Regional Studies

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/cres20

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To cite this article: Jose Luis Hervas-Oliver, Carles Boronat-Moll, Francisca Sempere-Ripoll & Jose Mariano Dahoui-Obon (2024) Industry diversification in industrial districts: is it about embedded regional or firm-level capabilities?, Regional Studies, 58:4, 756-767, DOI: 10.1080/00343404.2023.2244527

To link to this article: https://doi.org/10.1080/00343404.2023.2244527

REGIONAL STUDIES
2024, VOL. 58, NO. 4, 756–767
https://doi.org/10.1080/00343404.2023.2244527

Routledge Taylor & Francis Group
RSA Regional Studies Association

Industry diversification in industrial districts: is it about embedded regional or firm-level capabilities?

Jose Luis Hervas-Oliver[a], Carles Boronat-Moll[b], Francisca Sempere-Ripoll[a] and Jose Mariano Dahoui-Obon[c]

ABSTRACT

We analyse whether regionally embedded or firm-level capabilities drive regional diversification in industrial districts, examining the relationship between relatedness and Marshallian agglomerations. We argue that regional diversification lacks an explicit mechanism to explain branching into new products, positing that the origin of regional product branching is based on firm-level heterogeneity of capabilities and diversification, which is overlooked. Using mixed methods and patent analysis (1895–2019; 3592 patents and utility models), product diversification in the Toy Valley district in Alicante (Spain) is analysed, showing that firm-level related diversification with extensive local search explains the mechanism of the regional relatedness diversification.

KEYWORDS

industrial districts; clusters; relatedness; firm diversification

JEL O33, R10

HISTORY Received 17 November 2022; in revised form 28 July 2023

1. INTRODUCTION

Activity and routines renewal in a given region is influenced by a path dependency process where usually local available technologies, industries and paradigms drive change (e.g., Balland et al., 2019; Frenken & Boschma, 2007; Tödtling & Trippl, 2013). The existing regional diversification literature has highlighted that regions accumulate capabilities in a path dependence process where the regionally embedded capabilities drive regional diversification (e.g., Boschma et al., 2015; Feldman et al., 2015; Kogler, 2015; Pylak & Kogler, 2021). The literature, however, seems more focused on measuring the effect than in the mechanism driving the change. *How* does this regional diversification occur? *What mechanisms* drive this capability recombination and accumulation? Answering these questions requires positioning on the *agents of change* subline of enquiry, where specific regional actors, that is, firms, drive the diversification process (Elekes et al., 2019; Hidalgo et al., 2018; Tanner, 2014; Turco & Maggioni, 2016; Turco & Maggioni, 2019; Zhang & Rigby, 2022).

While relatedness diversification points out different mechanisms such as spinoffs, networking or the entrance of multinationals (Boschma, 2017; Elekes et al., 2019; Klepper, 2007), other drivers such as firm-level diversification are under-researched, as stated by Tanner (2014) and Zhang and Rigby (2022). The literature has even pointed out an existing tension between whether regionally embedded capabilities (e.g., Turco & Maggioni, 2016) or firms' internal capabilities (Tanner, 2014; Zhang & Rigby, 2022) shape regional diversification. We posit that regional diversification lacks an explicit mechanism to explain how a region branches into new products, in no small part due to the fact that firm-level diversification is less explored in regional diversification phenomenon. Our central tenet is that the mechanisms of regional branching are based on firm-level diversification, which is systematically less researched. We elaborate by showing that the mechanism for regions to diversify is based on a firm-level diversification process by recombining their own capabilities with those Marshallian externalities available in the local/regional settings, thus generating a related-driven regional diversification.

The present study adds to this literature by focusing on firms' diversification, *how* it occurs and *what* its effect is in the territory, contributing to that agents of change

CONTACT Jose Luis Hervas-Oliver Jose.hervas@omp.upv.es
[a] Management Department, DOE, Universitat Politècnica de València, Valencia, Spain
[b] Departament Direcció d'Empreses, Campus tarongers, Universitat de València, Valencia, Spain
[c] Instituto Itaca, Universitat Politècnica de València Spain, Valencia, Spain

Supplemental data for this article can be accessed online at https://doi.org/10.1080/00343404.2023.2244527.

literature (e.g., Tanner, 2014) and districts' evolution and renewal (e.g., Belussi & Sedita, 2009). In doing so, we align with Zhang and Rigby (2022) in finding that capabilities are more likely to emerge within the firm than they are to be built within the region. This idea implies that regional diversification is driven by firm-level diversification through capability recombination (Kogut & Zander, 1992). Our perspective focuses on the *process* rather than the regional output and our research question is: How does regional diversification occur?

Our study approaches relatedness diversification from a firm-level heterogeneity perspective, attempting to unfold a mechanism for fostering regional diversification by examining the micro-level or firm heterogeneity. Rather than just observing the regional change, we study the drivers and the agents of change at the micro-level. Thus, we posit that firm-level capability recombination produces new knowledge, builds heterogeneity and progressively diversify territories. We elaborate on the idea that any new knowledge is sourced from a firm's internal innovation activities, networking and collaborations in the focal value chain and also from external (to the district) sources. New activities, routines and capabilities are built from the recombination of those sources (à la Kogut & Zander, 1992) and thus a local firm's capabilities are reconfigured.

In addition, little is known about the relationship between Marshallian agglomeration economies and relatedness diversification, Potter and Doug Watts (2014) being an exception. For this reason, we position our research in industrial districts[1] in intermediate regions. These regions innovate intensively without research and development (R&D) and present high specialisation in clusters/industrial districts (e.g., Veneto or the Valencia Region; see Appendix A in the supplemental data online). Despite not being advanced regions, they are not institutionally thin peripheral ones but rather specialised (in the sense of Isaksen & Trippl, 2017). Diversification of local activities is less studied in the case of less advanced regions (Isaksen, 2015; Pylak & Kogler, 2021; Whittle & Kogler, 2020), lacking systematic evidence about how diversification occurs in those settings and, in particular, in industrial districts.

We posit and show that in industrial districts in intermediate regions, new knowledge from local firms' internal recombination of capabilities would be related to the district's existing assets, technology and activities through an intense process of *local* search. Put differently, a firm's diversification process is primarily driven through recombining its own and those local existing capabilities, therefore, local firms mainly diversify in products related to the existing ones in the territory. Thus, district renewal is expected to be related to existing local technologies and skills, that is, local Marshallian externalities. In intermediate regions, different from those advanced or thick ones, existing related technologies are less frequent and limited, therefore, recombination is expected to occur from available existing assets.

We leave relatedness indexes and complexity calculation to others because these tools focus on the output rather than on the process. In doing so, we build theory by developing a longitudinal case study, employing mixed methods. This paper analyses the factors and drivers behind the related-driven diversification of the Toy Valley district in Spain, from 1895 to 2021, exploring the factors and mechanisms that foster district (diversification) transformation and contributing also to less studied intermediate regions. We choose this district because of the intense territorial diversification process undergone in the last decades. To do so, we analyse 3592 patents and utility models for more than a century (1895–2019), complementing this with direct interviews with local firms and support organisations in the focal district and using secondary data.

Our results point out that district renewal and diversification is found to be intensively driven by firm-level diversification, which complements other mechanisms such as a pervasive spinoff process, institutional reconfiguration, the role of supporting organisations, new knowledge from outside the thematic boundary of the territory and the entrance of multinationals. Insights suggest that firms diversify primarily by recombining their own heterogeneous capabilities with those Marshallian externalities available in the local/regional settings: Marshallian economies do operate in the evolution of the district into related industries. Rather than generating technological diversifications, more likely occurring in advanced and thick regions, in these districts in intermediate regions we rather evidence industry and product diversification. This finding contributes to add knowledge to the tension on whether regionally embedded versus firm capabilities drive regional diversification (e.g., Zhang & Rigby, 2022) and unfolds the mechanism explaining regional and district industry diversification (e.g., Belussi & Hervas-Oliver, 2016), constituting valuable contributions to the geography of innovation literature. In addition, this present study responds to the call made by Boschma (2017) about studying the *micro-level* to explain how regional relatedness drives diversification. Also, this study follows Zhang and Rigby's (2022) call about understanding the process of regional diversification in single-plant firms as agents of change perspective. Overall, our study also conciliates and cross-fertilizes micro- and regional-level perspectives to understand regional growth from a district- and firm-level perspective.

2. LITERATURE REVIEW

Generally, the relatedness diversification literature (e.g., Frenken & Boschma, 2007; Pylak & Kogler, 2021; Whittle & Kogler, 2020) has highlighted the importance of regional capabilities for regional branching, linking both through related diversification: new activities spin out of existing ones. The branching literature primarily focuses on regionally embedded capabilities as drivers of change (Balland et al., 2019; Boschma et al., 2015; Rigby, 2015), leaving practically unattended the micro-level perspective based on firm heterogeneity (e.g., Tanner, 2014), therefore focusing more on the output of the transformation process than on the process itself.

The regional branching literature is now adopting a related yet different angle, looking at specific regional

actors or agents of change (Neffke et al., 2018). Zooming also into the micro-level and introducing firm diversification and heterogeneity of capabilities (based on the resource-based view; e.g., Barney, 1991) into the equation, we consider that regional diversification is also triggered by firm-level diversification, stemming from the recombination of firm capabilities (Elekes et al., 2019; Neffke et al., 2018; Tanner, 2014; Turco & Maggioni, 2016, 2019; Zhang & Rigby, 2022). This emerging subline of enquiry has tensioned the existing opposite perspective between whether regionally embedded capabilities (e.g., Turco & Maggioni, 2016) or firms' internal capabilities (Tanner, 2014; Zhang & Rigby, 2022) shape regional diversification. Therefore, as Tanner (2014) and Zhang and Rigby (2022) point out, new capabilities for diversification of regions are more likely to emerge within the firm than they are to be built within the region, refocusing on the micro-level process of regional diversification and thus complementing other literature on that perspective, such as spinoffs (Klepper, 2007). What are the fundamentals of this micro-level process of diversification?

The *resource-based view* of the firm (RBV) and the related *dynamic capabilities* (e.g., Barney, 1991; Peteraf, 1993; Teece et al., 1997) together constitute a framework to understand firms' internal capabilities recombination to innovate, linked to the idea of absorptive capacity (Cohen & Levinthal, 1990). A firm's absorptive capacity, as a dynamic capability, is defined as skills and resources to 'integrate, build, and reconfigure internal and external competences to address rapidly changing environments' (Teece et al., 1997, p. 516). Firms present heterogeneity of resources and capabilities that sustain their competitive advantage (Barney, 1991), along with dynamic capabilities to reconfigure and dynamically sustain them (e.g., Teece, 2007). That reconfiguration or recombination of capabilities is linked to diversification.

The fundamentals of firm-level diversification are based on the core idea that firms use their existing resources and capabilities by adding new activities/products/processes to their core one (e.g., Peteraf, 1993), searching for alternative applications (activities, products, markets, etc.) for their existing capabilities. This is achieved by recombining their own internal capabilities through external knowledge (open innovation) (e.g., Kline & Rosenberg, 1986; Chesbrough, 2003), along with their own innovation activities, constituting a conceptual base for diversification. Thus, firms build upon their core competences by specialising in related fields (Penrose, 1959).

Our argument points out that firms combine (Kogut & Zander, 1992) specific sets of coherently integrated external sources of knowledge according to their absorptive capacity (Cohen & Levinthal, 1990). As it is evidenced that complex knowledge resists diffusion because it is tacit and sticky, and does not travel well, *local* search is assumed in the innovation process (Becattini, 1990; Sorenson et al., 2006). Therefore, we argue that in industrial districts in intermediate regions, with limited infrastructure and industries, the locus of diversification will be reduced to those new activities existing in the territory that also require similar skills and technologies. Thus, new activities leveraged by a firm's existing capabilities are highly likely recombined with local available knowledge and assets, that is, Marshallian externalities regionally available. Put differently, in industrial districts, existing Marshallian externalities, such as skills, suppliers and knowledge are reused and recombined with those new activities originated at the firm level. Local tacit knowledge abundant in industrial districts restrains the scope of potential diversification by local firms, as the local tacit knowledge is based on learning-by-doing and is hardly transferable outside of the local context, technology and institutions.

This localisation of sourcing knowledge and collaboration, for reconfiguring and diversifying capabilities, is alto limited to a firm's cognitive and technologically close resources (e.g., Boschma, 2005; Nooteboom, 2007; Rosenkopf & Nerkar, 2001) that primarily occurs in the local/regional space, the latter reinforced by its social capital and embeddedness (Brusco, 1990; Uzzi, 1996). Shared resources and capabilities in a region are accessed primarily by local firms (Lawson, 1999) that is accessed from within the region (Neffke et al., 2018; Sorenson & Audia, 2000). Therefore, firms seek primarily local available knowledge, that is, Marshallian externalities for our framework, that can be easily integrated and recombined for diversification.[2]

Firms in districts and clusters have abundant knowledge and information regarding local assets. This in-depth knowledge facilitates entrepreneurial innovation through a better reorganisation and reconfiguration of local assets and capabilities to respond to environmental changes and lock-ins (e.g., Hervas-Oliver et al., 2017; Sorenson & Audia, 2000). Thus, local knowledge can be reconfigured to adapt to new opportunities and the new successful changes are rapidly diffused among local competitors. A new sub-identity, that is, new products, activities or technologies (*who we are*, à la Staber) will gradually form sediment on the focal territory and will be legitimated by changing institutions and cognitive structures. In the regional literature, Neffke and Henning (2013) point out that firms are far more likely to diversify into industries that have ties to the firms' core activities in terms of skill-relatedness. In the case of Marshallian economies, it is also argued that they can spillover local and technologically related industries with compatible skills and know-how (Neffke et al., 2011, 2012). This means that diversification is primarily oriented to those related industries that can take the opportunity of the existing in-house skills, more likely than going backward or forward as far as integration is concerned: existing (Marshallian) localisation externalities in the industrial district also influence and operate amongst locally related technologies and firms. For instance, related-skills, à la Neffke et al. (2012) can be applied to locally related industries. Therefore, we argue that local companies' recombination of capabilities includes not only leveraging their own capabilities by innovation activities but also recombining

them with the existing rich environment found in the focal region or industrial district, that is, the existing local *capability domain*: the focal cognitive structure or the set of local skills, competencies and know-how (Bellandi et al., 2018; Menzel & Fornahl, 2009) or distinctive territorially based resources and capabilities shaped by local firm heterogeneity (Andreoni, 2018). By trial and error, firms start to change products and/or customers within the same capability domain, building a new sub-identity (i.e., cognitive structure) in the district. Hence, local firms can explore other related products and customers by capitalising on skills, resources and capabilities that are recombined from local resources, challenging pre-existing local institutions and altering gradually the focal local capability domain.

In short, we expect that industry diversification in industrial districts in intermediate (non-advanced ones) regions is primarily driven by firm-level diversification, which occurs from the recombination of internal capabilities with those local available Marshallian pre-existing capabilities: recombining its own capabilities (heterogeneity) with available Marshallian externalities (all of them, suppliers, knowledge, skills) that prevail amongst new related industries. We argue that *industry* diversification, rather than technological diversification, is more common in districts in intermediate regions, due to the limited infrastructure and industries available. Therefore, in these Marshallian and intermediate regional settings, diversification will be reduced to those new firm-level activities originated from the recombination of local available capabilities (externalities), along a simultaneous transformation of local institutions and cognitive structures in line with the new local sub-identity.

3. METHODOLOGY AND SETTING

This study uses mixed methods, including patent analysis from 1895 to 2019 and 18 direct face-to-face interviews with business representatives (12, three of them with in-depth case studies), support organisation representatives (five) from AIJU (a local research and transfer institute devoted to local industries) and IBIAE (a local business association). In addition, we access secondary reports, materials and interviews from the local industrial museum (Toy Museum[3]), along other data from the SABI database (Bureau van Dijk) and the Spanish Association of Toy Manufacturers (AEFJ[4]), which is located at the heart of the district, in Ibi, signalling the importance of the territory for this industry in Spain. Interviews[5] and secondary data unfolded the *process* of product diversification, while the analysis of the patents showed the evolution and transformation *outcome* of the focal territory. We especially focused on the diversification of products. The Toy Valley district is called a Marshallian industrial district (Balland et al., 2016; Belso-Martinez et al., 2018; Hervás-Oliver et al., 2021), constituting a typical socio-economic context based on cooperation, competition and social ties among small firms. According to Hervas-Oliver (2021a), the district is responsible for 7000 manufacturing jobs and around 400 firms, most of which are small and medium-sized enterprises, in five close municipalities. For more information about the method and setting, see Appendix A in the supplemental data online. All study participants provided informed consent for their data to be used in the article, following the Universitat Politècnica de València ethics committee.

4. INTERVIEWS AND SECONDARY DATA: THE PROCESS OF CHANGE

Consistent with Hervas-Oliver and Sempere-Ripoll (2016), analysis of secondary sources points out that the formation of the district with the local Paya family around 1905. The family started production of metallic products and it was the *parent family* that spawned many new firms through a continuous process of spinoffs à la Klepper. In the 1960s, plastic injection technologies were gradually adopted, renewing the stock of competences and entering into new segments and products, complementing and replacing wood and metallic components in most toys. Then, during the 1970s, plastic and mechanical/metallic toys, as well as auxiliary components, were the most prominent products in the district.

Coherently with insights from secondary reports, interview findings show three important patterns within the district. First, there was a pervasive process of spinoff formation, when local ex-employees started up their own business locally, continuously since the beginning of the district's inception. As the local Toy Museum informants stated: 'The majority of firms are founded by local workers from the industry that abandoned their former jobs and started up on their own, using their existing skills.' As AIJU researchers stated: 'The spinoff process in this territory has been persistent and prevailing.'

Data from the Toy Museum showed the pervasive spinoff process in the territory, where almost all companies are founded by local entrepreneurs with extensive experience in local firms, that is, local entrepreneurs with region-specific pre-entry experience.[6] In particular, before the 1980s, the majority of new firms were spinoffs spawned by other local toy firms. After the 1980s business landscape change, those starting in the 1990s were not any more producing toys, as their parent companies did, but the majority were spinoffs, engaging in different type of products. For instance, Vicedo Martí, a company founded in 1988 producing plastic moulds for toys,[7] and which then diversified in 1997 into other household plastic products, was a spinoff from Pilen Toys, and this one also another spinoff from Climent Hermanos Toys (the latter also a spinoff from Jyesa Toys). These results confirm that spinoffs are pervasive in industrial districts (Hervas-Oliver et al., 2017) and that they also explain regional diversification, as in Boschma and Wenting (2007) and Boschma (2017).

Second, there was the entrance of multinational companies, especially during the 2000s. These multinational companies brought new technologies and products to the territory, generally acquiring local firms and then using their capabilities for new types of products. As local

informants from AIJU remarked: 'There are many multinational companies that acquired local ones, most of them recombining the business of those local companies' technologies and others continuing with existing operations (e.g., Smurfit Kappa, Johnson Controls, Smooby, SGR Global, Guardian …).' For instance, a local firm Plasticos Vicent, producing plastic toys through plastic weld sheets, diversified to produce packaging for food and beverages (Bag-In-Box products, mostly for bottling wine), using similar plastic technologies with new knowledge from the beverages industry. The company applied its plastic welding technologies and used existing local knowledge (suppliers, tacit knowledge on cardboard, etc.). In 2014, Smurfit Kappa, a giant multinational, acquired[8] Plasticos Vicent and transformed the new local firm to mass-produce Bag-In-Box and other related products. In 2023, the European R&D facilities for that product are in the local district.

Third, there is a massive firm-level diversification in the district, starting in the 1990s, that has led the territory to be multi-industry, while firms dedicated to toys still exist as a minority. As the IBIAE representative commented:

> The entrance of China in the [toy] industry was devastating. Local firms diversified to survive, applying all they knew from toys (plastics, metallic technology, packaging for toys, molding, etc.) into other fields compatible with their existing skills and capabilities.
>
> At the present time, we have companies based on plastics and metallic products serving diverse industries, such as packaging, automotive, energy, equipment, food, etc.; presently, toys are minor.

According to interviews, the firm-level diversification started by applying most of the skills and technologies involved in toys and auxiliary industries (small motors and engines for toys, packaging and plastics process for toys) into other industrial and consumer applications, recombining existing knowledge with new customers' and markets' requirements. The most important local capability domain was built around moulding technology, for both plastics and metallic (toys) products, facilitating pivoting into different markets and products. Rather than a technological diversification, the process seems to fit in an industry diversification change, were managerial and commercial capabilities were very important to access to new industries with existing technologies.

Local informants (serial entrepreneurs and local businesspeople) pointed out the industry diversification phenomenon, rather than a technological diversification. The main idea was to consider that the local externalities are recombined into new products and industries, especially at the firm level:

> Diversification was possible because the plastic and molding technology was excellent in the territory. The problem was not a technical one but a commercial and strategic shift to other different markets. Gradually, it was accomplished.
>
> Nowadays, toys are very minor and not attractive for local companies, other industries such as packaging for cosmetics or healthcare, automobile or high-value added childcare products (plastic-made) are more profitable, have the potential to be customized and do not compete with Chinese products.

For instance, the firm ITC Packaging started in the 1960s being a local spinoff producing toys packaging. Then in the late 1980s, it applied its technology, recombined with new knowledge from food industry, to ice-cream packaging (1989), healthcare packaging (2001) and then developed in-mould labelling (IML) to all different types of packaging for food.[9] Its knowledge was recombined with local externalities, around plastic, and with new knowledge from the new target markets. Similarly, the Vicedo Martí firm used its moulding and plastic injection technology for toys, progressively, for application into packaging for cosmetics and healthcare, using related technologies for new products and markets that were offering more opportunities.

Looking into different examples mentioned during interviews, we investigated specific cases through the SABI database and other directories. As observed in Table A0 in Appendix A in the supplemental data online, local firms recombined their toy-oriented capabilities into new products (different from toys) where *local toy-related* (Marshallian externalities) skills and technologies (metallic, plastic, moulding, etc.) were applied to other type of products or markets, incorporating new competences and capabilities (e.g., designs, certification of health/food normative, just-in-time automotive standards, automation, etc.) (see Table 1 and Table A0 online).

Is this change facilitated by the district? Definitively, yes. First, the focal industrial district presented technologies, skills and industries for toys, as above mentioned. Despite the fact that all of them were dedicated to toys, their complexity offered different capabilities to be recombined locally, also accessing external knowledge from the new consumers and markets. The diversity of the different sub-industries around toy manufacturing (metallic, plastic, mechanical knowledge, packaging, etc.) facilitated knowledge diversity to find new paths. This local knowledge was primarily *tacit* in nature, favouring a better circulation and interpretation in that focal setting.

> We have witnessed toy companies applying molding and plastic injection technologies from toys to packaging; metallic companies producing toy mechanisms turning them into parts for automobiles; wooden toy crafts transformed into furniture and so on and so forth. They utilized the same skills but applied them to other industries, laying foundations for new value propositions in the territory.

Second, the existing social capital with personal and inter-firm ties allowed a rapid circulation of new knowledge and

Table 1. Example of different recombination of local firms' capabilities.

Empresa	Originally	At the present time, 2023
CLR	(1994) Small motors for toys Local spinoff	Small, advanced motors and mechanisms for automobile industry and other industries
Smurfit Kappa (originally Plasticos Vicent)	(1977) Plastic toys, local spinoff Multinational acquisition (Smurfit Kappa)	Plastic and cardboard packaging for food and beverages
Miniland	(1962) Toys (1962) Local spinoff	Educational and healthcare (baby care) products
Actiu	(1968) Home furniture manufacturing Local spinoff	Furniture for offices, airports, schools, etc. (incorporating plastic and metallic parts)
Injusa	(1951) Toys (metallic and wood made) Local spinoff	Toys (electric toys, go karts, electric bikes for children)
Bornay	(1965) metallic tubes for tricycles and toy baby carts Local spinoff	Metallic tubes for multi-industry (equipment and energy industries, among others)
Gonher	Metallic toys (1958) Local spinoff	Metallic toys
Pepri	Toys (plastic-injection) (1969) Local spinoff	Products from plastic injection (consumers products, toys, etc.)
Vicedo Martí	(1988) Moulding for toys (auxiliary industry) Local spinoff	Moulding and manufacturing plastic-based products for cosmetics and healthcare
ITC Packaging	(1960) toys packaging (1989) packaging for food (ice-cream) (2001) packaging for health care Local spinoff	Moulding and manufacturing for food, healthcare and others (in-mould labelling technology – IML)
Flinsa (Gonvarri)	(1972) metallic parts for toys (1988) metallic tubes for toys and other applications Local spinoff	Metallic precision tubes for automotive industry
Avenida Plastics (Johnson Control)	(1967) plastics for toys Local spinoff Acquired by Johnson Controls multinational company Spinoff/multinational	Plastics for automotive and other industrial applications
Inden Pharma	(1965) Metallic moulding for toys (1989) plastic packaging Local spinoff	Plastics for pharmacy (pharmaceutical and healthcare industries: nasal, ophthalmics, etc.)
Inyectados Ibi	(1994) plastic injection toy auxiliary industry Local spinoff	Plastic injection for industrial components, healthcare and others
Juguetes Picó	(1942) Metallic toys Local spinoff	Transforming metallic tubes (mostly for toys), plastic injection, converted from fabric
Creaprint	(1987) labels for toys Local spinoff	In-mould labels for food industry and others
Claudio Reig	(1957) musical toys Local spinoff	Musical toys from different materials (plastic)
Colortec Quimica	(1980s) Chemical colours for plastics (toys)	Chemical colours for plastic (shoes, agriculture, etc.)

Sources: Authors' own, from interviews, SABI database (Bureau van Dijk) and companies' own websites.

existing knowledge applied into other products, diffusing new opportunities and value propositions in the territory. As noticed:

> We know each other, family, friends and competitors alike are all part of the local community. We all shared schools, sports teams or social clubs. Knowing *who* does this or that is very easy; some know-how is relatively easy to access through friendship and social ties, much more than through inter-firm ties. The reconfiguration of local knowledge to provide new products is facilitated by this social aspect.

> Local entrepreneurs possess a lot of information and knowledge before entering into a new market or product by applying their existing technologies. This pre-entry information is very good knowledge for the local businessmen.

> In general, most of knowledge utilized and recombined was originated in the territory: this knowledge is easily interpreted and applied, fits to existing local technology and most actors to make it operational are in the territory. Knowledge from other places I presume is not this way.

How did this process of change work at the micro-level? Most local companies dedicated to toys turned their capabilities towards new applications. As one leading company reported:

> Our field was plastic molding and injection for toy manufacturing. We were an auxiliary company in the toy industry. The market was shocked by new low-cost producers from China so we started to redeploy our skills into new products. After observing some different markets, we started by trial-and-error to produce molds and inject plastic for household products. We learned about new normative, standards and new distribution channels. Then, we also shifted into more profitable packaging for food, health care and other industries. While our core capability still was plastic technologies, we searched for new knowledge in the local value chain and in the new industries (external knowledge). We recombined our plastic technology with other new capabilities required for new industries (e.g., automation). We are now in the food plastic-packaging value chain.

This industry diversification was also supported by a re-adaptation of the local supporting organisations, such as the AIJU research centre that also shifted the focus from toys to all different plastic and moulding related industries, providing knowledge-intensive services, information and technological support on the new assets of the territory and subsequent policymaking initiatives that started to consider those specificities.

The new sub-identity, *who we are*, was also legitimated because the local supporting organisations, dedicated to toys, started to change the tide towards the new products and industries. New seminars, technology demonstration platforms, training, etc. were organised in the core local technologies (plastic, metallic processes, etc.) but apply to the new challenges: food industry, packaging, industrial applications, etc. Since the mid-1990s on, the shared goals and collective conscience has rapidly shifted from the old toy paradigm.

Overall, we found that (Marshallian) localisation economies from toys in the industrial districts, based on moulding, plastic injection and metal-mechanic capabilities were still operational and prevalent for local firms that used those capabilities for new different purposes (different markets, products and even technologies) in their micro-level diversification process.

5. THE OUTCOME: PATENT ANALYSIS FOR UNDERSTANDING DISTRICT DIVERSIFICATION

5.1. Data and method

A total of 3592 patents and utility models, the latter less restrictive than patents and more demanded by small and medium-sized enterprises, from the district were retrieved from the Spanish Patent Database INVENES, covering the period 1895–2019 (see Table A1 in Appendix A in the supplemental data online; Table A2 online presents a brief description of the different variables used for analysing the 3592 patents and utility models). We classified the patents according to the International Patent Classification (IPC) and their function for mapping the different knowledge and products available in the territory.[10] IPCs, categorised in family products, depict the different technologies and products that make up the evolution of the focal dynamic (and branching) territory capability domain.

Among the different ways to measure technological relatedness (Balland et al., 2019), we used those that focused on *products*, finding for each patent its product category ascription, in line with Hidalgo et al. (2007). We also use Breschi et al. (2003), classifying patents according to IPC codes. Then combining both approaches, we build a database that shows the different products patented in the territory and their associated IPCs. Our main purpose is to evidence the regional diversification, as an outcome, to triangulate with the transformation process described in the interviews and other secondary data analysis.

5.2. Results

Figure 1 and Table A3 in Appendix A in the supplemental data online show the different capability domains in the focal territory throughout the five periods analysed. The evolution of the focal district's capabilities are represented. We established the different periods or district life cycle stages from the new generation of technologies and products that became dominant from the patent analysis, as well as from studying events from the historical reconstruction that occurred at each different time period.

- Period 1 (1893–1957): inception of the district with the small presence of externalities; metallic products dominated (metallic toys and other metallic products).

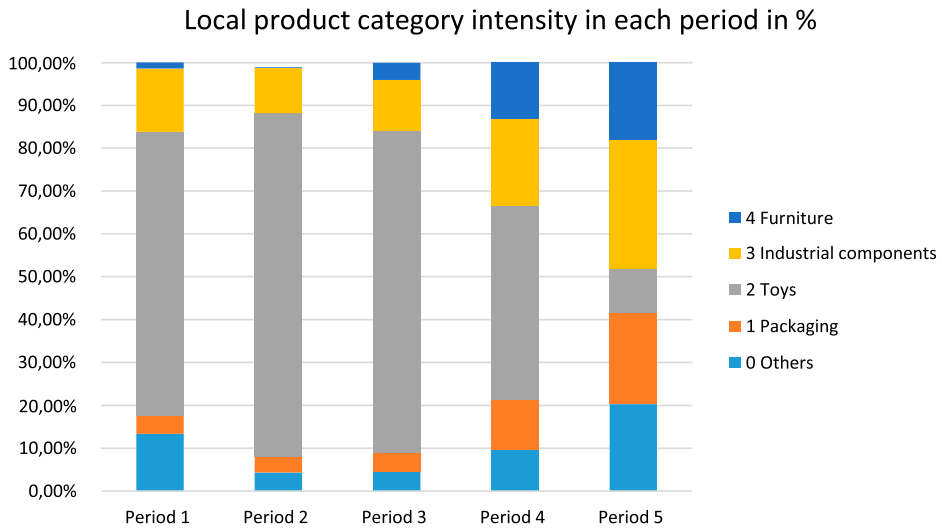

Figure 1. Description of products per period on average.
Source: Authors' own elaboration from data from patents and utility models.

- Period 2 (1958–79): growth; transition to plastic-based technologies, along with existing metallic ones (metallic and plastic-based toys).
- Period 3 (1980–92): crisis from Asian industries and beginning of transformation.
- Period 4 (1993–2007): diversification pervasive and generating new products and sub-identities in the territory (metallic products for automotive, plastic-based packaging and others).
- Period 5 (2008–19): Great Recession and industry diversification fully adopted in the territory.

In Figure 1 and Table A3 in Appendix A in the supplemental data online, period 1 signals, through the patents published in those years (1893–1957), the inception of the district, being the most relevant product, according to patents and utility models, the category 'toys' (66%), being the types of toys in that period those made of wood or metallic products (plastic was not invented yet), followed by 'industrial components' (15%), 'others' (13%) and 'packaging' (4%), respectively, the latter made of cardboard and paper. Primarily, these 'packaging' type products were for the 'toys' and the 'furniture' product type in this period is minor and applied to toys. The same product category 'toys' is preeminent in period 2, being also the rest of the products or industry just the auxiliary one for 'toys' (packaging or components). The 'toys' category accounted for 80% of patents, being the real dominant capability domain. Period 2 produced 626 patents and utility models, albeit most of them without IPCs. According to informants from AIJU and the local museum, the second part of period 2 brought the introduction of plastics that started just as auxiliary components to the metallic products. During the 1970s, plastic became more used by local industry, with or without combinations of metallic products.

Period 3 (1980–92) starts with a recent oil crisis (from the late 1970s) and an industrial crisis in the Spanish manufacturing industry in the early 1980s. At the same time, leading manufacturers start to seek cost advantages in Asian economies, such as China. Then, diversification into other products started, producing metallic products and plastic ones for other industries and markets different from 'toys', albeit toys still dominated the focal district. In this period 3, the dominance of the product type 'toys' continued, but now the district started to diversify.

Period 4 (1993–2007) shows that the most common type of product in this period continued to be 'toys', but we can see that it had already dropped to 45% of the patents analysed, when period 2 represents more than 80% (see Table A3 in Appendix A in the supplemental data online). The product type 'packaging' was no longer just for toys, as it could be for construction or other industrial or consumer products, and the same holds for 'industrial components'. The trend towards greater diversification anticipated in period 4 was fully developed in period 5, where the product category 'toys' totally disappeared from first position, dropping to fifth in the ranking of local products (10.3%). In first position, we observed the 'industrial components' category with 30% of the cases. The 'other' category went from 9.5% in the previous period 3–20.2% (see Table A3 online) and the 'packaging' category was now the third in importance and did not appear as a complement to toys, but constituted a whole range of products for other applications.[11] 'Furniture' relates to industrial furniture for offices and the contract market (equipment for airports, universities, etc.,) combining metallic, plastic and wooden (minority) components in products with that category (Figure 1 and see Table A3 online).[12]

Overall, this patent analysis showed the output, the industry diversification of the territory. All different products shown, ascribed to the IPCs of patents, generally are based on a combination of pre-existing plastic- and metallic-based technologies. Interestingly, previously existing Marshallian externalities around plastic and metallic products, originally created from toy manufacturing, were preserved and recombined with new knowledge

from firm innovation to reach different markets/customers, the entrance of multinationals in related products or a process of regional spinoff. The combination of these drivers unveils a firm-level mechanism to explain regional branching in Marshallian districts in intermediate regions.

6. CONCLUSIONS

We argue that regional diversification lacks an explicit mechanism to explain how a region branches into new products. Contextualising in districts, our research question is: How does regional diversification occur? We posit that the origin of branching is based on firm-level diversification, which is rather overlooked. We elaborate and show that the mechanism for regions to diversify is based on a firm-level diversification process through recombining their own heterogeneous capabilities with those available in the local/regional settings, generating thus a related-driven regional industry diversification. We also argue that this industry diversification might be more observable in industrial district settings in intermediate regions, differing from that technology diversification occurring in advance/thick regions. In doing so, this article contributes to the *agents of change* literature (Tanner, 2014) and to connect relatedness diversification to the Marshallian literature.

This study explores whether regionally embedded or firm internal capabilities recombination leads to regional diversification, contributing to disentangling this tension. Specifically, our goal consisted of unfolding and explaining district branching and how it occurs in intermediate regions by exploring firm-level diversification as a main mechanism. As pointed out by Tanner (2014), the latter is under-researched. In addition, we explore the relationship between diversification and Marshallian externalities, researching the role of industrial district localisation economies in a diversification process. Using mixed-methods, we analysed the Toy Valley district (Alicante, Spain). Results show the gradual district-related industry diversification from manufacturing toys to produce parts and components for packaging, automotive, health, food and other industries and the mechanisms that explain it.

As results indicate, district diversification occurs primarily from local firm-level diversification, recombining firm capabilities with those local existing Marshallian externalities. This process transformed the focal district's capability domain from toys to multi-industry products around plastic and metallic technologies cultivated for almost 80 years upon a toy manufacturing basis. After decades of specialisation in toys, the learning dynamics of the district firms since the 90s were based on gradual firm-level diversification process. Local entrepreneurs were recombining local existing technologies, incorporating new activities and knowledge usually related to the existing one in the district. The regional learning process and capability diversification and reconfiguration was primarily based on local firm-level recombination of capabilities, capitalising on their previous toy-dedicated and locally available (Marshallian externalities) moulding, plastic injection or metal-mechanic capabilities for embracing new opportunities in other industries where those capabilities were applicable. Factors external to the cluster linkages were also important. In particular, knowledge from new customers and markets (food, pharmacy, automotive) brought ideas and products' requirements for reusing local capabilities. Similarly, spinoffs also played a role, as well as the entrance of multinationals in the new activities. *Imitation* gradually complemented *cooperation and networking*, reinforcing the rapid circulation of knowledge in the district.

Findings show that both mechanisms play a role and coexist, pointing out that new district capabilities are likely to be generated within firms rather than built in the region, albeit the regionally embedded capabilities support, through local existing Marshallian externalities, the firm-level diversification process. The latter occurs because of the intensive *local* search of the firm diversification process in these settings. In other words, capability recombination in firm-level diversification is one of the pervasive mechanisms (along with networking, spinoffs and multinationals, etc.) that drive district industry diversification: firms diversify primarily by recombining their own heterogeneous capabilities with those locally available in the local/regional settings, for the case of intermediate regions.

Why did industrial district firms primarily access local externalities in intermediate regions? The lower diversity of local industries in industrial districts in intermediate regions, the low absorptive capacities of local firms and the positive district effect (social capital), facilitating a preferential access to local knowledge to *insiders*, enhance the fact that the knowledge source for that recombination process is related to that existing in the local setting, technology and paradigms, in line with literature on districts (e.g., Hervas-Oliver et al., 2018, 2021b, 2022; Sorenson & Audia, 2000). The low complexity observed through the IPCs and their associated technologies, and the relatively related type of products along the time window studied, most of them related to the pre-existing local capabilities, show a district-related industry diversification process. Incumbents mainly specialise and reinforce the existing regional base through related diversification (Neffke et al., 2018), not conducting structural change (unrelated diversification). In addition, the insights about the pervasive local spinoff process, where most entrepreneurs have extensive experience in the focal local industry, shows that local (insiders) entrepreneurs with region-specific pre-entry experience reinforce the local district's core activities, in line with Neffke et al. (2018). Our results also confirm the stylised fact from the regional relatedness diversification literature (Boschma & Frenken, 2011; Frenken & Boschma, 2007), where it is pointed out that related diversification means that new activities spin out of existing activities. Also, in line with Boschma and Frenken (2011), relatedness also drives localisation economies, and Marshallian economies spillover local and technologically related industries with compatible skills and know-how, that is, foster diversification (Neffke et al., 2011,

2012; Potter & Doug Watts, 2014). Thus, we state the following propositions:

> *Proposition 1: In intermediate regions' industrial districts, the relatedness diversification process is driven primarily by a firm-level diversification process that recombines firm capabilities and local existing Marshallian externalities.*
> *Proposition 2: In intermediate regions' industrial districts, firms' diversification is dependent on local tacit knowledge from existing Marshallian externalities that is cognitive and technologically close and accessible to local firms' limited absorptive capacity.*
> *Proposition 3: In intermediate regions' industrial districts, social capital and networking facilitates recombination of existing Marshallian externalities.*

Eventually, the focal district recombined its capability domains and also its identity. Thus, the district gradually accepted different sub-identities and cognitive structures beyond toys and, once legitimised, challenged the historical *district institutional configuration*, that is, the combination of shared goals, behaviours and relations (in the sense of Harris, 2021). The narratives for legitimising new products, customers, routines and information were pervasively founded in the territory and local routines were developed around new applications of existing local technologies that turned into new opportunities: from 'we are toys' to we are 'multi-industry products', capitalising on their original plastic and metallic manufacturing expertise. Clearly, the different technological trajectories of local firms drove a *path diversification* (Isaksen et al., 2018) in the focal district, local firms were the main actors enacting change and driving district evolution.

There is not one single catalyser of regional diversification but rather a combination of different factors. Our findings indicate that regional diversification is fuelled primarily by the firm-level diversification process, that is, firm heterogeneity of capabilities and its natural innovation process is the dominant driver. This process, however, is complemented by related ones such as spinoffs and the entrance of multinationals, the effects of supporting organisations and the entrance of new knowledge from outside the thematic boundary of the territory. These complementary drivers, in combination with the dominant one, gradually reconfigure existing Marshallian externalities, sediment new capabilities in the territory and adapt institutions, establishing a new identity and a new *who we are*, legitimising new products and establishing new community-based commitments in networks. The diffusion of these new components in the territory is also supported by an amazing and pervasive process of networking (*learning with*) and imitation (*learning from*) that branches the territory.

Our insights bring implications for policymakers, pointing out how important is to consider not only the regional capabilities but firm-level diversification in the regional branching process. For scholars, it is also important to reinforce the power and value of the socially thick local/regional networks and the available Marshallian externalities to diversify; in addition, we point out that branching necessarily requires consideration of not only the regional capabilities but different components like spinoffs, multinationals, institutional reconfiguration, etc., as well as understanding of the central role of firm heterogeneity. Finally, for managers, we show how important is local externalities for undertaking diversification in firms, especially in non-advanced regions.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

FUNDING

Funding by MICIN/AEI/10.13039/501100011033 [grant number PIDI2021-128878NB-100, project INNI4-CLUSTER].

NOTES

1. We use indistinctively clusters and districts, despite their 'social' difference, and also *new path development* generically for the local transformation, in the sense of Isaksen et al. (2018).
2. Cognitive inertia might occur under this perspective (Breschi et al., 2003; Glasmeier, 1991).
3. See https://www.museojuguete.com/en/
4. See https://www.aefj.es/
5. Following Neffke and Henning (2013), we follow a resource-based relatedness in the interviews.
6. Data are available from the authors upon request.
7. See https://www.vicedomarti.com/en/history/; founder Mr. José Vicedo.
8. See https://www.smurfitkappa.com/us/newsroom/2014/opening-of-new-bag-in-box-plant
9. See https://www.itc-packaging.com/en/history/
10. For a list of IPC codes and their corresponding products, see in Appendix A in the supplemental data online.
11. Example: 'molded beverage and food containers' or 'self-assembly fluid pouch packaging'.
12. See https://www.actiu.com/en/furniture-airports/ or https://www.actiu.com/en/furniture-education/ as examples.

ORCID

Jose Luis Hervas-Oliver http://orcid.org/0000-0001-6438-5497
Carles Boronat-Moll http://orcid.org/0000-0003-4714-9200
Francisca Sempere-Ripoll http://orcid.org/0000-0003-2658-6196
Jose Mariano Dahoui-Obon http://orcid.org/0000-0002-7033-5135

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