MNC technological upgrading in emerging regional areas: a case study on automotive subsidiaries in MERCOSUR

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Abstract: Technological upgrading dynamics in subsidiaries operating in emerging regions remains an under researched topic. This study aims to examine the role of headquarters and subsidiaries in the upgrading process of subsidiaries in regional agreements among emerging countries. It also examines how the multi-level normative frame regulating such agreements affects the accumulation of technological capabilities. A single case study has been designed to examine the process of upgrading of automotive subsidiaries operating in MERCOSUR, covering the period 1991 and 2012. Among the main findings, the study concludes that the decision to promote technological upgrading in subsidiaries in emerging regions remains at the level of headquarters during the early stages of the learning process. Only when subsidiaries go beyond a capability threshold, they are able to gain autonomy to make autonomous learning initiatives. Furthermore, it was found that the functionally-integrated network organised by the headquarters within the MERCOSUR region adopted a highly hierarchical structure lead by the Brazilian unit, which truncated the learning process of the Argentinean subsidiary. The intra-firm hierarchies were accentuated by the characteristics of the MERCOSUR normative framework that did not included provisions to counterbalance growing asymmetries within the region.

Keywords: multinational companies; subsidiaries; technological capabilities; MERCOSUR; innovation; technological learning; subsidiary development.

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1 Introduction

In the last four decades, multinational corporations (MNCs) have undergone a profound restructuring of their intra-corporate division of labour. Traditionally characterised for being highly centralised and hierarchical organisations, in which knowledge-intensive activities were concentrated in the home-country headquarters (Hymer, 1971, 1979; Vernon, 1966), MNCs have progressively evolved into differentiated networks with flatter organisational structures (Hedlund, 1986; Bartlett and Ghoshal, 1989; Prahalad and Doz, 1987; White and Poynter, 1984; Jarillo and Martínez, 1990). Whereas subsidiaries had traditionally been shaped as 'miniature replica' (White and Poynter, 1984), with technological activities limited to the adaptation of foreign technology to domestic conditions, intra-corporate changes in MNCs opened opportunities for their technological upgrading.

The transformation occurring at the core of MNCs has motivated scholars to study the role of headquarters and subsidiaries in subsidiary evolution (for a literature review, see for instance, Kostova et al., 2016). Some streams of literature highlighted the growing autonomy and initiative of subsidiaries to advance their own initiatives and to carry out in-house capability-accumulation activities in close connection to external networks embedded in the territory where they operate (Castellani and Zanfei, 2006; Bartlett and Ghoshal, 1989; Cantwell and Iammarino, 2003; Cantwell, 2013; Reilly and Sharkey Scott, 2014; Birkinshaw, 1997; Birkinshaw and Lingblad, 2005; Beugelsdijk and Jindra, 2018). Others, even recognising the increasing autonomy of subsidiaries, stressed the power of tools which remain under the control of headquarters to regulate the distribution of competence-creating 'mandates' within the corporation and to restrain the autonomy of subsidiary (Chiesa, 1996; Papanastassiou and Pearce, 2009; Birkinshaw, 1996; Birkinshaw and Hood, 1998b; Collinson and Wang, 2012). However, the relationship between headquarters and subsidiary has a dynamic nature. It evolves over the time as MNCs introduce innovations in their business models, the organisation of the intra-firm value chain is rearranged and the relative power of headquarters and subsidiaries change (Reilly and Sharkey Scott, 2014).

The prolific literature in this field, however, has insufficiently examined two issues which are to be addressed in this paper. Firstly, most studies focus on the experience of subsidiaries operating in high-income economies, such as Canada, Scotland and Scandinavian countries. The determinants of technological upgrading in subsidiaries hosted in emerging economies have, with a few exemptions, received less attention from scholars (see for instance, Ariffin and Bell, 1999; Hobday and Rush, 2007; Balcet and Consoni, 2007; Lema et al., 2015). The issue is not trivial, since, to a large extent, the extant literature has shown that the ability of subsidiaries to undertake an upgrading path is highly dependent of the institutional setup and knowledge resources embedded in the host territory (Cantwell and Zhang, 2009; Castellani and Zanfei, 2006; Bartlett and Ghoshal, 1989) which would, in principle, limit the upgrading opportunities in emerging economies. Secondly, the prevailing analytical approach has primarily focused on the examination of subsidiaries operating within national and to a lesser extent, sub-national geographical spaces (Iammarino and McCann, 2013). However, empirical studies show that MNCs privilege the articulation of functionally integrated networks around regional areas, where they find a large enough scale to organise their value chain functions and deploy their business strategies (Rugman et al., 2011; Rugman and Verbeke, 2004;

Rugman and Oh, 2013). The importance of regions, however, is not constrained to the adoption of a regional value chain strategy but has also affected the intra-firm organisation, which assumed multi-layered hierarchical structures within regional areas (Ambos and Schlegelmilch, 2010). As a result, some subsidiaries were given the role of regional headquarters with managerial power over sister units in the same region. Differences in the degree of autonomy enjoyed by subsidiaries under this organisational structure are directly related to the different opportunities available to them to embrace a technological upgrading path (Lunnan and Zhao, 2014; Asakawa and Lehrer, 2003). In the case of MERCOSUR, Quadros and Queiroz (2001) and Obaya (2014) illustrated the growing asymmetries among subsidiaries in terms of their capabilities. However, these studies do not offer an explanation on the driving forces underpinning this process and the role of headquarters and subsidiaries in it.

This paper aims to bridge these two gaps in the literature with an in-depth case study analysing the role of headquarters and subsidiaries in the process of technological upgrading of automotive subsidiaries operating in Argentina and Brazil, in the frame of the Southern common market (MERCOSUR), a regional integration process formed by emerging economies. In particular, the study examines whether subsidiary autonomy from the headquarters is a requisite for capability accumulation or by contrast, it is the result of it.

The case of the automotive industry, in which MNCs have deployed business strategies which have given rise to 'regional automotive spaces' (Carrillo et al., 2004; Humphrey et al., 2000; Rugman and Collinson, 2004; Radosevic and Rozeik, 2005; Obaya, 2014) offers the opportunity to explore how the interplay between subsidiaries operating in a functionally integrated network within a supra-national space limits the possibility for individual subsidiaries to undertake an autonomous upgrading technological path.

The paper offers a dynamic multi-level analytical frame and provides micro-level evidence showing that the process of technological upgrading in subsidiaries is favoured by the growing autonomy in subsidiaries. However, it also highlights that the accumulation of capabilities and the infrastructure that allowed subsidiaries to follow such upgrading process is the result of decisions originally made by headquarters, which controls crucial dimensions of the structure of the corporation. Furthermore, the paper highlights that the multilayered organisation put in place within the regional area – crystallised into a highly hierarchical organisation in the product development area at regional level – resulting in a highly unbalanced process of technological upgrading between subsidiaries operating within MERCOSUR, favouring the accumulation of capabilities within the Brazilian unit and limiting the autonomy of the Argentinean subsidiary.

The paper is structured as follows. Section 2 discusses the different strands of literature dealing with the drivers of the technological upgrading processes and their determinants in MNC subsidiaries. The research design of the study follows in Section 3 and in Section 4, the findings of the case study are presented and analysed. The paper concludes with a discussion of the implications of the empirical findings and its contribution to the extant literature.

2 Subsidiary development in emerging regions: drivers of the process of technological upgrading

The review of different strands of literature dealing with the question of the technological upgrading of subsidiaries identifies two main groups of drivers: one originated within the corporation; and the other stemming outside the firm, principally created by the regulatory environment.

2.1 Intra-corporate drivers of subsidiary technological upgrading

In contrast to the traditional view of MNCs, prevailing in early theories, where knowledge is uni-directionally transferred from the headquarters to subsidiaries overseas (Hymer, 1971, 1979, 1960; Vernon, 1966; Dunning, 1958), modern views of MNCs have depicted it as a globally distributed knowledge network (Kogut and Zander, 1993; Hedlund, 1986) or 'differentiated inter-organisational network of value activities' (Ghoshal and Bartlett, 1990). In this process, subsidiaries progressively gain power to autonomously lead their own evolution and disrupt the then prevailing hierarchical intra-firm division of labour – which has been pointed as a potential source of competitive advantage for the corporation (Ghoshal and Bartlett, 1990; Birkinshaw and Hood, 1998a).

According to this latter view, the main source of autonomy for subsidiaries is the development of ownership-specific advantages acquired on the basis of their privileged access to location-bounded resources embedded in differentiated economic and institutional domains (Bartlett and Ghoshal, 1989; Cantwell and Iammarino, 2003; Castellani and Zanfei, 2006; Cantwell, 2013). Subsidiaries operating in resource-rich host environments are in a better position to undergo an autonomous 'creative transition' (Papanastassiou and Pearce, 1994) that allows them to accumulate their own technological capabilities, to gain authority within the corporation and to contribute to the global competitiveness of the organisation.

However, it has been shown that the ability of subsidiaries to undertake an autonomous process of technological upgrading does not only depend on external resources, but also on their own capabilities to recognise, absorb and combine different types of knowledge from a variety of sources – both internal and external to the firm (Cohen and Levinthal, 1990; Almeida and Phene, 2004). It also depends on the ability of subsidiary management to invest in augmenting the knowledge stock necessary to improve its absorptive capacity and to take its own initiatives (Birkinshaw, 1997).

Despite the growing autonomy gained by subsidiaries, their process of technological upgrading should not be understood as an uncontested and self-sustained process. The interests of headquarters and subsidiaries are not always aligned and therefore, the intention of the latter to autonomously carry out capability-augmenting activities can become a disputed intra-firm political process (Pedersen, 2006; Mudambi et al., 2014; Geppert and Dörrenbächer, 2011). The capacity of individual subsidiaries to drive a virtuous learning trajectory notably depends on how it interfaces with some dimensions of the corporate strategy which, to a large extent, are still under the control of headquarters (Gupta and Govindarajan, 1991; Asakawa and Aoki, 2016). The following three mechanisms are found to be particularly relevant:

1 the organisation of corporate R&D activities

2 the internationalisation strategy and the product policy

3 the procedure for the allocation of resources and mandates within the corporation.

2.1.1 Organisation of corporate R&D activities

A great deal of power retained by headquarters is largely based on its ability to control the structure and level of centralisation of knowledge creation, exploitation and experimentation activities within the firm (Chiesa, 1996). The circulation of corporate knowledge among sub-units is not freely available to subsidiaries, as it is limited by the tacit, relational and path-dependent nature of knowledge (Kogut and Zander, 1993; Szulanski, 1996). Furthermore, headquarters can regulate the access to corporate knowledge in order to maintain its relative power within the corporation (Szulanski, 1996).

In their study of the technological trajectory of a group of MNC subsidiaries operating in the electronics industry in Thailand, Hobday and Rush (2007) show that the level of centralisation of the technological strategy decided by headquarters was critical in determining the learning performance of the subsidiaries. The least advanced experiences of technological learning corresponded to subsidiaries operating in corporations with tightly centralised technological strategies, in which headquarters only transferred assembly technology to their units overseas. By contrast, the most virtuous learning experiences corresponded to cases where a more decentralised technological strategy in favour of subsidiaries was adopted. In the same vein, in their paper on the technological performance of subsidiaries operating in the electronics sector in Malaysia, Ariffin and Bell (1999) observed that the ability of subsidiaries to build up a basic knowledge-base fundamentally depended on the establishment of capability-building links controlled by the headquarters. It was only when subsidiaries had reached a minimum threshold of technological capabilities were they then able to adopt upgrading initiatives with a certain degree of autonomy.

2.1.2 Internationalisation strategy and product policy

The objectives and characteristics of the internationalisation strategy defined at the level of the headquarters are also an important factor in determining the scope for technological learning in subsidiaries (Birkinshaw and Hood, 1998b). Units operating in areas considered to be crucial for the strategy – for instance, for having access to a large consumption market or for being hosted in a centre of knowledge and technological excellence – are more likely to be endowed with resources and mandates to upgrade their capabilities (Chiesa, 1996).

In the automotive industry, the product policy adopted by the corporation has proved to be a crucial component of the internationalisation strategy and therefore, an important factor determining the technological mandate of subsidiaries. Carmakers aiming to expand its presence in developing regions have setup R&D facilities in selected emerging locations. This has been the case, for instance, of Renault and its R&D centre in Romania for the development of the Logan project (Jullien et al., 2012), Toyota and its centre in Thailand for the IMV project (Ichijo and Kohlbacher, 2007) and General Motors in Brazil with the Meriva project (Consoni and Quadros, 2006). Some of them originally

participated in some specific tasks in the vehicle development process and then evolved into fully-fledged development centres.

2.1.3 The corporate procedures for the allocation of resources and mandates

The ability of subsidiaries to develop initiatives leading to a technological upgrading pathway is highly conditioned by the procedures put in force by headquarters for the allocation of resources and mandates within the corporation (Dellestrand and Kappen, 2011). While in some cases, the decision on the beneficiary subsidiary is made by headquarters in a unilateral manner, in others, subsidiaries need to 'convince' headquarters while also having to compete with 'fellow' subsidiaries across the same MNC network (Geppert and Dörrenbächer, 2011; Dörrenbächer and Gammelgaard, 2006). The methods used to carry out this function range from open request-for-proposal procedures, in which subsidiaries have to compete for new mandates, to more managed competition processes (Birkinshaw and Hood, 1998b). Subsidiaries showing a better track record and credibility and having accumulated a higher level of capabilities are always in a better position to be given the benefit of more complex responsibilities being delegated to them (Birkinshaw and Hood, 1998b; Dicken and Malmberg, 2001). This opens up a process of competition among the MNC sub-units which "manifests itself in terms of social and political processes, such as lobbying, negotiating and initiative taking, that help to shape a unit's charter" [Birkinshaw and Lingblad, (2005), p.675].

2.2 Regional integration: a multi-level regulatory framework shaping upgrading in emerging regions

The strategic behaviour of MNCs – either driven by headquarters or subsidiaries – is shaped in close interaction with players operating beyond the limits of the firm. In this regard, it is particularly relevant the role of state agents, who are in the main responsible for setting up the multi-level regulatory framework within which firms deploy their business strategies (Ietto-Gillies, 2012).

State agents endeavour to capture as much as possible of the value created within the boundaries of their territories. With this purpose, they put in place policies and regulations aiming to 'embed' the activity of transnational agents in their domains – i.e., to multiply the direct and indirect spillovers generated by their activity, including the establishment of knowledge-intensive linkages with local agents (Liu and Dicken, 2006). The policy tools available to the government to achieve the embeddedness of subsidiaries include, among others, local content requirements, tariffs, subsidies and international agreements (including integration agreements). Largely drawing on the experience of East Asian countries, economic geographers advanced the concept of 'strategic coupling' to describe the efforts of host-country institutions to achieve an active technological behaviour of MNCs operating in local territories (Yang, 2009; Yeung, 2009; Yang et al., 2009; Coe and Yeung, 2015).

Although nation states maintain a central position in the configuration of regulatory frameworks and have consequently been the main focus of analysis by scholars (Iammarino and McCann, 2013), empirical studies show that MNCs privilege the articulation of functional networks around regional areas, where they find a large enough scale to organise their value chain functions and deploy their business strategies (Rugman et al., 2011; Rugman and Verbeke, 2004; Rugman and Oh, 2013). Accordingly, the

analysis of MNCs' strategic behaviour within multi-level regulatory settings is more suitable in understanding the technological performance of individual subsidiaries.

De jure regional integration initiatives, such as the European Union, the Association of Southeast Asian Nations (ASEAN) or MERCOSUR can be understood as collective strategic coupling initiatives to favour the embeddedness of subsidiaries in a regional space. The coordination of public initiatives by a group of neighbouring countries essentially seeks to strengthen their relative power in relation to global firms, as they provide state agents with control over assets which prove to be strategic for the sustainability of corporate business strategies – for instance, the access to a large regional market. At the same time, however, collective action among states is not without tensions. In the absence of adequate institutional mechanisms, there are incentives for individual member states of the integration process to take independent actions to achieve a deeper embeddedness of the MNCs subsidiaries into their domain.

The vast majority of papers addressing the question of subsidiary development in regional areas deal with the case of the European Union (see for instance, Cantwell and Iammarino, 2000; Benito et al., 2003; Filippov and Duysters, 2011, 2014; McDonald et al., 2011, Teresa Tavares and Young, 2006; Dörrenbächer and Gammelgaard, 2006). However, the possibilities of generalising the conclusions from these studies to emerging regions are rather limited. From an institutional perspective, the European Union is a full-fledged common market, with extremely low barriers to factor mobility. Additionally, most member countries – including the majority of Central and Eastern European nations – have higher technological capabilities compared to emerging regions. Last, but not least, Europe is the home region of a large number of the MNCs – notably in the case of the automotive industry – which has implications in regards to the geographical localisation of technology-intensive functions within the global value chain.

By contrast, regional integration processes among emerging economies – such as that of MERCOSUR – have regulatory frameworks with high barriers to the mobility of goods, services and factors of production. Additionally, they generally lack a regional competition policy, regulating the scope for national incentives offered to economic players. These features have considerable effects on the strategic behaviour of MNCs with subsidiaries in the various different countries, as the largest member countries have more resources to pursue policy measures to support the technological upgrading of subsidiaries hosted in their territories.

3 Research design

3.1 Research questions and frame of analysis

In light of the review of the literature and the objectives proposed above, this paper analyses the drivers of the process of technological upgrading of the subsidiaries of an automotive MNC – AutoCompany[1] – with manufacturing operations in Argentina and Brazil, within the MERCOSUR region.[2] In order to respond to the complexity of the phenomenon under analysis, characterised by the extremely intricate and dynamic ways in which multi-level institutional structures and actor networks are interconnected, a case study research has been designed (Yin, 2009). Case studies allow for a rich description of facts and processes that cannot be adequately grasped by purely quantitative studies (Yin, 2009; Patton, 2015). This methodological choice is in line with research methods

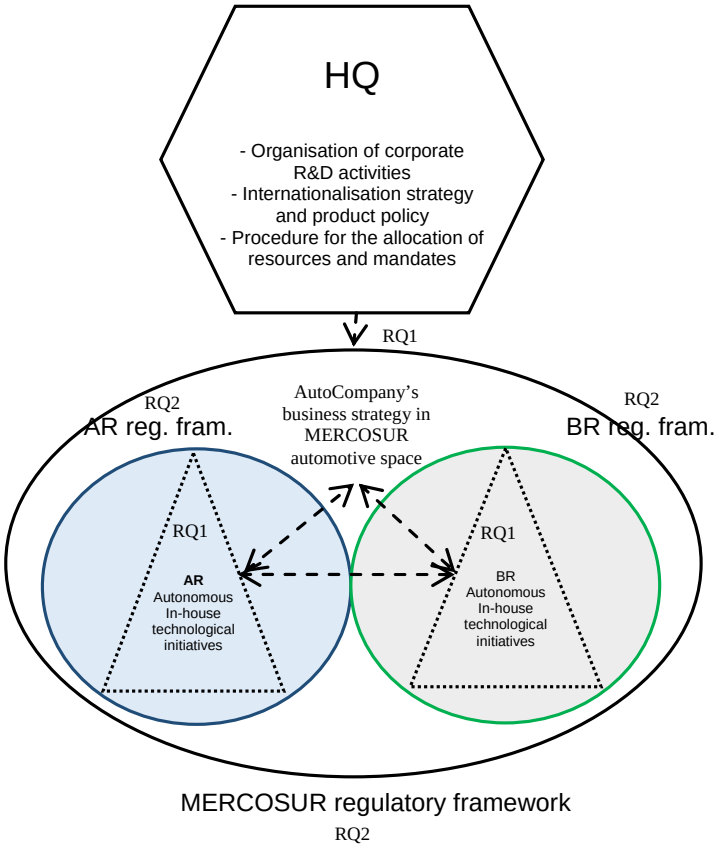
utilised in studies on technological learning processes both in MNCs subsidiaries and 'uni-national' firms operating in emerging economies (see for instance, Ariffin and Bell, 1999; Ariffin and Figueiredo, 2006; Figueiredo and Brito, 2011; Dantas and Bell, 2011, 2009; Dutrénit, 2000).

The period under analysis extends over the years 1991, when MERCOSUR was launched and 2012, when subsidiaries in the region launched a vehicle completely developed by local subsidiaries. More specifically, the following two research question will be addressed:

RQ1 What were the roles of the headquarters and the subsidiaries of AutoCompany operating in Argentina and Brazil in the process of technological upgrading of the subsidiaries?

RQ2 How did the multi-level normative framework regulating the automotive industry in MERCOSUR affect the process of technological upgrading of the subsidiaries of AutoCompany in Argentina and Brazil?

Figure 1 Frame for the analysis of the drivers of subsidiary technological upgrading in regional areas (see online version for colours)



The frame of analysis, depicted in Figure 1, was elaborated based on the concepts discussed in the review above. In regards to RQ1, we will focus on the following dimensions of the headquarters' strategy affecting the upgrading process of AutoCompany in the MERCOSUR region:

1 the organisation of corporate R&D activities

2 the internationalisation strategy and product policy

3 the procedure for the allocation of resources and mandates.

At the level of subsidiary, we will explore the autonomous in-house initiatives adopted by those located in Argentina and Brazil which contributed to the process of technological upgrading. Moreover, we will seek to understand how the automotive multi-level regulatory framework affected the strategic behaviour of MNCs players. In particular, we will focus on two levels: the bi-lateral agreement between Argentina and Brazil regulating intra-regional exchange of vehicles; and the rules and incentives set at national level by domestic governments.

3.2 Sources of data

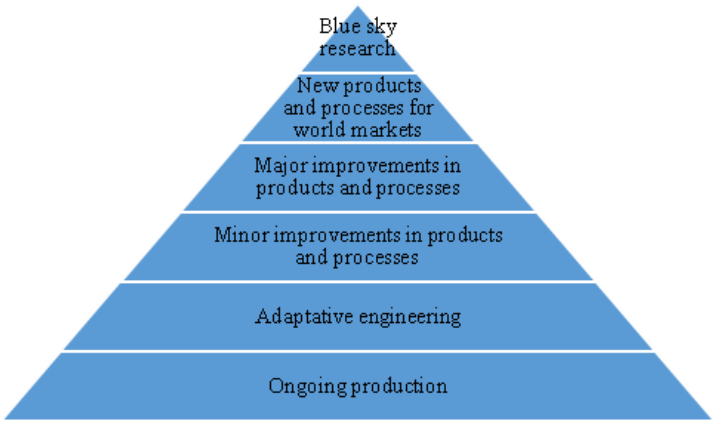
In order to ensure data triangulation, information was collected from multiple sources within and outside the examined firm (Yin, 2009). A total of 862 published newspapers and magazine articles were accessed using the emerging markets information service (EMIS) database. Twelve semi-structured interviews were conducted with managers of AutoCompany in Argentina and Brazil between July and December 2012 (Annex). Interviews aimed at obtaining the following information: the facts concerning the milestones in the process of upgrading in product engineering capabilities; the autonomous initiatives undertaken by the subsidiary; the specific delegation of responsibilities by the headquarters; the evolution of the global strategy of the corporation; the relations of subsidiaries with the headquarters and state agents. Regulatory data was gathered from official sources, including Infoleg (Argentina), LexML (Brazil), the Latin American Integration Association (LAIA) and the National Development Bank of Brazil (BNDES). Finally, nine interviews were conducted with scholars, consultants, government officials and executives of business associations in the two countries. These meetings enabled interviewees to provide their views on the emerging global business strategies and technological changes in the automotive industry, as well as on the political processes in the MERCOSUR region.

3.3 Data analysis

Data and information was compiled and codified according to the categories defined in the frame of analysis (Figure 1), using the qualitative data analysis software Nvivo. The analysis of data was carried out in two stages. Firstly, we framed the process of technological upgrading of the subsidiaries of AutoCompany in Argentina and Brazil between 1991 and 2012, in accordance with the operationalisation of the concept of technological capability described below. In a second stage, we identified the milestones of the upgrading process and analysed the corporate (RQ1) and regulatory (RQ2) drivers leading to each milestone, according to the frame depicted in Figure 1.

The operationalisation of the process of technological upgrading builds upon the technological capabilities framework (Bell and Pavitt, 1995; Katz, 1987; Lall, 1992). Developed to examine the process of technological learning in firms operating in emerging countries, this frame portrays the process of accumulation of capabilities as an ascendant path along which firms progressively acquire skills to introduce improvements and innovations of growing complexity in products and processes (for empirical studies based on this framework, see for instance, Ariffin and Figueiredo, 2006; Figueiredo, 2001, 2003; Dutrénit, 2000; Kim, 1997, Quadros and Consoni, 2009).[3] The technological capability framework provides a more nuanced analytical tool compared to dual taxonomies categorising subsidiaries in competence-exploiting or competence-creating units (Cantwell and Mudambi, 2005), which allows it to grasp a much wider range of innovative activities that are not normally described as R&D.

Figure 2 Scale of technological capabilities (see online version for colours)



Source: Own elaboration adapted from Hobday (1999)

Focusing in particular on 'product-centred' capabilities, we elaborated a technological capability scale (TCS) tailored to the specificities of the automotive industry (see Table 1), which is an adaptation of that elaborated by Balcet and Consoni (2007). The adaptation seeks to improve the capacity of grasping the particular characteristics of the process of technological upgrading of automotive subsidiaries in emerging regions by:

1 Incorporating completely-knocked down (CKD) assembly operations.

2 Differentiating the development of new platforms targeting developed countries from those primarily oriented towards emerging markets, since they use different types of technology.

3 Incorporating R&D activities for the development of new technologies as different from product development operations.

Table 1 Product engineering capabilities in automotive MNCs

1	CKD assembly operations:
	• Replication of fixed product specifications.
	• Standard quality controls.
2	Nationalisation:
	• Localisation of parts: search, evaluation, selection and contracting of local suppliers of parts and components. Technical support to local suppliers.
	• Minor changes in parts and/or components, for instance, in response to local availability of materials or regulations.
3	Adaptation/restyling/facelift:
	• Adaptations in parts/components to comply with domestic market features and conditions (e.g., suspension, engines).
	• Restyling/facelifts involving external body and minor adjustment in platforms.
4	Development of partial derivatives from existing platforms for regional/emerging markets:
	• Centre of excellence on certain systems/components for the whole corporation.
5	Complete derivative projects from existing platforms for regional/emerging markets.
6	New platform and family of vehicles for regional/emerging markets.
7	New platform and family of vehicles for world markets.
8	Consistent R&D activities for the development of new products, technology and/or materials using leading-edge technology (engine, driving, braking, suspension, body, electronics and materials).

Source: Adapted from Balcet and Consoni (2007)

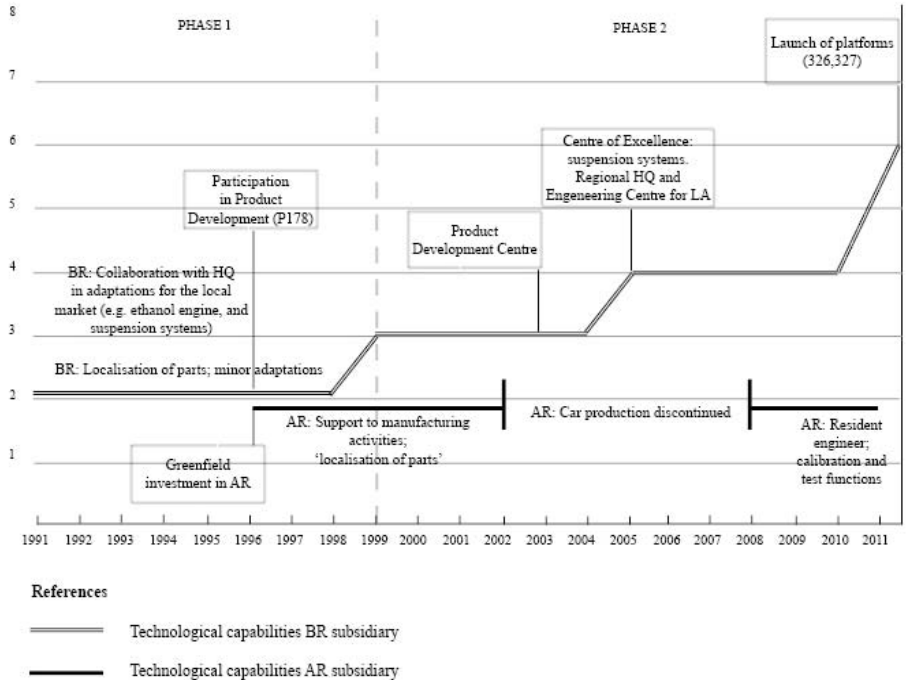
4 AutoCompany case study

4.1 Technological upgrading of AutoCompany's subsidiaries in MERCOSUR

Figure 3 depicts the process of technological upgrading of the subsidiaries of AutoCompany in Argentina and Brazil between 1991 and 2012, according to the TCS proposed in Table 1. The period under analysis can be divided in two phases: the first one corresponds to the period 1991–1998, being the implementation of the so-called Global Car Project (GCP) a major milestone; the second phase developed between 1999 and 2012, when the subsidiary showed autonomy to carry out in-house product development activities and a full-fledged vehicle development centre established in Brazil.

Figure 3 clearly illustrates that the process of technological capability accumulation of the two subsidiaries in the region followed a deeply divergent trajectory. Whereas the starting point was nearly the same, by 2012, the technological gap between the two units was very large. The analysis below seeks to identify the drivers of this dissimilar process of technological upgrading according to the frame of analysis (Figure 1).

Figure 3 Technological capability accumulation of subsidiaries of AutoCompany in Argentina and Brazil



Source: Own elaboration on the basis of fieldwork

4.2 Drivers of the technological upgrading of AutoCompany in MERCOSUR

4.2.1 Stage 1 (1991–1998) – the GCP: a learning platform for AutoCompany's subsidiary in Brazil

AutoCompany's internationalisation strategy: the conquer of an emerging regional market

A major milestone in the process of technological upgrading of the subsidiaries of AutoCompany in the MERCOSUR region was the launch of the so-called GCP in 1993. The implementation of the project responded to the intention of the company to redefine its internationalisation strategy underpinned by a new product policy targeting non-European emerging countries. The GCP envisaged the development of a family of low price vehicles, adapted to the preferences and purchasing power of consumers in 'emerging' markets, based on the same modular platform – i.e., non-visible structural and powertrain related components and systems.

The decision was motivated based on the high economic growth and motorisation rate prospects of a group of emerging regions undergoing deep economic and political reforms the main pull force for the GCP. As put by an AutoCompany's manager:

> "AutoCompany adopted a new strategy to penetrate into markets where demand will be higher in the next 20 or 30 years: East Asia, Latin America and Eastern Europe. For this, we need to keep growing, because it is the only way of guaranteeing a long-term future for the company." (Interview CA-BR2)

The redefinition of the multi-level normative framework regulating the automotive industry in the MERCOSUR region was a major factor attracting the interest of AutoCompany in the region. At the national level, the governments of Argentina and Brazil put in place domestic measures intended to boost the depressed demand levels for vehicles, creating incentives for carmakers to expand their production capacity (Comin, 1998; De Negri et al., 2008; López et al., 2008).

At a supra-national level, the automotive industry was initially excluded from the founding treaty which gave birth to MERCOSUR in 1991. However, the political decision of creating a regional market was a major driver for AutoCompany to create a manufacturing regional hub to seize the opportunities offered by a large regional market in rapid expansion. In 1991, a scheme of bilateral export quotas was established, whereas member countries remained free to adopt their own automotive policy. In 1995, the four member countries of MERCOSUR – not only Argentina and Brazil – signed an agreement in Ouro Preto which expressed their commitment to create a common normative framework to regulate the car industry at a regional level. Against this background, Argentina and Brazil reached a transition agreement to partially liberalise bilateral trade, as long as some compensation rules were met in order to avoid large trade imbalances.

Early intra-corporate hierarchies within MERCOSUR

In the frame of its new internationalisation strategy and product policy, AutoCompany's parent company selected the Brazilian subsidiary as a global co-leader of the GCP, which was expected to account for 40% of the total output forecasted for the project by 2001. The subsidiary was given by headquarters the role of 'technology scanner' (Chiesa, 1996). Until then, the track record of the Brazilian unit, established in the 1970s, was rather limited, as research and development functions were then completely centralised in the headquarters. Product development activities in Brazil had been limited to the provision of assistance to the corporate engineering department for the development of some specific adaptations for the domestic market (Interview PROD-BR).

The main role of the Brazilian subsidiary in the GCP was to provide major inputs for the development of the new family of vehicles based on its direct knowledge of the main targeted market. Although it did not result in an immediate rise in the technological capabilities of the subsidiary, as measured in Figure 3, it was a period of a relevant 'learning' experience for the Brazilian unit which would act as a stepping stone in its technological upgrading.

The leading role of Brazil at a global level was also replicated within the MERCOSUR region. In the context of the GCP, the Argentinean subsidiary was established through a green field investment with manufacturing operations. From the very beginning, the intra-firm division of labour between the Argentinean and Brazilian subsidiaries was hierarchical in nature. Most managers in Argentina reported to a regional manager responsible for the corresponding area who was located in Brazil. The Argentinean subsidiary did not have the autonomy to make strategic decisions

without the authorisation of the regional manager in Brazil (Interview CA-AR; Interview PROC-AR).

In the absence of a regional competition policy, state agents remained autonomous in adopting their own policy strategies. Against this background, the leading role of Brazil was reinforced by the more active policy initiatives: the industry benefited by subsidised credit mainly offered through the Brazilian National Development Bank (BNDES, for its Brazilian acronym), the establishment of benefits for companies investing in less advanced regions and generous promotional schemes set by sub-national states – in this latter case, giving rise to the so-called fiscal wars between Brazilian states (Rodríguez-Pose and Arbix, 2001).

4.2.2 Phase 2 – the 'tropicalisation' of AutoCompany

At the origin of a divergent technological trajectory within the MERCOSUR region

This phase was characterised by a dynamic technological upgrading of AutoCompany in the MERCOSUR region. However, this process was almost exclusively concentrated in the Brazilian territory, which led to a widening of the technological divergence between subsidiaries in the MERCOSUR region. The drivers of this development combined both headquarters decisions and subsidiary autonomous initiatives, whereas the characteristics of the regulatory framework contributed to reinforce the asymmetries.

The Brazilian unit was given by headquarters mandates of increasing complexity and endowed with the resources necessary to meet them. Initially, headquarters delegated to the subsidiary responsibility for some specific tasks in the development of 'facelifts' for the family of models of the GPC, the first of which was introduced on the market in 2001 (Interview PROD-BR). Progressively, the mandates assigned to the subsidiary expanded, until it reached the point of the development of two new vehicle platforms which replaced the models of the GPC.

It is interesting to note that, concurrently with the delegation of functions decided at the level of headquarters, during this period, the Brazilian subsidiary carried out autonomous in-house initiatives resulting in a process of technological upgrading. These initiatives were possible as a result of the learning experienced acquired in the GCP and the expansion staff numbers in the development department from 200, in 1996, to 350, in 1999.

In 1999, the Brazilian subsidiary launched into the market a derivative model which gave an off-road style to some models of the GCP family of products. Drawing on data collected from surveys and the observation of trends in consumer behaviour, strategists from local marketing and product development departments identified a growing preference among Brazilian consumers for off-road four-wheel drive automobiles. Until then, that niche had been satisfied by imported vehicles. From a technical perspective, the development of the new vehicle required some structural modifications to the original product which were almost completely developed by the Brazilian subsidiary. The project was developed almost 'clandestinely', since leaders of the GCP in the headquarters were against it, for considering the vehicle to be 'too Brazilian' and 'quasi-folkloric' (Interview PROD2-BR). The model, however, was very well received by the market, virtually creating a new niche in the MERCOSUR market which led other carmakers in the region to develop vehicles with similar characteristics.

With this project, strategists of the Brazilian subsidiary demonstrated very good knowledge of the market environment and a great capacity to grasp the potentiality of the product. Furthermore, the local engineering team showed capabilities to assume responsibilities in the design of parts and components (level 3 of TCS). It was also a demonstration for the parent company of the fact that the proximity to the market was important and that it was difficult to develop products from the distant headquarters in Europe (Interview IC-PROD2).

In contrast to the experience of the Brazilian subsidiary, the decisions made by the headquarters involved a progressive downsizing of the Argentinean unit opened a few years earlier. The manufacturing operations of the latter were discontinued between 2002 and 2008 and the regional market was served from Brazil. AutoCompany justified its decision arguing that the normative framework regulating the trade of vehicles between the two countries was harmful for the firm. In 2000, Argentina and Brazil had failed to reach an agreement on the creation of the common automotive market as originally accorded. In June, a protocol was signed whose spirit has governed the MERCOSUR automotive space until today. The scheme basically set a common external tariff and an 'export deviation coefficient' ('flex' index) establishing the margins between which vehicles and auto parts could be freely exchanged between the two countries. In essence, 'flex' index set a ratio between the value of automotive exports and imports that could not be exceeded by any of the signing countries. Originally, it was set at a tight value of 1.105, with the objective to constrain large trade imbalances. Although the level of the flex index was set at national level, once trade flows went beyond it, the governments could apply a fine on the individual firms in infraction. In the context of a significant demand contraction in Argentina since 2000, the Brazilian Government threatened to fine AutoCompany as imports from the Argentinean subsidiary infringed the limits of the flex rule. As a result, the production in Argentina was discontinued.

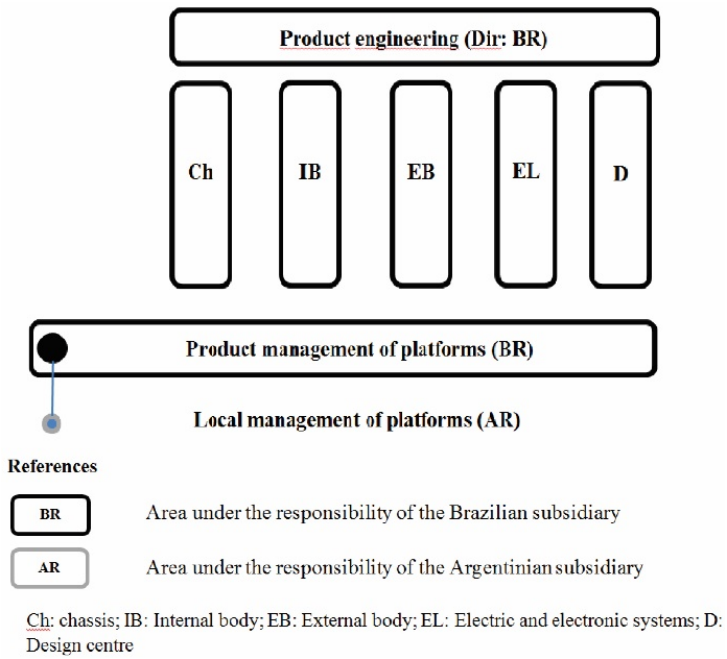
The consolidation of a development hub in Brazil and the crystallisation of intra-regional technological divergence

In 2003, the headquarters of AutoCompany decided to start the construction of a full-fledged product development centre in the Brazilian subsidiary. The ultimate objective of the centre was to be able to develop a '100% Brazilian vehicle' (Interview PROD-BR) targeting the South American and other emerging markets. It was estimated that this would contribute to a reduction of development costs by around 20%, whereas development time would be cut down by around 10%–20%. The decentralisation of the development process, as it was argued by one of the managers, "would avoid project-delaying bottlenecks occurring in the headquarters' engineering department" (Interview PROD2-BR). Although the centre was conceived by the company as a 'regional' development centre, it was located in Brazil and fully integrated into the structure of the Brazilian subsidiary. Its organisational structure (Figure 4) crystallised the hierarchical division of labour with the Argentinean unit, which remained as a local antenna with local management responsibilities over the models produced in the country.

Around 2008, the Brazilian subsidiary started to develop two new platforms (GCP2 and GCP3), which finally resulted in the launch of a new family of vehicles into the Latin American market in 2012 (level 6 TCS in Figure 1). The subsidiary had great autonomy to work on these projects and received limited technical support from the parent company (Interview PROD-BR). Only a few activities were performed in the

premises of the headquarters – for instance, aerodynamic, electromagnetic and safety tests. The reason for the retention of activities in Europe, however, did not lie in the lack of capabilities of the Brazilian subsidiary, but in the high investment costs the construction of the labs would have entailed.

Figure 4 Structure of the MERCOSUR product development centre (see online version for colours)



Source: Own elaboration on the basis of fieldwork

In 2005, the Brazilian subsidiary was formally appointed as a regional engineering headquarters for the South American region, assuming responsibility for the product adaptation and development required by the various domestic markets in the region (Interview CA-BR). Around the same year, the subsidiary became a corporate centre of excellence in the area of suspension systems, thus becoming a 'contributor' to the corporation. Since then, the subsidiary has assumed an active role in the development suspension systems, even in models not commercialised in the country (level 4 in TCS in Figure 1). As a result of this process, in 2011, the development centre in Brazil reached a staff of around 1,000 employees.

As for the Argentinean subsidiary, the production of vehicles resumed in 2008. Although the domestic market had grown steadily since 2003, the decision was only made once the production capacity of the Brazilian subsidiary was not able to cope with the increasing demand of vehicles in the whole region (Interview PROD-AR). A small 'antenna' of the product development centre was opened in Argentina with a total staff of 18 people. In 2010, figure of 'resident engineer' was created with the objective of reducing the burden of workload on the Brazilian subsidiary in some fields that

specifically concerned the Argentinean market – for instance, calibration of engines and validations tests.

The process of technological divergence between the two countries was reinforced by the widening asymmetries in industry promotion policies between the two countries. In Brazil, the federal government stimulated the expansion and modernisation of the industry by enlarging the amount of subsidised credit available for firms, in particular through the BNDES (Barros and Pedro, 2012). In particular, since 2007, the BNDES set the promotion of innovation activities as one of its priorities. Between 2005 and 2011, the Brazilian subsidiary of AutoCompany was granted seven loans funded with a total of BRL 2.7 bn (equivalent to approximately USD 1.6 bn) by the BNDES, a large amount of the funding being applied to product development projects. Argentina, by contrast, lacked a consistent public policy funding model for companies investing in the country. The only exception was, in 2010, when the government created the so-called 'bicentennial credits', a temporary subsidised loan facility to fund investment projects. In 2012, the Argentinean subsidiary of AutoCompany took a loan of ARS 565 mn (equivalent to approximately USD 128 mn) to fund an investment of ARS 813 mn (USD 184 mn) to produce the new version of the GCP in the country.

5 Discussions

The evidence presented in this paper follows the vein of the literature on MNC subsidiary development, showing that subsidiaries in emerging territories have increased their ability to accumulate capabilities to perform product development activities and reach advanced levels of technological development (Ariffin and Bell, 1999; Beugelsdijk and Jindra, 2018; Hobday and Rush, 2007; Marin and Bell, 2010; Marín and Costa, 2013; Qi et al., 2014; Figueiredo, 2013). However, the empirical findings contribute to the understanding of the process of upgrading, clearly showing that autonomous initiatives in subsidiaries were only possible once a minimum level of capabilities and infrastructure had been transferred from the headquarters.

Table 2 identifies the main drivers of the process of technological upgrading of the subsidiaries in Argentina and Brazil over the period 1991–2012, according to the dimensions proposed in Figure 1.

In reference to the RQ1, the study reveals that the driving agents motorising the process of technological upgrading changed over the years. As it can be seen, during the first phase (1991–1998), the subsidiary in Brazil experienced an intense learning process as a result of mandates unilaterally assigned by the headquarters. The main reason for delegating some product development functions to the subsidiary was the decision of advancing the new internationalisation strategy based on a product policy targeting the preferences of consumers of these countries. Subsidiaries played no role in this process, as the headquarters did not open competition to allocate this new mandate. The decision was unilaterally made based on the close relation the Brazilian subsidiary had with the targeted consumers, as it was considered that this would position it as a more effective technology scanner (Chiesa, 1996). In our case study, the lack of autonomous in-house initiatives during this period is not explained by formal constrains imposed by the headquarters on the subsidiaries' autonomy, as suggested by Reilly and Sharkey Scott (2014). Rather, it is accounted for by the low level of technological capabilities and infrastructure in subsidiaries in MERCOSUR.

Table 2 Drivers of the process of subsidiary technological upgrading in the MERCOSUR region

	RQ1				*RQ2*		
	Headquarters			*Subsidiaries*	*Multi-level regulatory framework*		
Phases	*Organisation of corporate R&D activities*	*Internationalisation strategy and product policy*	*Procedure for the allocation of resources and mandates*	*Autonomous in-house technological initiatives*	*Regional*	*Domestic*	*Technological capabilities of subsidiaries*
Phase 1 (1991–1998)	Centralised. Specific tasks delegated to Brazilian subsidiary	**Expansion in emerging markets with specific product policy**	Direct allocation by headquarters	Low	**Expectations for the creation of a common market** Limited trade liberalisation Non regional competition policy	More active support measures adopted in Brazil	TC level 2. However, BR unit experience learning experience under GCP
Phase 2 (1999–2012)	**Decentralised. Hierarchical organisation under the direction of Brazil within the MERCOSUR region**	Expansion in emerging markets with specific product policy	Direct allocation by headquarters and proposals by subsidiaries	**High in Brazil** Low in Argentina	Trade liberalisation within 'flex' boundaries Non regional competition policy	Growing policy asymmetries. Brazil adopts a much more active support to innovation activities	Growing technological divergence within MERCOSUR BR: TC level 6 AR: TC level 2

Later on, in the second phase, drawing upon the acquired capabilities in the GCP, the Brazilian subsidiary progressively gained autonomy and assumed an active technological strategy. Without the accumulated capabilities, as highlighted by interviewed managers, the Brazilian subsidiary would have lacked the resources to undertake autonomous initiatives – and even to 'challenge' headquarters to develop the off-road derivative of the GCP family, in 1999. These findings support Ambos et al. (2011), who argued that subsidiary autonomy may be facilitated by high levels of intra-firm embeddeness and control in the past (in this case under the GCP), which contribute to build trust with headquarters.

These findings are along the same vein as studies, for instance, by Ariffin and Bell (1999), Dörrenbächer and Gammelgaard (2006) and Dellestrand and Kappen (2011), who found the decision of headquarters is decisive in the evolution and growing autonomy of subsidiaries, in particular through the transfer of knowledge resources in the initial stages of their development. In our study, the first signs of autonomy became apparent with the development of the off-road models by the Brazilian subsidiary decided by local managers. Until then, the capacity of the Brazilian subsidiary to upgrade their technological capabilities remained largely based upon knowledge resources and R&D infrastructure controlled by the headquarters (Chiesa, 1996). The full expression of subsidiary autonomy was only possible when headquarters decided to change its corporate R&D structure and to build a full-fledged development centre in Brazil.

In regards to the intra-regional dynamics of the process of technological upgrading, the paper shows that headquarters played a crucial role, during the early years of the configuration of the business strategy in MERCOSUR, in laying the foundations for a multi-layered division of labour of a hierarchical nature between the Brazilian and the Argentinean subsidiaries and correspondingly, to a divergent process of technological learning. Notably, this included the selection of the Brazilian subsidiary as a co-leader of the GCP, in 1993; and the construction of the product development centre in Brazil, in 2003. As a result, the Argentinean subsidiary was never able to build the minimum level of capabilities necessary to undertake autonomous technological learning initiatives. This is an important contribution of the paper, which supports the contention of Rugman et al. (2011) who reflected on the asymmetrical impact of regional integration on subsidiaries' value chain activities. According to the authors, as MNCs advance in the creation of regional production networks they rationalise their activities in order to avoid an unnecessary dispersion of resources across countries within the same region.

In regards to RQ2, the role of state agents in boosting technological upgrading was limited. However, this had a significant influence in shaping a hierarchical geography that reinforced the intra-corporate hierarchies. In a region in which large structural asymmetries prevail – in particular, in terms of market size – national and sub-national policy asymmetries prevailing among the two countries contributed to augment incentives to agglomerate investment in the Brazilian territory (Baruj et al., 2008, Bouzas, 2008). Public policy in Brazil proved to be much more active in achieving a successful 'strategic coupling' (Yang, 2009; Yang et al., 2009; Yeung, 2009) and no agreement was found in this field to privilege coordination over individual actions of member countries. As opposed to the European Union, MERCOSUR did not put into place a regional competition policy to limit national incentives. Nor. did it establish well-endowed structural and cohesion funds aimed at narrowing the development disparities among member states – as the European Union did.

6 Conclusions

The importance of the issue of subsidiary technological upgrading in emerging regions goes beyond the study of MNCs themselves and has implications for policy-making. As flagships of global production networks, intra-firm MNC dynamics have profound effects on the geographical distribution of capabilities underpinning the growth potential of national economies (Ernst, 2002; Henderson et al., 2002; Gereffi, 2005; Coe et al., 2008; Coe and Yeung, 2015). The case analysed in the article shows, on the one hand, the opportunities the process of decentralisation within MNCs opened for technological upgrading in peripheral regions. Partly as a consequence of this process, which was hardly conceivable before the 1990s, some nations in these regions became commonly known as 'emerging countries'. However, on the hand, the empirical evidence shed light on the asymmetric process of accumulation of capabilities among participating countries of emerging regions. This question, which remains largely under researched in the literature, has deep consequences on the development perspectives of these countries. As MNCs play a dominant role in technologically dynamic sectors, the geographical agglomeration of virtuous capability-accumulation processes may result in a divergent growth path among the member countries and consequently, in the articulation of a centre-periphery division of labour within emerging regions. Against this backdrop, policy tools need to be developed aimed at moderating the imbalances in production networks within regions. In this sense, the strengthening of national innovation systems is crucial to empower local subsidiaries to undertake a more autonomous upgrading process, whereas the coordination of such systems at the supranational level would allow it to occur in a more balanced manner.

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Notes

1 Written authorisation was provided by the company and interviewed managers to report the findings of the research project. In order to comply with research ethics standards of Monash University, the institution that funded the research project, the company will not be identified by its name.

2 As the analysis is focused on capabilities related to manufacturing activities, we will limit the study to the case of subsidiaries with manufacturing facilities in the region, which are located in Argentina and Brazil.

3 The technological capability literature mostly works with a concept of 'revealed capability' that could be equalled to that of 'charter' used by Birkinshaw and Hood (1998b, p.782) – "the business – or elements of the business – in which the subsidiary participates and for which it is recognized to have responsibility within the MNC." This means that capabilities are not measured based on the knowledge possessed by organisations or individuals, but they are inferred from the actual performance of the firm.

Annex

Table A1 Interviews

Code	*Area*	*Subsidiary*
CA-AR	Corporate affairs	Argentina
PR-AR	Procurement	Argentina
PROC-AR	Process engineering	Argentina
PROD-AR	Product engineering	Argentina
CA-BR	Corporate affairs	Brazil
CA-BR2	Corporate affairs	Brazil
PR-BR	Procurement	Brazil
PROC2-BR	Process engineering	Brazil
PROC-BR	Process engineering	Brazil
PROD-BR1	Product engineering	Brazil
PROD-BR2	Product engineering	Brazil
PROD-BR3	Product engineering	Brazil
AE1-AR	University of Quilmes	Argentina
AE2-AR	Abeceb – consulting firm	Argentina
BA1-AR	Auto-Parts Association (AFAC)	Argentina
BA2-AR	Auto-Parts Association (AFAC)	Argentina
BA3-AR	Automotive Engineers and Technicians Association (AITA)	Argentina
BA4-AR	Automotive Manufacturers Association (ADEFA)	Argentina
AE1-BR	Centro Universitário da FEI	Brazil
BA1-BR	Automotive Engineers and Technicians Association (SAE)	Brazil
BA2-BR	Automotive Manufacturers Association (ANFAVEA)	Brazil