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Authors:	Fiona Maureen Courtens, Elvira Haezendonck, Alain Verbeke
Journal:	Competitiveness Review
Manuscript ID:	ID CR-10-2023-0243.R1
Manuscript Type:	Conceptual Research Paper
Keywords:	location advantage, firm-specific advantage, subsidiary-specific advantage, manufacturing, country-specific advantage
DOI:	10.1108/CR-10-2023-0243
Volume:	34
Issue N°:	2
Accepted for publication date:	4 January 2024
Accepted for publication:	19 February 2024
Issue publication date:	11 March 2024

Courtens, F.M., Haezendonck, E. and Verbeke, A. (2024), "The decay of location advantages and the substitutive role of firm-specific advantages in technology-based manufacturing", *Competitiveness Review*, Vol. 34 No. 2, pp. 468-487. https://doi.org/10.1108/CR-10-2023-0243

The decay of location advantages and the substitutive role of firm-specific advantages in technology-based manufacturing

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Abstract

Purpose — This research aims to provide a new perspective on the evolving linkages between LAs and FSAs in the context of the technology-based manufacturing industry. Firm-level competitive strengths in an international context build upon the combination of (largely) exogenous location advantages (LAs) and endogenous firm-specific advantages (FSAs). The authors focus especially on the decay of LAs over time, which has been observed in many highly developed countries during the past decades. The authors show how the strengthening of FSAs can substitute for decaying LAs, thereby safeguarding against the demise of entire industrial regions.

Design/methodology/approach — We examine the technology-based manufacturing industry in Belgium, building upon an analysis of survey responses by 66 firms including a subgroup of 26 multinational enterprise (MNE) subsidiaries. The professional association representing this industry in Belgium (Agoria) viewed the firms included in the survey as

representative for Belgian technology-based manufacturing in terms of the LAs they presently build upon (or location disadvantages they face) and the internal strengths they command relative to (foreign) rivals. Our investigation uncovered the decay of critical LAs in Belgium and in parallel, the rise of 'compensating' FSAs of Belgian operations relative to foreign firms, including especially MNE sister subsidiaries in other countries. We also conducted 23 in-depth interviews with senior level managers (CEOs and senior vice presidents) of technology-based firms, including 10 subsidiaries of foreign-owned MNEs, that validated our analysis of the interplay between LAs and FSAs.

Findings — Our findings reveal that since inception, Belgian manufacturing operations experienced an overall decay in their critical LAs by 23% on average. Despite this, several Belgian subsidiaries of foreign MNEs consider themselves as commanding a resource-base superior to that of the *next-best-in-class* subsidiaries. Furthermore, when assessing the dynamic interplay between LAs and FSAs, there is some evidence that the decay of LAs fueled the quest for – and firm-level journey towards – stronger FSAs.

Originality — The originality of this study is the alternative perspective to the conventionally assumed 'positive-positive' relationship between LAs and FSAs. Prior management research has not examined the impact of decaying LAs on new FSA-creation in the realm of technology-based manufacturing.

Keywords: location advantage, firm-specific advantage, subsidiary-specific advantage, manufacturing, country-specific advantage

Paper type: Qualitative and explorative research paper

1 Introduction

Location advantages (LAs) are critical to attract multinational enterprise (MNE) activity, which in turn can further increase country-level competitiveness. In addition, the MNE activity itself will only be successful subject to the foreign entrant commanding firm-specific advantages (FSAs). The interaction between LAs and FSAs has been extensively researched, since the seminal work of Rugman (1986), itself building on older, classic work in international business, including Dunning (1958), Hymer (1976), Vernon (1966), etc. Despite the volume of past research on the subject, the linkages between LAs and FSAs remain a core topic of research in international business strategy (Akpinar, 2020; Buckley, 2017; Rugman, 2010).

Akpinar (2020) analyzed the interplay between LAs, FSAs, firm-level competitive strategies, and manufacturing location choices. Akpinar (2020) found that Belgium could be considered a disadvantaged location for the manufacturing industry as it does not benefit from conditions leading to cost or differentiation advantages, given its high labor cost and lower innovation index as compared to other countries. Nevertheless, there is a sizable technology-based manufacturing industry presence in Belgium with a strong export performance, which means that both home-grown firms and foreign MNEs did select and subsequently maintained this location over other countries to conduct manufacturing operations (Akpinar, 2020; Buckley, 2017; Rugman, 2010).

As Belgian LAs have decayed (which we show in detail in the next sections), there is substantial evidence of MNE subsidiaries exiting from Belgium and relocating to other jurisdictions over the course of several decades, meaning that the combined strength of their FSAs and any LAs of Belgium were insufficient to remain in this country with at least some value chain activities,

a situation also observed in several other European countries (Gokh & Filippaios, 2021). Furthermore, many Belgian firms have repositioned some activities to other countries, to secure survival in the face of decaying LAs (Coucke & Sleuwaegen, 2008). This is again a phenomenon observed throughout the European Union (EU). The share of the EU in global manufacturing is perceived to have declined more significantly than is the case for the US or Japan (Altomonte et al., 2020; Marschinski & Martínez-Turégano, 2020).

Furthermore, many subsidiaries of Belgian and foreign MNEs within the EU appear to be *footloose*, in the sense that their capabilities have been commodified and are similar to those found in other subsidiaries (cf. Rugman, Verbeke & Yuan, 2011). These sister subsidiaries might be located in larger markets for the firm's outputs or in markets with more favorable production costs (after correcting for productivity differentials) (Ellram et al., 2013). Examples include Spain, the Czech Republic, and Slovakia. The integration of value chains and output markets within the EU has further strengthened this pattern of relocations (e.g., Jacobs, 2019). On the other hand, recent evidence also shows that Belgian-based firms remain (highly) competitive in a rather diverse set of manufacturing industries (Agoria, 2021).

We conducted an empirical study of the Belgian technology-based manufacturing industry in 2021, to determine whether a decay in critical LAs of Belgium actually took place, and if so, how this decay co-evolved with FSAs of the manufacturing companies that remained in Belgium.

The remainder of the paper is structured as follows. In section 2, we discuss our conceptual framework, representing an extension of Porter's work on location. In section 3, we describe the research methodology. In section 4, we report our empirical findings. Section 5 concludes.

2 Conceptual framework

2.1 Location advantages and their interaction with firm-specific advantages

Location advantages (LAs) matter much to firm-level competitiveness (Casson,1982; Porter, 1990). Country-specific advantages (CSAs), meaning LAs characterizing a country, can be critical to domestic firms' international competitiveness and to foreign firms establishing operations in that jurisdiction (Rugman & Verbeke, 2001).

However, CSAs evolve over time. Macro- and meso-level dynamics can lead to a strengthening or weakening of CSAs relative to other countries. In the latter case, a significant decay could drive firms to exit a country (Burgelman, 1994; Dunne et al., 1988; Siegfried & Evans, 1994). However, FSAs – including subsidiary-specific advantages held by foreign MNE's subsidiaries in a country – may be sufficiently strong to act as a substitute for decaying LAs and can thereby function as exit barriers.

In the prior literature, the notions of CSAs and LAs are often used interchangeably and as synonyms (e.g. Buckley, 2017; Narula & Santangelo, 2012; Rugman, 1986; Rugman & Verbeke, 1992). But how they play out in practice often depends on the unit of analysis chosen, including, *inter alia,* the industry, the region, or the national level across industries (Narula & Santangelo, 2012). In the remainder of this paper, we will use the notion of LAs, even though the firms we studied were asked mainly about the evolution over time of LAs in Belgium. We should realize that when senior company managers are asked about LAs in a country, they may think first and foremost about the region or even municipality where they are located and obviously about how location affects their particular firm. We should also note that not all firms may capitalize on supposedly generically available LAs because of market

imperfections in terms of access to these LAs. Especially newly established foreign MNEs may be relative outsiders in terms of their ability to gain easy access to LAs (Akpinar, 2020; Buckley, 2017). Gaining access to the LAs of a foreign country typically requires the recombination of resources and capabilities, a process that can be challenging (Buckley, 2017; Verbeke & Lee, 2021). For instance, Uber encountered significant obstacles when trying to establish a presence in Belgium, *inter alia*, due to the country's taxi regulations mandating specific licenses (Schellevis, 2014; van Monsjou, 2021). Even when commanding unmatched digital assets, international expansion can be fraught with difficulties (Verbeke & Hutzschenreuter, 2021). Conversely, although country borders define the boundaries of a 'national diamond' in Porterian terms, some national boundaries may be largely irrelevant to firms' access to LAs. For instance, Belgian-based suppliers of the German automobile industry are closely integrated in the pan-European supplier networks of these German companies. More generally, firms may benefit from partaking in cross-border clusters and regional value chains (Brugman & Verbeke, 2018).

Firm-specific advantages have been categorized in various ways (Buckley, 2017; Rugman, 1986). A key question in this realm is whether FSAs are internationally transferable, deployable and amenable to profitable exploitation abroad (Verbeke & Lee, 2021). Location-bound FSAs (LB FSAs) are not transferable across business units in different locations, whilst non-location-bound FSAs (NLB FSAs) can be deployed across borders. To the extent that new FSAs are developed in foreign subsidiaries and are embedded within these subsidiaries, we can use the notion of subsidiary-specific advantages or SSAs (Rugman & Verbeke, 2001). SSAs are those advantages embedded within the subsidiary that cannot easily be redeployed within the MNE but that do have cross-border –and possibly global– exploitation potential. SSAs

reflect a subsidiary's resources superiority vis-à-vis sister affiliates. SSAs can lead a subsidiary to assume (or to be assigned by the MNE's head office) the status of 'strategic leader', or 'centre of excellence', or holder of a 'world or regional product mandate' (Rugman & Verbeke, 2001). In sum, CSAs and SSAs can be considered as subsets of LAs and FSAs respectively.

The interaction between LAs and FSAs has been investigated extensively, yet it remains an area that requires further exploration and scrutiny (Akpinar, 2020; Rugman & Verbeke, 2004). Some key points of scholarly debate have revolved around (a) the relationship between the presence of LAs as a foundation for generating FSAs (or SSAs) and vice versa, and (b) the extent to which LAs and FSAs should be considered complements versus substitutes. For instance, Porter's (2008) view is that the firm can use home country diamond characteristics (LAs) as a platform to build up its FSAs. A type of internalization or endogenization of LAs occurs, which then leads to FSA development.

In parallel, especially large firms or lead firms can deploy their FSAs to strengthen LAs, for instance in the context of creating clusters or regional value chains (Akpinar, 2020; Buckley, 2017; Lepori, 2022; Marinova et al., 2011; Narula & Santangelo, 2012; Porter, 2008; Porter et al., 2008; Rugman, 1986; Rugman, Verbeke & Nguyen, 2011; Rugman & Verbeke, 2001, 2004). In this regard, the LA-FSA interplay is important as it can create a form of lock-in for firms, and the better the performance of a subsidiary, the greater its embeddedness in a certain location (Brugman & Verbeke, 2018; Narula & Santangelo, 2012). Here, governments can attempt to complement and augment FSAs by improving the reservoir of LAs, but in most cases, bundles of LAs attractive to internationally operating firms are required, rather than isolated LAs (such as a one-off tax advantage or a subsidy) (Brugman & Verbeke, 2018; Lehmann & Lehmann, 2017).

What has not yet been studied is the case of MNEs establishing subsidiaries to benefit from a host environment's LAs, and then subsequently experiencing a gradual decay of these LAs while remaining in that country or region with major investments to create substitutive FSAs. Our working hypothesis, however, is precisely that the subsidiary may have created internal capabilities, including SSAs, to substitute for decaying LAs and to create a form of locational lock-in.

2.2 Importance of location advantages in manufacturing industry

The expansion of manufacturing MNEs and their location choices abroad has been the subject of a vast literature in international business, and the interaction between LAs and FSAs remains a particularly important topic of research in the field. Akpinar (2020) has suggested that the manufacturing industry provides a relevant context for analyzing the dynamics at hand. One of the key areas in present research is that of continued offshoring versus reshoring or friend-shoring of subsidiary activities. Many highly productive MNE subsidiaries, thus, become vulnerable to relocation to countries that are closer to large output markets or where a variety of other LAs can be compelling to consider (Marschinski & Martínez-Turégano, 2020). For instance, the exits from Belgium of firms such as General Motors in Antwerp (December 15th, 2010) and Ford in Genk (December 18th, 2014) were largely the result of the absence of SSAs, with the production plants viewed as '*spokes*', albeit highly productive ones, in these US-multinationals' value chains (Kamp & Matthyssens, 2006; Marschinski & Martínez-Turégano, 2020; Rugman & Verbeke, 2001; Verbeke & Yuan, 2020). LAs are thus important for both initial entry and subsequent exit and relocation decisions (Barbieri et al., 2018, 2019; Fratocchi et al., 2016; Sleuwaegen & Dehandschutter, 1990).

Belgian LAs for technology-based manufacturing firms have included the presence of abundant skilled labor, a well-developed transport infrastructure and logistics apparatus, and efficient communication systems. Subsectors such as high-tech products, the metal industry and the pharmaceutical sector, have all exhibited noteworthy levels of high productivity, contributing to sustained competitive advantage of Belgian operations vis-à-vis the rest of the world (Agoria, 2021; Meylemans & Dessers, 2021). Moreover, a recent analysis of productivity trends has shown a stabilization of exit rates in 2017, coinciding with a decline in new entries (Dumont, 2021). What this may imply is that firms presently still operating in Belgium have a preference to remain in place and are willing to make new investments to stay competitive in this location, but also that potential new entrants, supposedly contemplating a large number of alternative locations for their investments (especially within an EU context) ultimately do not select Belgium as their preferred location. As to global value chain participation, it has been observed that pressures for labor wage increases exert an adverse influence on Belgian operations (Marschinski & Martínez-Turégano, 2020). However, it is worth noting that higher wages, if combined with equivalent productivity increases, can also be beneficial to the manufacturing operations affected, and may be accompanied with innovation and differentiation advantages (Brugman & Verbeke, 2018; Lepori, 2022; Porter, 2008; Porter et al., 2008).

2.3 Approaches to appraising location advantages

Many conceptual frameworks exist to evaluate LAs. Porter's '*diamond*' framework and the '*double diamond*' extension have often been applied as a lens to assess the competitiveness of countries, regions and industry clusters (Smit, 2010; Verbeke & Lee, 2021). Here, the quality of the business environment is determined by the interaction among 'factor conditions',

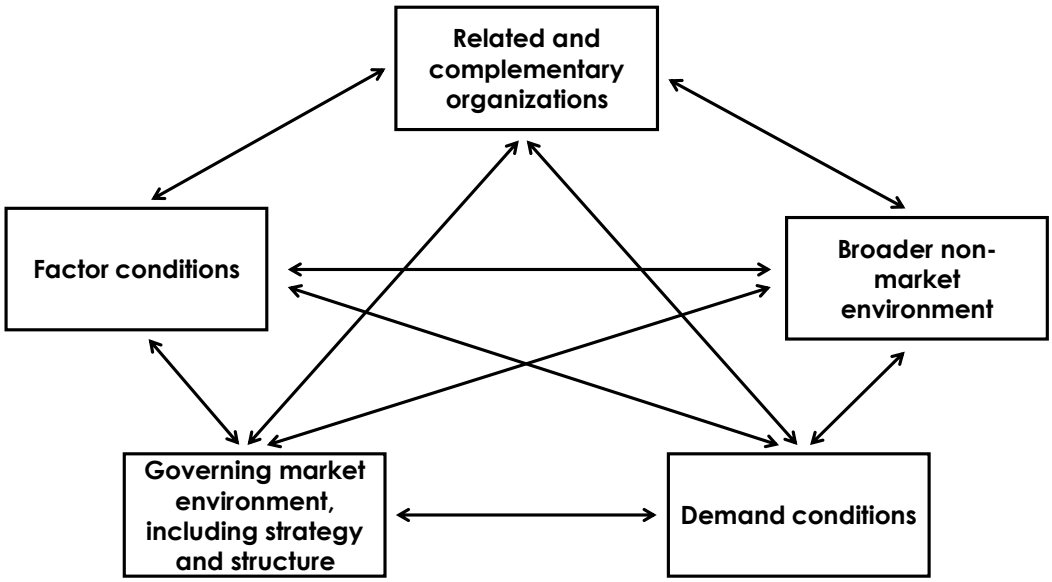
'demand conditions', 'related and supporting industries', and 'firm strategy, structure and rivalry'. These four elements have then been complemented with two overarching elements, namely 'chance' and 'government'. In industries where multinational activities are prevalent, the double diamond framework often provides a more suitable analysis for assessing LAs and their impact on international competitiveness (Moon et al., 1998; Rugman & Verbeke, 1993). Furthermore, Brugman & Verbeke (2018) introduced an extended diamond model, with 'government' being considered explicitly as an additional variable.

In our research, we further broadened this element to include the non-market environment more generally. Empirical evidence suggests the important role of stakeholders and how these can be supportive of –or detrimental to– the development of firms, clusters, and entire industries. This influence is often exerted indirectly in the form of a non-market stakeholder conferring a location disadvantage or advantage; for instance, when threatening to withhold the social license to operate from firms in particular industries that supposedly create negative externalities. In that case, stakeholders can engage in NIMBY (not in my backyard) and NIABY (not in anyone's backyard) behavior, thereby creating significant uncertainty as to whether firm-level investment projects can come to fruition (Dooms et al., 2006). As an example on the positive side, non-market stakeholders can also be instrumental to identifying and amplifying business opportunities in the realm of circular economy (CE) projects in a particular locale (Courtens et al., 2023).

Building upon the above, we propose a '*pentagon*' rather than a '*diamond*' framework to assess LAs. This pentagon essentially covers the same range of competitiveness determinants except that the *Firm strategy, structure and rivalry* dimension is broadened to include all *Governing market environment*-components, thereby also including *government*. Even

though *government* as a regulator (rather than as a producer, distributor or purchaser of goods and services) is explicitly and evidently not a market force, it is a party to 'contracts' (or at least a party in two-sided, contracting equivalents) with all the market actors in the jurisdiction(s) where it has regulatory power. These contracts involving government form an important part of the governing market environment for firms. In addition, a fifth element is added, denoted here as '*Broader non-market environment'* which includes all LA-components not directly related to the forces governing the market environment. This pentagon approach can be extended further, in the form of a 'double pentagon' approach, whereby locational strength assessments are always made explicitly vis-à-vis other locations and considering relative access to whatever resources are available in home or host environments, see Figure 1.

Figure 1: Determinants of the Single Pentagon of Location Advantages (LAs) affecting Firm-Specific Advantages (FSAs)



Source: Composed by the authors, inspired by Porter, M. E. (2008). On competition. Harvard Business Press.

3 Methodology

In 2021, the Belgian professional association representing technology-based manufacturing in Belgium, namely Agoria[1], commissioned a study from the authors of this paper to assess the international competitiveness of Belgian operations in technology-intensive manufacturing companies and to create a roadmap to enhance Belgium's attractiveness as a location (Agoria, 2021). At that time, Agoria had already studied from a practitioners' perspective the vulnerabilities of Belgian-based operations and it had observed a significant number of exits of mostly foreign MNE subsidiaries. Agoria acknowledged the need for a further, in-depth analysis of the vulnerabilities of the manufacturing industry, and in particular of the technology-intensive companies in Belgium; because within the EU, there had been a *capabilities commodification* that had started three decades earlier with the 'Europe 1992' (Single Market) program, especially at the level of large MNEs.

The research was to examine the perspectives of technology-based manufacturing firms operating in Belgium, including home-grown companies and foreign MNE subsidiaries. These firms had all been established in Belgium from pre-1950 to the year 2019.[2]

We adopted a mixed methods approach, combining a formal survey instrument with subsequent in-depth interviews. The purpose of this two-stage approach was to triangulate the veracity of the survey findings. Agoria suggested who would be the best interviewees, most likely to have a broad and objective view of both Belgian LAs and their own company's

[1] In 2021, Agoria represented over 2,000 technology-based manufacturing firms and related services companies operating in Belgium.

[2] We considered four timeframes in terms of initial location in Belgium by the 66 firms responding to the survey: pre-1950 (9), 1950-1999 (41), 2000-2009 (12), and 2010-2021 (4). The subsample of 26 MNE subsidiaries had the following numbers for the respective establishment periods: 2, 19, 3, and 2 firms.

FSAs. These interviews permitted interpreting correctly the responses from the formal survey.

We conducted the online survey with Agoria members in June and July 2021, and received 66 useable responses, including 26 from foreign MNE subsidiaries. The initial longlist of Agoria members was carefully selected by the professional association itself, to ensure that our findings would be representative of the entire membership, and thereby the technology-based manufacturing industry in Belgium. We performed further in-depth interviews with 23 Agoria members between June and August 2021. The interviewees represented medium-sized Belgian firms (6), large Belgian firms (7), Belgian affiliates of medium-sized foreign MNEs (5), and Belgian subsidiaries of large foreign MNEs (5). The targeted 'representativeness' intended by Agoria was based on the following criteria: (a) the type of firm, to secure the presence of home grown companies and MNE subsidiaries; (b) the various time periods of establishment, namely pre-1950, 1950-1999, 2000-2009, and 2010-2021; (c) the type of technology usage, ranging from low to high proprietary technology development; and (d) the sales volume, to secure inclusion of both medium-sized and large firms.

The final set of 66 usable responses represents a broad spectrum of firms in the Belgian, technology-based manufacturing industry. Within this set of firms, as noted above, 26 were foreign MNE subsidiaries, allowing to differentiate between these firms and the remainder of the sample. The surveyed firms represented approximately 13% of the entire industry revenue in the country. The Belgian operations varied in employment size and included medium-sized enterprises (up to 249 employees, 78%), firms with 250 to 500 employees (10%), and firms with over 500 employees (13%).

Apart from questions about LAs, MNE subsidiaries were also asked (using Likert scale

questions) about the existence of SSAs in their operations. Respondents were asked how the foreign subsidiary in Belgium viewed itself, in terms of internal strengths, in comparison to the *best operations outside of Belgium*, with possible responses ranging from 'much weaker than' to 'much stronger than'. For these responses, we employed the Likert scale mean, to indicate weaknesses or strengths vis-à-vis those of sister subsidiaries outside of Belgium.

The question arises as to possible biases in the answers of the respondents to our survey, who might be motivated to overstate the strengths of Belgian operations, especially in the context of their internal multinational network, where they may be in competition with sister subsidiaries for resources and product lines. The main reason why biases, in terms of overestimating subsidiary strengths, are unlikely to pose a problem in this particular study, is the absence of incentives to exaggerate these strengths. The study was commissioned by Agoria, the professional association of the technology-based industries in Belgium and one of its goals was to identify firm-level weaknesses that in aggregate could lead to general recommendations to strengthen firm-specific and subsidiary-specific advantages through new initiatives, whether originating with Agoria, or with the various sector-based professional organizations, or with the subsidiaries themselves. If any bias could have been expected in the (subsequently widely distributed) anonymized responses to the questions asked, it would more likely have been an underestimation, rather than an overestimation of the strength of subsidiary-specific advantages, in order to benefit from novel, dedicated initiatives, whether in the form of professional association support, public subsidies, tax incentives, or other business-friendly regulatory measures.

We assessed the presence or absence of SSAs based on a *synthetic score* derived from the five-point Likert scale responses, with this score ranging from -1 (or -100%) to +1 (or +100%).

For instance, for the questions related to SSAs, if the '*much stronger than*' response was given by the respondent, the synthetic score for an SSA component would be +100%. In contrast, if a '*much weaker than'* response for an SSA component were given (amounting to the absence of an SSA or, in other words a subsidiary specific liability), this would lead to a -100% synthetic score. Between these two extremes, a '*slightly stronger than*' response would yield a score of +50%, whereas a '*slightly weaker than*' response would earn a -50% score. A neutral response (*equal strength)* would earn a 0% score. These scores were then aggregated across the entire sample of subsidiaries.

The general SSA question, covering multiple capability subdomains, was formulated as follows:

> *"Please rate your strengths/weaknesses as compared to the <u>best operations</u> in your own company (i.e., your sister subsidiaries) <u>outside of Belgium</u>. We are (please select only one): much stronger, slightly stronger; have equal strengths; slightly weaker; much weaker."*

With this question, we aimed to compare the Belgian subsidiary of a foreign MNE with the *top-performing* sister subsidiary, based on a specific capability component. The '*much stronger than*' response reflects an SSA in the form of a capability superiority vis-à-vis the *next-best-in-class* sister subsidiary and consequently all other subsidiaries within the MNE network. A '*slightly stronger than'* response still corresponds to a leading-edge vis-à-vis the *next-best-in-class* and other subsidiaries. An '*equal-strength'*-response refers to a subsidiary being *top-performing* but not benefiting from an SSA (and rather relying on a non-location bound FSA shared throughout the MNE). A '*slightly weaker than'*-response indicates that the Belgian subsidiary commands somewhat inferior capabilities vis-à-vis the *best-in-class sister subsidiary* but obviously does not imply that the subsidiary is unable to compete. Finally, the

'*much weaker than'*-response reflects a clear weakness *vis-à-vis* sister subsidiaries. We are confident about the knowledge that respondents had about their strengths *vis-à-vis* those of sister operations, because in most cases advanced benchmarking occurs by the parent companies, especially in the European context, with each subsidiary's senior management knowing exactly its position in the internal network as regards productivity, innovation, etc.

4 Empirical findings

4.1 Descriptive analysis of Belgium's location advantages

In the realm of FSAs at the country-level, prior research suggests that Belgian CSAs have during the past decades included, *inter alia*, the high quality of the logistics and telecom infrastructure, the ease of access to information, the excellence of the workforce's education and its skills, the strategic proximity to significant demand, the potential to establish strong relationships and collaboration with local firms, and Belgium's membership in a regional trading block, with all these elements contributing to the country's overall competitiveness (Brugman & Verbeke, 2018). Particularly significant LAs for the Belgian technology-based manufacturing industry have been the highly educated and skilled labor force, and the collaboration opportunities with knowledge institutions. However, as we explain below, we observed a general decline in presence of critical LAs from the time of establishment to the year 2021, based on the survey responses.

The survey asked each firm:

> *"Which factors were critically important when selecting Belgium as your preferred location, when you initially started production there? Please check all the critically important factors" and "From the factors you checked as critical to the firm's establishment in Belgium, are they still critical in 2021?"*

We should note upfront that there may be some bias in the assessments of LAs at inception of the company, especially for older firms: when answering questions that address very specific, narrow location advantages, information on the proximate past may be conflated with the reality at the time of inception. However, what matters most for our purposes is the trend perceived by the senior managers, i.e., comparing a situation in the past that is most

relevant to them (whereby the year of inception was suggested as the relevant benchmark) with the present situation. It is noteworthy that across all periods of first establishment, the *Availability of highly skilled talent* was mostly considered a critically important LA at the time of establishment. However, this was predominantly true in the three earlier eras[3], with 71% of the respondents mentioning it as a critically important LA to establish themselves in Belgium[4]. In contrast, for the latest period — i.e., firms established between 2010 and 2021 — only 25% viewed the availability of highly skilled talent as critical[5], thus representing a reduction in the perceived critical nature of this LA (as an exogenous source of strength) by 65%.

Furthermore, other LAs were also viewed as less important when comparing the earlier eras and the latest period. The *Proximity to demand* and the *Easy access to suppliers of critical inputs and components*, which appeared to be decisive for older firms at the time of their establishment, were not viewed as critical LAs by younger firms when they established themselves. The LAs that appear to matter most to the newly established companies, include factors such as *a Local network and dense social ties of owners and managers*, as well as the *Degree of openness and internationalization of Belgium*. The incentives for firms to establish themselves in Belgium have thus changed significantly over time.

[3] These earlier eras refer to our first three distinct timeframes, i.e. (1) pre-1950; (2) 1950 to 1999; and (3) 2000 to 2009.

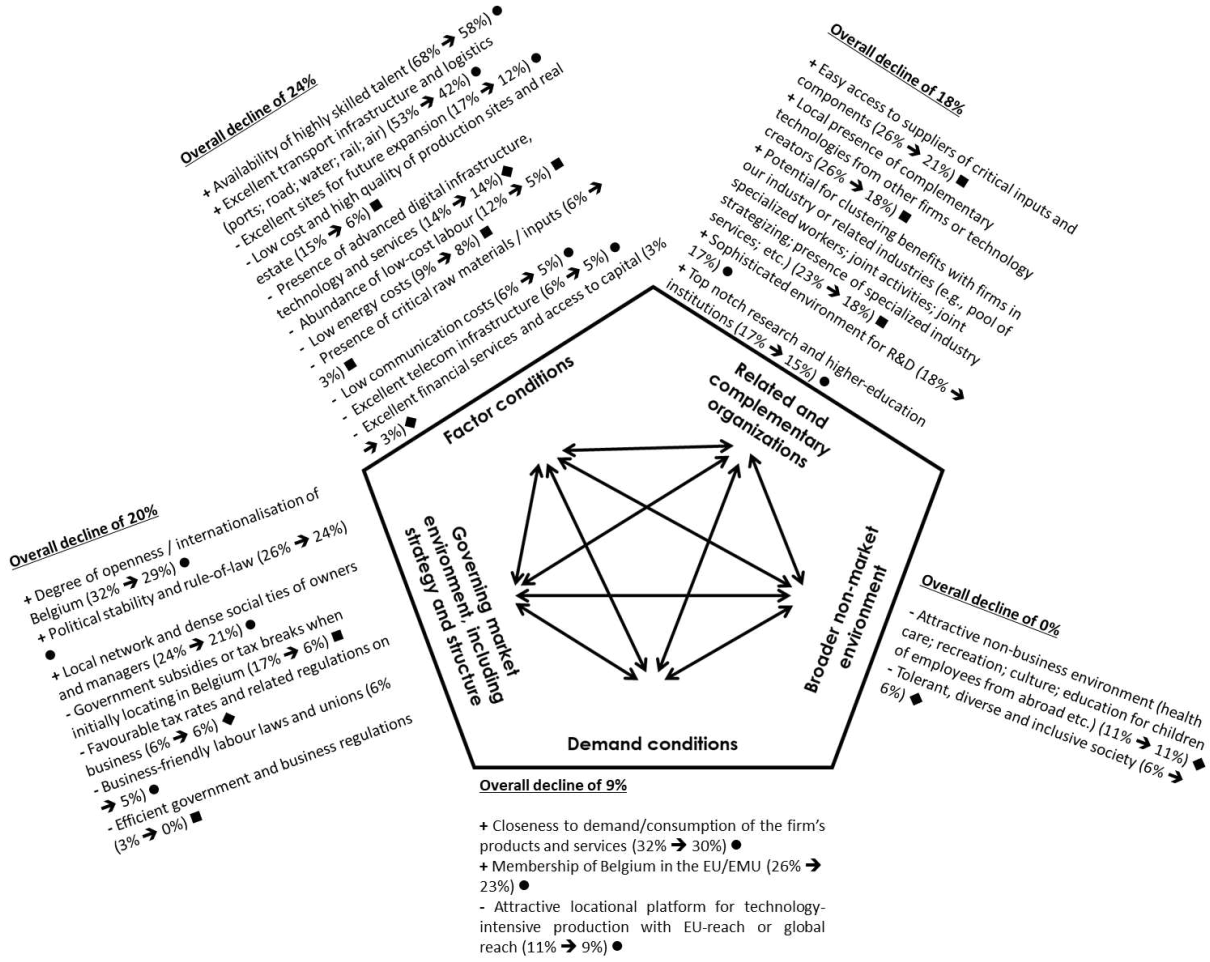
[4] This percentage was calculated as: $\frac{SUM(\ LA\ present\ \&\ older\ firm)}{SUM(all\ older\ firms)}$

[5] This percentage was calculated as: $\frac{SUM(LA\ present\ \&\ youngest\ firm)}{SUM(all\ youngest\ firms)}$

When comparing the LAs that were critically important at the time of establishment of the Belgian operations with those that remained relevant in 2021, we observe an overall decline. In Figure 2, we visualize the location factors for all 66 firms in a pentagon-like structure, which illustrates whether the location factors encouraged the firms' initial establishment, i.e., represented a LA, and whether this LA was still critical in 2021. For example, '68% ➔ 58%' means that 68% of respondents mentioned *Availability of highly skilled talent* as a LA at the time of establishment, but only 58% found this advantage still to be valid in 2021.

Figure 3 represents the same assessment but only for MNEs having engaged in foreign direct investment in Belgium.

Figure 2: Location advantages of Belgian-based manufacturing operations from inception to 2021



Source: Authors
Note: Total count: 66 respondents
x% → y% reflects the evolution in strength of each LA from the year of establishment (average score of x%) to 2021 (average score of y%)
Average LA decline as compared to the initial score in % of this initial score: -23%.
Average, remaining overall LA score in 2021: 15%.
The + sign reflects a factor to have a 2021 LA score at or above the 15% average. The - sign reflects a factor to have a 2021 LA score below the 15% average.
The term 'overall decline' represents the aggregated decrease for all LAs under each side of the five-sided pentagon. Thus, the LAs of each side are aggregated, and the decrease hereof is measured.
● Milder decline than average; ■ Stronger decline than average; ◆ No change perceived in LA

In 2021, the most frequently mentioned critical LAs were *Availability of highly skilled talent* (58%)[6]; *Excellent transport infrastructure and logistics* (42%), which greatly facilitate easy access to the European region and the rest of the world*; Closeness to demand/consumption*

[6] The interviews clarified that there was a slight Belgian advantage in skills and flexibility, but the advantage was presently (i.e., in 2021) eroding as compared to e.g., Germany, Italy, Slovenia, etc.

of the firm's products and services (30%) and *Degree of openness / internationalisation of Belgium* (29%). These are LAs in the realm of factor conditions, demand conditions and governing market environment, including strategy and structure.

Regardless of the perceived decline of the LAs in Belgium by an average of 23%[7] as compared to the initial LA scores, the firms responding to the survey had remained active in the country (being survivors as opposed to the firms that had exited) with only few considering scaling down, phasing out specific activities or relocating outside of Belgium. On the contrary, most respondents expected new capital expenditure and innovation investments and employment in Belgium (70% of 66 firms).

This confidence in the existing Belgian-based operations despite the decay –almost across the board– of LAs suggests that the firms involved have developed substituting FSAs to mitigate the negative impact of diminished LAs. The planned capital expenditures in the nearby future ranged between Euro 0.5 to 10 million for most firms. However, some of the largest firms planned much more significant investments, namely of Euro 20, 40 and 140 million. As to planned investments in innovation, most of these were positioned in the 'new economy' sphere, and covering budgets of over a million Euros, but with a few budgets substantially above this average and in the range of 25, 30 and 140 million Euros. The estimates for future additional employment associated with these investments typically entailed fewer than one hundred jobs, thereby highlighting the capital intensity of Belgian manufacturing. The post-

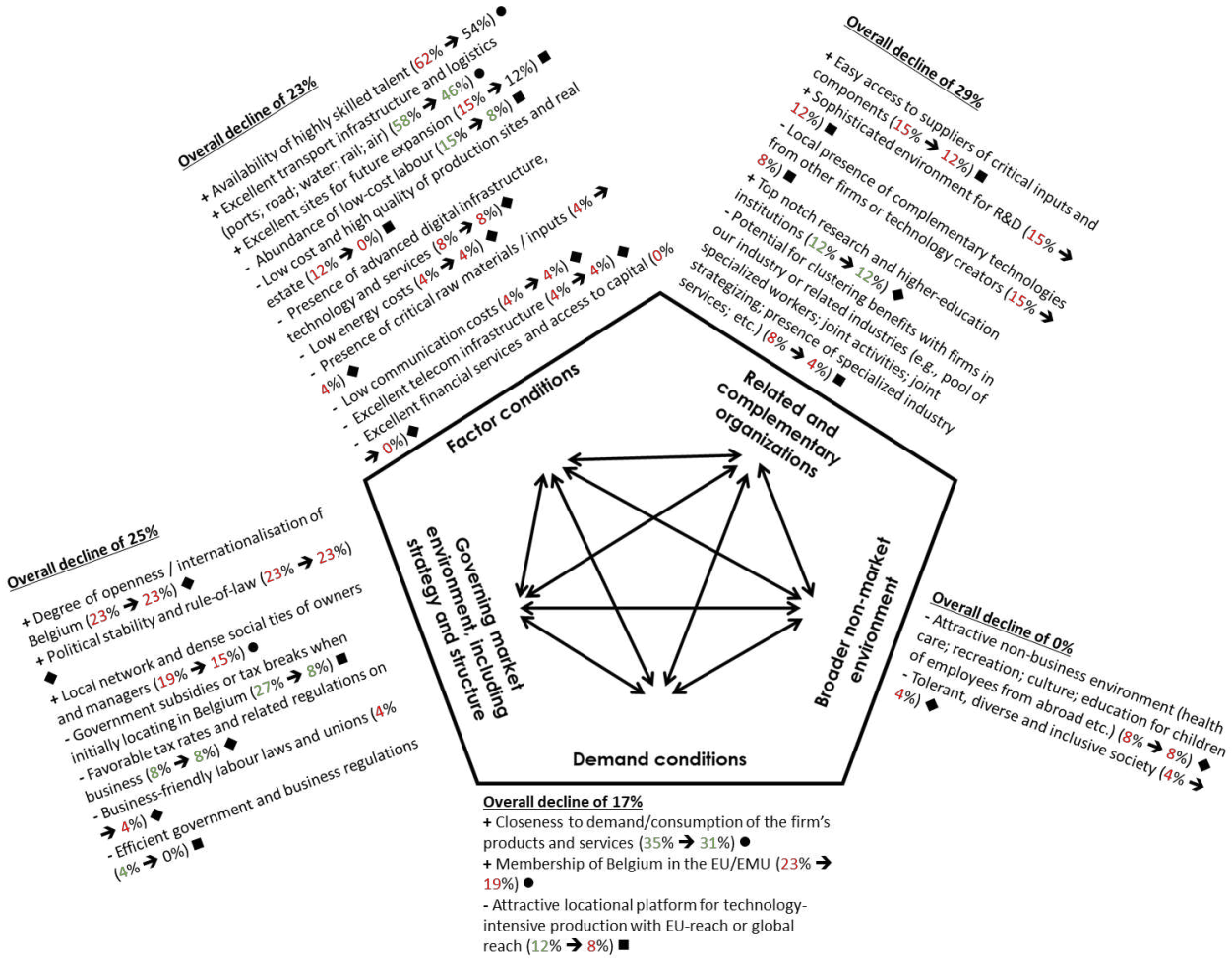
[7] This percentage was calculated as:

$$Average\left(\frac{SUM(\,Firm\ identified\ LA\ present\ in\ 2021) - SUM(Firm\ identified\ LA\ present\ at\ establishment)}{SUM(Firm\ identified\ LA\ present\ at\ establishment)}\right)$$

survey interviews further suggested that some large MNE subsidiaries may be phasing out production lines and the associated employment, and with Belgian operations conducting narrow and specialized activities in international value chains.

Figure 3 shows the difference in perceived LAs between the 26 MNE subsidiaries and the entire sample of 66 Belgian-based operations. Foreign MNE subsidiaries appear to view *Excellent transport infrastructure and logistics* as even more important than the entire sample of firms does, and this also holds for *Abundance of low-cost labor; Top notch research and higher-education institutions; Closeness to demand/consumption of the firm's products and services; Favorable tax rates and related regulations on business.* Finally, the LA of *Government subsidies or tax breaks when initially locating in Belgium* had drastically decreased in importance in 2021 as compared to the time of establishment.

Figure 3: Location advantages of Belgian-based manufacturing operations of foreign MNEs, from inception to 2021



Source: Authors
Note: Total count: 26
x% → y% reflects the evolution in strength of each LA from the year of establishment (average score of x%) to 2021 (average score of y%)
Average LA decline as compared to the initial score in % of this initial score: -22%
Average, remaining overall LA score in 2021:12%
The + sign reflects a factor as having a 2021 LA score at or above the 12% average. The - sign reflects a factor as having a 2021 LA score below the 12% average.
The term 'overall decline' represents the aggregated decrease for all LAs under each side of the five-sided pentagon. Thus, the LAs of each side are aggregated, and the decrease hereof is measured.
● Milder decline than average; ■ Heavier decline than average; ◆ No change perceived in LA
Green: higher LA score than for overall sample of 66 firms; Red: Lower LA score than for overall sample of 66 firms

The decline in Belgium's LAs for foreign MNE subsidiaries appears similar overall to what was observed for the entire sample of firms. Here too, the continued presence (and non-exit) of

these operations signifies that FSAs, including especially SSAs, were developed as substitutes for the now defunct or substantially weaker LAs.

The greatest perceived strength of Belgian subsidiaries as compared to sister subsidiaries – and which can reasonably be interpreted as an SSA– is related to innovation. Only for this FSA component did the subsidiary managers overwhelmingly perceive their operations to be in a '*much stronger'* position (42%) as compared to the *next-best-in-class* sister subsidiary (see Table 1). The production quality of Belgian subsidiaries also appears to be superior to that of other subsidiaries, with half of the respondents indicating a slightly stronger capability as compared to the *next-best-in-class* sister subsidiary, and 19% claiming a much stronger position of their subsidiary. Further, *Human resources management*, *Coordination/control of the international operations*, and *Management of stakeholders* are FSA components that yielded an average of 3.5 out of 5 on the Likert scale, thereby also reflecting a favorable position within the MNE network.

If the Likert scale across all subsidiaries for an FSA component reached 3.5, we attributed the presence of an SSA to the entire group of Belgian based operations as compared to their *next-best-in-class* sister subsidiaries, i.e., an A^{+} *SSA*. In the case of Likert scale scores for FSA components below the 3.5 threshold but above 3, when aggregating across all the subsidiaries, we still attributed the presence of SSA to the group, albeit with only a slight superiority as compared to the *next-best-in-class* sister subsidiaries (see Table 1).

FSA components yielding a small negative synthetic value at the aggregate level, suggested the absence of an SSA for those components, and with the relevant subsidiary operations relying mainly on non-location bound FSAs received from the parent MNE.

One factor was viewed as a reason for significant concern, namely the sphere of production costs, with 31% of respondents perceiving their subsidiary to be '*much weaker'* than the *best-in-class* subsidiary. The low synthetic score of -46%, indicates that the production cost related weaknesses of subsidiaries in Belgium could be viewed as a Subsidiary-Specific Liability (SSL).

Table 1: Strengths and weaknesses as compared to the best sister subsidiaries outside of Belgium

	Sum 'weaker'	Much weaker	Slightly weaker	Equal strength	Slightly stronger	Much stronger	*Sum 'stronger'*	*Synthetic Value*	*Mean LS**	*Rank*
Innovation	8%	4%	4%	35%	15%	42%	58%	**44%**	**3,88**	***A⁺ SSA***
Purchasing	31%	4%	27%	42%	23%	4%	27%	**-2%**	**2,96**	***NLB FSA***
Logistics (transport, warehousing, distribution)	12%	-	12%	54%	23%	12%	35%	17%	3,35	*SSA*
Production cost	77%	31%	46%	12%	8%	4%	12%	**-46%**	**2,08**	***SSL***
Production quality	-	-	-	31%	50%	19%	69%	**44%**	**3,88**	***A⁺ SSA***
Quality of plant location	8%	-	8%	54%	38%	-	38%	15%	3,31	*SSA*
Sales and marketing (including advertising)	23%	12%	12%	54%	19%	4%	23%	**-4%**	**2,92**	***NLB FSA***
After sales service (including distributor support)	12%	4%	8%	50%	23%	15%	38%	19%	3,38	*SSA*
Financial management	8%	4%	4%	62%	19%	12%	31%	15%	3,31	*SSA*
ICT and digital technology systems	12%	4%	8%	46%	27%	15%	42%	21%	3,42	*SSA*
Human resources management	15%	-	15%	35%	38%	12%	50%	**23%**	**3,46**	***A⁺ SSA***
Legal issues management	12%	-	12%	54%	27%	8%	35%	15%	3,31	*SSA*
Corporate social responsibility	8%	-	8%	54%	27%	12%	38%	21%	3,42	*SSA*
Management of political issues	12%	4%	8%	62%	23%	4%	27%	8%	3,15	*SSA*
Coordination/control of the international operations (if relevant)	-	-	-	67%	17%	17%	33%	**25%**	**3,50**	***A⁺ SSA***
Management of stakeholders (other than shareholders)	-	-	-	65%	50%	5%	55%	**30%**	**3,50**	***A⁺ SSA***

Source: Authors
Note: Total count=26, LS= Likert scale*

We then linked the above results for perceived strong SSAs with those for the perceived presence versus absence of LAs. It would be reasonable to assume that the presence of LAs, especially those chosen most frequently by all firms, would be instrumental to developing SSAs. After all, an SSA reflects embeddedness in a host country and the fact that the subsidiary has capitalized on this country's location advantages.

In order to assess the possible linkages between SSAs and LAs, we selected the two capability elements that had received the highest 'A^{+} SSA' synthetic scores (44%), namely *Innovation* and *Product quality*. We related those SSAs to the most frequently selected, critical LAs, i.e., *Availability of highly skilled talent* (recognized by 54% of subsidiaries to be important in 2021), and *Excellent transport infrastructure and logistics* (recognized by 46% of subsidiaries to be important in 2021). Our working assumption was that these two critical LAs of Belgium would be associated with the presence of strong SSAs. We subsequently related these highest scoring SSAs with the perceived presence or absence of all other LAs. We reviewed whether the respondents who claimed to have an SSA for the above two capability components also selected a variety of LAs as being critical to them in 2021, see Table 2. For instance, *Innovation* had been perceived by 58% of the entire sample of subsidiaries to be much stronger or slightly stronger in Belgium than in foreign sister operations, and *Availability of highly skilled talent* had been viewed by 54% of the subsidiaries to be a LA in 2021.

Unexpectedly, however, only 31% of the subsidiaries reported *Innovation* as an SSA and viewed the *Availability of highly skilled talent* as a LA (see Table 2). There thus seemed to be a negative, rather than positive, association between the presence of this SSA and a LA

normally considered to be essential for SSAs to flourish.

Table 2: Percentage of respondents with Innovation and Production quality as an SSA, acknowledging the presence of a LA

LA	Innovation	Production quality
Availability of highly skilled talent	31%	35%
Excellent transport infrastructure and logistics (ports; road; water; rail; air)	31%	31%
Average for other LAs	**4%**	**4%**

Source: Authors

Table 3: Percentage of respondents with Innovation and Production quality as an SSA, acknowledging the absence of a LA

Absence of LA	Innovation	Production quality
Availability of highly skilled talent	27%	35%
Excellent transport infrastructure and logistics (ports; road; water; rail; air)	27%	38%
Average for absence of other LAs	**53%**	**65%**

Source: Authors

Furthermore, we also assessed the likelihood of an SSA being present alongside an LA across the subsidiary sample, as compared to the likelihood of an SSA being present but with the LA absent, and this for all SSAs considered. This comparison is shown in expressions (1) and (2) below, respectively individual SSAs and LAs (expression 1) and then for the average across all SSA and LA categories (expression 2). In both cases, we observe that when LAs are absent, the paradoxical outcome materializes of a higher propensity for an SSA to be present.

$$P(\text{SSA present \& LA present}) < P(\text{SSA present \& LA absent}) \quad \textbf{(1)}$$

$$\Leftrightarrow \text{Average}\left(\frac{\text{SSA present \& LA present}}{\text{LA present}}\right) < \text{Average}\left(\frac{\text{SSA present \& LA absent}}{\text{LA absent}}\right) \quad \textbf{(2)}$$

More specifically, the coexistence of SSA and a LA occurs on average in 21% of the cases, whereas the coexistence of a SSA and the absence of a LA characterizes 37% of the cases. Thus, SSAs appear to materialize more frequently in the absence of LAs. These findings are only tentative and should be interpreted with caution, given the limited number of subsidiaries in our sample, but they do suggest a substitution effect between LAs and SSAs for

these ‘survivors’ in the Belgian case and in the present era.

Building upon the above analysis, we then combined the subsidiaries’ own overall assessment of commanding SSAs (low or high) with their perspective on whether the parent company values the location in Belgium as being strategically important (low or high), leading to the matrix visualized in Figure 4. We asked the following question.

> *“Please describe the present role of the Belgian production operations in the overall company: (a) star performer with Belgium as a hub location (quadrant 3); (b) star performer but with the location in Belgium being less important (quadrant 4); good team-player important to the multinational enterprise’s operations (quadrant 2); (b) high potential if we were given more resources and responsibilities inside the multinational enterprise (quadrant 1); other (role not covered by the matrix).”*

Figure 4 shows how subsidiaries of foreign MNEs are sometimes misunderstood by societal stakeholders[8]. There are, indeed, a limited number of star performers with a hub function in Belgium likely to have a low vulnerability to, for instance, cost-increasing public policy measures or normative actions from the non-market (quadrant 3; 19%). But such star performers with SSAs reflecting best-in-firm operational and innovation performance, and often characterized by an effective interplay between R&D and production, typically represent a minority of subsidiaries in small open economies (Rugman, Verbeke & Nguyen, 2011).

In our sample, an equally large number of firms could still be considered star performers, because of the SSAs these subsidiaries command, but they function more as network partners

[8] It is important for all societal stakeholders to understand that when Belgian operations of foreign MNEs caution against high labor costs, this does not reflect the classic conflict between providers of capital and providers of labor in terms of maximizing value capture. Belgian subsidiaries are part of GVCs, whereby cost and quality benchmarking comparisons are performed continuously against alternative locations, both within the firm and vis-à-vis other GVCs. A systemic public policy focus on labor costs, as well as on the other external pressures facing firms operating in Belgium does therefore not entail the danger of a race to the bottom. It is critical to know that several locations within the EU can provide access to equivalent human talent, but at a considerably lower labor cost for some manufacturing activities. Apart from the need for labor-cost-increase moderation, the question then arises what Belgium and its regions can offer as ‘compensating’ LAs.

in global value chains (GVCs) (quadrant 4; 19%). These subsidiaries can be vulnerable if other locations become more attractive, e.g., when national economies in Eastern Europe grow faster than in Western Europe. Their production over the long term may consist of smaller batches of niche products, manufactured on-demand and using advanced technologies (Rugman, Verbeke & Nguyen, 2011).

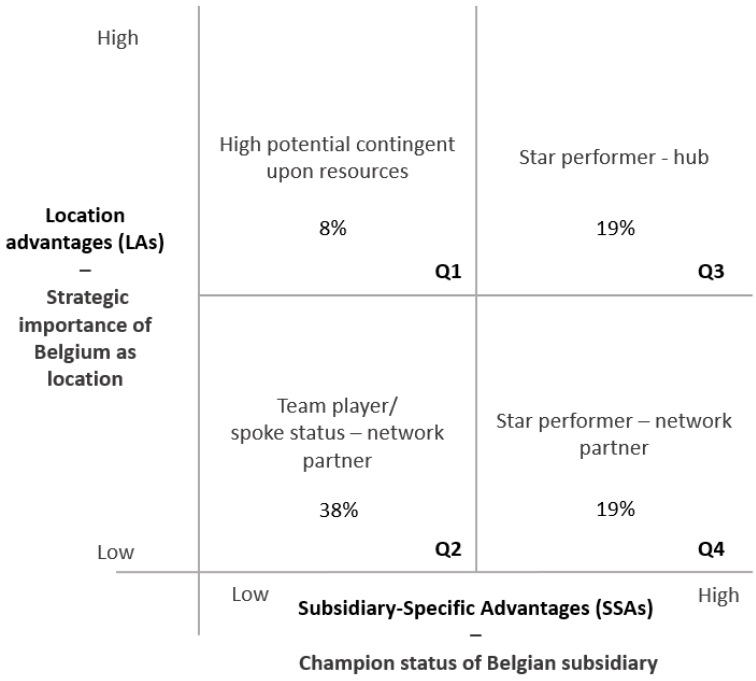
A substantially larger number of subsidiaries in our sample also function as network partners in GVCs of MNEs, but have more of a spoke status, meaning that their location in Belgium is not critical to the MNE parent, even though the operations may be intrinsically important (quadrant 2; 38%). These subsidiaries could be especially vulnerable to unfavorable benchmarking *vis-à-vis* rival locations (Rugman, Verbeke & Nguyen, 2011). For these subsidiaries, dimensions of operational excellence such as a service attitude within the MNE, agility in the form of rapid responsiveness to MNE network needs, and reliability in executing fine-sliced activities within the firm are the key to securing continued operations in Belgium. It is here that the absence of critical LAs could trigger the development of SSAs and a move from quadrant 2 to quadrant 4, aligned with our earlier analysis.

Finally, a few subsidiaries self-identified as having more potential in Belgium than can presently be realized with their existing production mandate and resource base received from the parent (quadrant 1; 8%). Here lies an avenue for growth, but at the same time also the highest vulnerability, if the parent MNE head office cannot be convinced of the Belgian operations' growth potential.

Among the subsidiaries that did not see themselves fit in the matrix, a few of these represented operations being restructured and 'legacy-type' operations that may still provide

value for the time being despite high production costs. It could be argued that these operations are as vulnerable as those in quadrant 1, but with a lower likelihood that new resources will be injected to build upon emerging business opportunities.

Figure 4: Belgian subsidiary roles in the MNE



Source: Composed by authors, based on Rugman, A., Verbeke, A., Yuan, W. (2011). Re-conceptualizing Bartlett and Ghoshal's Classification of National Subsidiary Roles in the Multinational Enterprise. Journal of Management Studies.
Note: N=26; 15% of the responding subsidiaries classified as 'other'

5 Discussion and conclusion

The interplay between LAs and FSAs –with the latter including SSAs in the context of MNE activity– has been much debated in the field of international business strategy. Most research has focused on positive interactions, with stronger LAs providing a platform for firms to exploit or develop their FSAs, and with stronger FSAs typically instrumental to net positive spillovers benefiting the location where they are deployed (though, admittedly, crowding out effects and negative spill overs have also been documented). The case of LAs gradually decaying over time, but with FSAs replacing these in parallel, has remained largely unexplored.

We identified the critical LAs that led technology-based manufacturing firms to establish operations in Belgium, and the extent to which these LAs have remained relevant until the present day (2021). The most frequently identified LAs of Belgium –as perceived by senior management of the Belgian-based operations, including the subsidiaries of foreign MNEs– were the *Availability of highly skilled talent* and the *Excellent transport infrastructure and logistics*.

Extending Porter's (2008) framework of location-based competitiveness by incorporating the *'Broader non-market environment'* we observed an average decline of 23% in LAs as compared to the situation at the time of establishment. However, MNE subsidiary managers noted the presence of SSAs in the Belgian operations as compared to *best-in-class* sister subsidiaries in other countries. These managers identified strong SSAs in five areas (ranging between 23% and 44% above the capabilities of best-in-class, sister subsidiaries), with the highest comparative strengths recorded in *Innovation* and *Product quality*. The three other areas with strong SSAs were *Human resources management, Coordination/control of the international*

operations and *Management of stakeholders other than shareholders*. When considering LAs and these SSAs simultaneously, there is some evidence that the decay in LAs has unfolded in parallel with the MNE subsidiaries developing their SSAs. We showed this evolution for individual SSAs and LAs, and at the aggregate level: it would appear that the absence of LAs is associated with a higher propensity for an SSA.

What are the implications of the above for corporate strategy and public policy? Our analysis suggests that 'survivors' in country environments that have become less attractive over time are typically resilient and will find ways to overcome adversity disadvantages in a given location, along the lines of the old adage: 'What does not kill you, will make you stronger.' Here, both Belgian firms and foreign MNE subsidiaries, built strengths that allowed them to survive in a high-cost environment with sometimes challenges to access the requisite high-quality human resources. Table 1 shows the areas where strengths have been built up over time, exemplified by: (a) specializing in high value-added manufacturing, itself driven by innovation and a focus on product quality; and (b) striving to achieve excellence in governance, with high scores on human resources management, and on the more externally oriented management of stakeholders and network partners as a result. Our observations in this regard may be particularly important in the present era of global decoupling, whereby macro-level tensions between governments can trigger resiliency-based strategies at the micro-level, including nearshoring and friend-shoring, micro-modularization, adding regional components to strategy and structure, etc. At the same time, home and host country governments must be made aware of minimum quality thresholds to be respected, both for individual LAs and for the entirety of LAs at the aggregate level. For instance, if LAs trend downward in the sphere of quality of the human resources that can be accessed and quality

of the external logistics systems upon which firms depend, it should not be assumed that these developed-economy, educational and logistics infrastructure voids at the macro-level will automatically be compensated and 'filled' by the local operations of Belgian firms and foreign MNEs. As noted above, exit is still a strategic option at the micro-level. Firms can also fine-slice their value chains, whereby some Belgian operations might indeed be kept, but in a leaner and more narrow set of activities. In the extreme case, only a hollow shell of the original company may remain in place.

Our analysis also points to a new way for firms and governments to work together towards enhanced competitiveness: there is a clear need for a comprehensive 'dashboard', measuring the evolving strength of a wide range of location advantages for firms operating in the country. Firms need to convey clearly to public policy makers that the country's attractiveness and the industry's competitiveness may be in jeopardy when a red light starts flashing related to specific LAs. Here a distinction can reasonably be made between 'global' and 'regional' (in this case, EU-related) flashing red lights, given the importance of the EU region for strategic decision making (Verbeke & Kano, 2012). Public policy makers should remember that flashing red lights are relevant not only for strategic decisions made by firms already present in the country, but also for potential new entrants, contemplating various, alternative locations for their foreign direct investments.

Our research does have a number of limitations. *First*, we should note that our focus has been on survivors, i.e., firms that did not need to engage in exit from Belgium, given the relative importance of their FSAs *vis-à-vis* (decaying) LAs. This scenario of companies experiencing a decay of LAs accompanied with a strengthening of their FSAs and therefore staying in place in a given location, describes one evolutionary pathway for success, but it does not cast any

doubt on the real-world significance of the parallel scenario, whereby firms not included in our sample exited from Belgium and relocated operations to other countries, precisely because of the decay in LAs. *Second*, we should also reiterate that our study reflects the one-country-case of Belgium, a small open economy positioned in the center of the European Union. *Third*, the 66 firms in our sample (including 26 MNE subsidiaries), though viewed representative by the professional association for the technology-based manufacturing industry, account for only approximately 13% of the total industry revenue in the country. Conducting similar research in other countries and with larger sample sizes will be important to validate our findings in other contexts.

Acknowledgements

We express our gratitude to Agoria — Ann Peeters, Patrick Slaets, Frank Vandermarliere, and Ben Van Roose — for commissioning the study in 2021, enabling us to derive our findings. Additionally, we extend special thanks to Jean-Pierre Merckx and Michaël Dooms for their valuable contribution to the study. Our appreciation also goes to all respondents for their participation in the survey and interviews.

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