiaries: in Europe, where the company operates in the commercial markets, the Slovakian plant now reports to the Italian subsidiary while the Russian one reports to the former. The other plants in China and Mexico manufacture compressors for domestic applications, reporting directly to the headquarters.

Therefore, Embraco's network configuration may be considered as GMC3 – Global-Integrated (global dispersion with vertical integration). Network capability combines cost efficiency and agility. Tables 8 and 9 summarise the longitudinal evolution.

Table 8. Embraco establishing the network mission.

Period	International strategy	Country of origin effects	CbPF-GPN	Main network mission
1971–1994	Exports	Imports substitution policy	Manufacturer	Capability building
1990–2000	Low-cost partner	Trade liberalisation	Manufacturer	Resource searching
2000–	Low-cost partner	Declining effects due to growing internationalisation	Manufacturer	Market presence

Table 9. Embraco designing the network.

Period	Main network mission	Configuration	Main network capability	Most important role of a subsidiary
1971–1994	Capability building	GMC1	Learning ability	Server
1990–2000	Resource searching	GMC2	Resource accessibility	Contributor
2000–	Market presence	GMC3	Resource accessibility	Lead

Thus, flows in the company blends both standardised and ad hoc types. For example, the Mexican subsidiary is responsible for the production of the new family of domestic compressors, developed in Brazil; the inputs will come from China, in an operation organised by the Chinese subsidiary and the targeted market is the USA. Therefore, Embraco's network configuration may be considered as GMC3 – Global-Integrated (global dispersion with vertical integration). Network capability combines Cost Efficiency and Agility.

6. Discussion

The three cases bring initial insights in regards to the research questions. First of all, they highlight specific traces of country history – factors endowment, local culture and public policies – which influenced their internationalisation movements. The common point is that the previous set of traces mentioned prompted them to become late-movers in the international markets, and cope with the consequences of such. They had to choose among the generic internationalisation strategies that are typical of late-moving companies.

The firms' preferences for neighbouring countries in the early stages of their internationalisation processes is linked to home-country characteristics, especially reduction of cultural distance and risk avoidance. Their trend to centralise decision-making at the headquarters reflects national and organisational culture, which values tight control. There is strong evidence that country-of-origin effects influence decisions related to geographical dispersion and governance in particular, and to the design of international operations networks as a whole.

The positioning of the enterprises in GPNs also influences their evolution as multinationals. The three of them started as manufacturers, what led them to internationalise by keeping manufacturing at home while trying to serve the international markets through exports. Their subsequent expansion revealed different trajectories: Embracer became a complex product systems Integrator while both WEG and Embraco expanded as manufacturers. Interestingly, around 2007, WEG considered becoming a CoPS integrator, but discarded that idea (Ghoshal and Tanure 2004) while Embraco is currently seeking a new role, as developer, in its GPN.

7. Conclusions

The aim of this paper is to study how emerging country multinationals are developing their international operations networks and whether that would bring contributions for the IOM field.

To achieve that goal, a specific analytical framework was prepared because IOM studies on emerging country multinationals require an integrated approach looking at three different levels of the organisation. The framework here developed according to the guidelines prescribed by Whetten (1989) may be seen as a contribution to the field. It is integrative and comprehensive, underscoring and describing the complexities an MNE has to deal with. Providing the researcher with the most important elements, it enables the researcher to focus on one or more specific levels to conduct a study, without disregarding the connection and mutual influence with the remaining levels.

The insights brought about with the use of that framework applied to EMNEs relate to the influence of country-of-origin and GPN effects. In principle, every country has its own set of country-of-origin idiosyncrasies influencing internationalisation, what is valid for MNEs in general. The point is that it is necessary to pinpoint what is specific in a country and avoid stereotyped models. The specific characteristics of the local environment, such as factors endowment,

culture and governmental policies, influence the shaping of international operations networks indirectly through generic strategy and directly by the geographic dispersion criteria and governance modes. Therefore, the design and implementation of international operations networks must consider the effects generated by the country of origin, although they may change with time and have less influence as the EMNE becomes more internationalised.

The challenges associated with positioning and upgrading in GPNs also influence strategy and design of international networks. This outcome, identified through the studies of Brazilian EMNEs, could also be extended to DMNEs because not every DMNE is a GPN leader; for the cases of DMNEs which are not leaders, the same rationale applies. Moreover, the cases presented reveal a co-evolution between changes in strategy, associated with upgrading GPNs, and network configuration, the latter being a necessary supportive condition for such changes.

What other contributions does this study bring to theory development in the IOM field? The first one embraces the notion of stages development: the building of the international operations network is done in stages, as the firm gradually learns how to operate within the international context. Although the proposition of stages models may be criticised for not matching to each companies' trajectories (Galbraith 2000), it is paramount to recognise the existence of stages. The second insight concerns a circular relation between internationalisation strategy and international operations network development. It emerges from the analysis that once a strategy is implemented through the respective ION, it renders the company new capabilities which will be supportive of a new enhanced competitive strategy.

The above-mentioned outcomes, though interesting for the IOM field, cannot be generalised from the limited empirical evidences here presented. However, they point out to relevant streams of research. Perhaps the most promising is the revision of the IOM literature aiming at an enhanced understanding of how country-of-origin effects influence the design and implementation of developed country multinationals' international networks. For this, the proposed analytical framework would be a relevant tool, although its strengths and weaknesses had already been identified. It allows a fairly detailed description of the factors influencing the internationalisation of EMNEs, but the causal relationships between constructs are not clearly stated so far. Some, especially those hard to measure, have to be better explained. Furthermore, the analysis of the fit, or alignment, between the three levels of the framework may be the next challenge for this stream of research.

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