INDUSTRY DIVERSIFICATION IN INDUSTRIAL DISTRICTS: IS IT ABOUT EMBEDDED REGIONAL OR FIRM-LEVEL CAPABILITIES?

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Abstract: We analyze 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. Utilizing mixed methods and patent analysis (1895–2019; 3,592 patents and utility models), product diversification in the Toy Valley district in Alicante (Spain) is analyzed, showing that firm-level related-diversification with extensive local search explains the mechanism of the regional relatedness-diversification

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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; Tödtling and Trippl 2013; Frenken and Boschma 2007). 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. Feldman, Kogler, and Rigby 2015; Kogler 2015; Boschma, Balland, and Kogler 2015; Pylak and Kogler 2021). 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* sub-line of inquiry, where specific regional actors, i.e. firms, drive the diversification process (Zhang and Rigby 2022; Lo Turco and Maggioni 2016; Hidalgo et al. 2018; Tanner 2014; Turco and Maggioni 2019; Elekes, Boschma, and Lengyel 2019).

While relatedness-diversification points out different mechanisms like spinoffs, networking or the entrance of multinationals (Klepper 2007; Boschma 2017; Elekes, Boschma, and Lengyel 2019), other drivers such as firm-level diversification are under-researched, as stated by Tanner (2014) and Zhang and Rigby (2022). Literature has even pointed out an existing tension between whether regionally embedded capabilities (e.g. Turco and Maggioni 2016) or firms' internal capabilities (Zhang and Rigby 2022; Tanner 2014) 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 firm-level diversification process through recombining their own capabilities with those Marshallian externalities available in the local/regional settings, generating thus a related-driven regional diversification. Thus, 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 literature (e.g. Tanner 2014) and districts' evolution and renewal (e.g.

Belussi and 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 and 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 and 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 Watts (2014) being an exception. For this reason, we position our research in industrial districts[i] in intermediate regions. These regions innovate intensively without R&D and present high specialization in clusters/industrial districts (e.g. Veneto or Valencia Region; see Appendix). Despite not being advanced regions, they are not institutionally thin peripheral ones but rather specialized (in the sense of Isaksen and Trippl 2017). Diversification of local activities is less studied in the case of less advanced regions (see Pylak and Kogler 2021; Whittle and Kogler 2020; Isaksen 2015), 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 analyzes 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 analyze 3,592 patents and utility models for more than one century (1895–2019), complementing this with direct interviews with local firms and support organizations 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 like a pervasive spinoff process, institutional reconfiguration, the role of supporting organizations, 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 vs firm capabilities drive regional diversification (e.g. Zhang and Rigby 2022) and unfolds the mechanism explaining regional and district industry diversification (e.g. Belussi and 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's 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, contributing to industrial districts (Hervas-Oliver et al., 2022).

2. LITERATURE REVIEW

Generally speaking, relatedness-diversification literature (e.g. Frenken and Boschma 2007; Pylak and Kogler 2021; Whittle and Kogler 2020) has highlighted the importance of regional capabilities for regional branching, linking both through related diversification: new activities spin out of existing ones. Branching literature primarily focuses on regionally embedded capabilities as drivers of change (Boschma, Balland, and Kogler 2015; Balland et al. 2019; 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) in the equation, we open the door to consider that regional diversification is also triggered by firm-level diversification, steaming from the recombination of firm capabilities (Zhang and Rigby 2022; Elekes, Boschma, and Lengyel 2019; Turco and Maggioni 2016; 2019; Neffke et al. 2018; Tanner 2014). This emerging sub-line of inquiry has tensioned the existing opposite perspective between whether regionally embedded capabilities (e.g. Turco and Maggioni, 2016) or firms' internal capabilities (Zhang and Rigby 2022; Tanner 2014) shape regional diversification. Therefore, as Tanner (2014) or 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, Pisano, and Shuen 1997), together, constitute a framework to understand firms' internal capabilities recombination to innovate, linked to the idea of absorptive capacity (Cohen and 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" (see Teece et al., 1997:516). 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 et al. 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 utilize 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[ii]), along with their own innovation activities, constituting a conceptual base for diversification. Thus, firms build upon their core competences by specializing in related fields (Penrose 1959).

Our argument points out that firms combine (Kogut and Zander 1992) specific sets of coherently integrated external sources of knowledge according to their absorptive capacity (Cohen and 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 (Sorenson, Rivkin, and Fleming 2006; Becattini, 1990). Therefore, we argue that in industrial districts in intermeditate regions, with limited infrastucture and industries, the locus of diversification will be reduced to those new activities existing in the territory that also require smiliar 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 reutilized and recombined with those new activities originated at the firm-level. Local tacit knowledge abundant in IDs 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 localization of sourcing knowledge and collaboration, for reconfiguring and diversifying capabilities, is alto limited to a firm's cognitive and technologically close resources (e.g. Rosenkopf and Nerkar 2001; Nooteboom 2007; Boschma 2005) that primarily occurs in the local/regional space, the latter reinforced by its social capital and embeddedness (Uzzi 1996; Brusco 1992). Shared resources and capabilities in a region are accessed primarily by local firms (Lawson 1999), that is accessed from within the region (Sorenson and Audia 2000; Neffke et al. 2018). Therefore, firms seek primarily local available knowledge, that is Marshallian externalities for our framework, that can be easily integrated and recombined for diversification[iii].

Collaboration is key for SMEs in less advanced regions (e.g. Hervas-Oliver et al., 2021). These firms in districts and clusters have abundant knowledge and information regarding local assets. This in-depth knowledge facilitates entrepreneurial innovation through a better reorganization and reconfiguration of local assets and capabilities to respond to environmental changes and lock-ins (e.g. Hervas-Oliver, Lleo, and Cervello 2017; Sorenson and 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, Henning, and Boschma 2012; Neffke et al. 2011). 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) localization externalities in the ID also influence and operate amongst locally-related technologies and firms. For instance, related-skills, *à la* Neffke, Henning, and Boschma (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 ID, that is, the existing local *capability domain*: the focal cognitive structure or the set of local skills, competencies and know-how (Bellandi, Santini, and Vecciolini 2018; Menzel and Fornahl 2009) or distinctive territorially-based resources and capabilities shaped by local firm heterogeneity (see 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 capitalizing 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 infrastucture 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 utilizes 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 organization representatives (5) from AIJU (local research and transfer institute devoted to local industries) and IBIAE (local business association). In addition, we access to secondary reports, materials and interviews from the local industrial museum (Toy Museum[iv]), along other data from the SABI database (*Bureau Van Dijk*) and the Spanish Association of Toy Manufacturers (AEFJ[v]), that is located at the heart of the district, in Ibi, signaling the importance of the territory for this industry in Spain. Interviews[vi] 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, Belso-Martínez, and Morrison 2016; Belso-Martinez et al. 2018; Hervas-Oliver 2021b), constituting a typical socio-economic context based on cooperation, competition and social ties among small firms. According to Hervas-Oliver (2021b), the district is responsible for 7,000 manufacturing jobs and around 400 firms, most of which are SMEs, in five close municipalities. See more information about method and setting in the Appendix. All study participants provided informed consent for their data to be used in the article, following the UPV 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 60s, 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 70s, 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[vii]. In particular, before the 80s, the majority of new firms were spinoffs spawned by other local toy firms. After the 80s business landscape change, those starting in the 90s 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 molds for toys[viii], 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 also 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 utilized existing local knowledge (suppliers, tacit knowledge on cardboard, etc.). In 2014, *Smurfit Kappa*, a giant multinational, acquired[ix] *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 90s, 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 molding 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 60s being a local spinoff producing toys packaging. Then, in the late 80s, applied its technology, recombined with new knowledge from food industry, to ice-cream packaging (1989), health care packaging (2001) and then developed IML (in-mold labelling) to all different types of packaging for food[x]. 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 molding and plastic injection technology for toys, progressively, for application into packaging for cosmetics and health-care, 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 A-0, local firms recombined their toy-oriented capabilities into new products (different from toys) where *local toy-related* (Marshallian externalities) skills and technologies (metallic, plastic, molding, 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 A-0 in the Appendix to complement Table 1. See **Table 1.**

Insert Table 1 here

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, favoring 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 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 organizations, such as the AIJU research center that also shifted the focus from toys to all different plastic and molding 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 organizations, dedicated to toys, started to change the tide towards the new products and industries. New seminars, technology demonstration platforms, training, etc. were organized in the core local technologies (plastic, metallic processes, etc.) but apply to the new challenges: food industry, packaging, industrial applications, etc. Since the mid-90s on, the shared goals and collective conscience has rapidly shifted from the old toy paradigm.

Overall, we found that (Marshallian) localization economies from toys in the IDs, based on molding, plastic injection and metal-mechanic capabilities were still operational and prevalent for local firms that utilized 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 3,592 patents and utility models, the latter less restrictive than patents and more demanded by SMEs, from the district were retrieved from the Spanish Patent Database INVENES, covering the period 1895 to 2019. See Appendix and Table A-1. In table A-2 in the Appendix we present a brief description of the different variables utilized for analyzing the 3,592 patents and utility models. We classified the patents according to IPCs and their function for mapping the different knowledge and products available in the territory[xi]. IPCs, categorized 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 (see Balland et al. 2019), we utilized those that focused on *products*, finding for each patent its product category ascription, in line with Hidalgo et al. (2007). We also use Breschi, Lissoni, and Malerba (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

[Insert Figure A-1 here]

Table A-3 in the Appendix shows the different capability domains in the focal territory throughout the five periods analyzed. Then, Figure A-1 graphically depicts Table A-3. The evolution of the focal district's capabilities are represented. See Figure A-1 and Table A-3 in the Appendix. 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 small presence of externalities; metallic products dominated (metallic toys and other metallic products).
- Period 2 (1958-1979), growth; transition to plastic-based technologies, along with existing metallic ones (metallic and plastic-based toys).
- Period 3 (1980-1992), 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 (2008-2019) Great Recession and industry diversification fully adopted in the territory.

In Table A-3 or Figure A-1, 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 70s, plastic became more utilized by local industry, with or without combinations of metallic products.

Period 3 (1980–1992) starts with a recent oil crisis (from the late 70s) and an industrial crisis in the Spanish manufacturing industry in the early 80s. At the same time, leading manufacturers start to seek cost advantages in Asian economies, like 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 analyzed, when Period 2 represents more than 80% (see Table A-3). 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 to 20.2% (see Table A-3) 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[xii]. "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[xiii]. See Table A-3 (Appendix) and Figure A-1.

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. Contextualizing 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 ID localization economies in a diversification process. Using mixed-methods, we analyzed 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 specialization 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, capitalizing on their previous toy-dedicated and locally available (Marshallian externalities) molding, 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 re-using 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 co-exist, 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 ID firms primarily access local externalities in intermediate regions? The lower diversity of local industries in IDs 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, 2021b; Hervas-Oliver, Lleo, and Cervello 2017; Sorenson and 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 specialize 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 stylized fact from the regional relatedness-diversification literature (Frenken and Boschma 2007; Boschma and Frenken 2011), 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 localization economies, and Marshallian economies spillover local and technologically related industries with compatible skills and know-how, that is, foster diversification (Neffke et al. 2011; Neffke, Henning, and Boschma 2012; Potter and Watts 2014). Thus, we state the following propositions:

P1: 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.

P2: 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.

P3: 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 legitimized, challenged the historical *district institutional configuration*, that is, the combination of shared goals, behaviors and relations (in the sense of Harris, 2021). The narratives for legitimizing 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", capitalizing on their original plastic and metallic manufacturing expertise. Clearly, the different technological trajectories of local firms drove a *path diversification* (Isaksen, Tödtling, and Trippl 2018) in the focal district, local firms were the main actors enacting change and driving district evolution.

There is not one single catalyzer of regional diversification but rather a combination of different factors. Our findings indicate that regional diversification is fueled 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 organizations 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*, legitimizing 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 heterogeneity and 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.

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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) Molding for toys (auxiliary industry) Local spinoff	Molding and manufacturing plastic-based products for cosmetics and health-care
ITC Packaging	(1960) toys packaging (1989) packaging for food (ice-cream) (2001) packaging for health care Local spinoff	Molding and manufacturing for food, healthcare and others (In-mold 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 molding 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	IML (in mold labels) labels for food industry and others
Claudio Reig	(1957) musical toys Local spinoff	Musical toys from different materials (plastic)
Colortec Quimica	(80s) Chemical colors for plastics (toys)	Chemical colors for plastic (shoes, agriculture, etc)

Source: own, from interviews, SABI database and company's own webpages.

APPENDIX

Method and Settings

Field work was conducted throughout 2015 to 2019. In 2020 and 2021 we checked results with the support organization representatives and discussed the conclusions from the complete analysis in two meetings with AIJU representatives. Field work for this project was also enriched by the analysis of the district under an R&D contract with the regional policymakers during 2017 (Valencian Regional Government designed an industrial plan for the next 6 years, 2018-2023, named PEIV[1]), therefore, additional information and interviews complemented the analysis but were not computed for this particular project. Then, 3,595 patents and utility models from the district municipalities were analyzed (1985-2019, from INVENES, Spanish Patent Database from the Ministry of Industry[2]), tracing the evolution of the different products and their related technologies patented in the district, as explained in the Empirics Section. Complementarily, interviews helped to interpret the type of products and technologies at each time with the informants. Finally, additional secondary sources (press reports, industry analyses, etc.) were investigated to contextualize the evolution of the analysis.

As regards support organizations, the district is well endowed with public-private research and technology labs (AIJU), local business associations (IBIAE), a cooperative-oriented cluster platform ("Innovative Toy Valley Cluster"), as well as plastic- and metal-dedicated vocational training centers, specialized press and others. Especially relevant is the role of AIJU, which serves as a research lab for the local technologies, supporting local innovation, research, testing, certification of products and other knowledge-intensive services. As indicated by Hervas-Oliver (2021b), AIJU[3] is especially central for the territory, as it is specialized in the local technologies on manufacturing- and plastic-related technologies that are the core technology in that territory, with more than 80 highly-qualified staff for innovation. Following Belso-Martinez et al. (2018), supporting organizations in the Toy Valley perform three main roles, such as coordination of local

[1] Valencian Manufacturing Strategic Plan, see more here: http://www.indi.gva.es/es/web/industria-e-i-d-i/estrategia-politica-industrial

[2] https://invenes.oepm.es/InvenesWeb/faces/busquedaInternet.jsp;jsessionid=7bTe69MZlmW7T2j3EYIEchmu.srvvarsovia1

[3] See more here: https://www.aiju.es/en/about-us/#about

institutions, as an interconnector among local organizations and as a gatekeeper, connecting the district to external networks. Moreover, the “Innovative Toy Valley Cluster” supports and facilitates collective efforts (e.g. competitive intelligence and information gathering, serving as a forum for strategic reflections, fostering cooperation among firms and organizations, and conducting lobby actions focused on the public administrations, among many other tasks). Finally, toys were, up to the 80’s, so impressively important in the focal territory that the *Spanish National Association of Toy Manufacturers* (AEFJ[4]), representing the whole industry in Spain is located in Ibi, providing information, lobbying, knowledge on trends, among other services to the entire industry and especially to local firms.

By **intermediate region** we refer to those where firms in these districts/regions are innovative, even without undertaking R&D activities (e.g. Belussi and Sedita 2009; Hervas-Oliver, Manjarres-Henríquez, and Boronat-Moll 2018). The Regional Innovation Scoreboard present these less advance regions that are not peripheral in Tödtling's and Trippl's (2005) perspective, such as those labeled as “moderate” ones like Valencia (ES52, “moderate+”) or North Region in Portugal (PT11, “moderate”). Doing, Using and Interacting (DUI) modes ae prevalent and SME dominate the landscape.

CASE STUDIES

Table A-0. Example of different recombination of local firms’ capabilities

Empresa	**Originally**	**At the present time**	**Knowledge**	**Strategy**
CLR	(1994) Small motors for toys Local spinoff	Small advanced motors and mechanisms for automobile industry and other industries	Internal-to-the firm and local knowledge, external knowledge from automotive	Diversification (similar technologies, new products and new markets)
Smurfit Kappa (Originally *Plasticos Vicent*)	(1977) Plastic toys, local spinoff -Multinational acquisition (Smurfit Kappa)	Plastic and cardboard packaging for food and beverages	Internal-to-the firm and local knowledge, external knowledge from the multinational	Diversification (similar technologies, new products and markets)
Miniland	Toys (1962) Local spinoff	Educational and healthcare (baby care) products	Internal-to-the firm and local knowledge	Diversification (similar technologies, new products and markets)
Actiu	Home Furniture manufacturing (1968)	Furniture for offices , airports,	Internal-to-the firm and local	Diversification (similar and new

[4] https://www.aefj.es/

	Local spinoff	schools, etc. (incorporating plastic and metallic parts)	knowledge	technologies, new products and markets)
Injusa	(1951) Toys (metallic and wood made) Local spinoff	Toys (electric toys, go karts, electric bikes for children)	Internal-to-the firm and local knowledge	Specialization, adaptation of technologies (similar and new technologies, similar products, new markets)
Bornay	(1965) metallic tubes for tricycles and toy baby carts Local spinoff	Metallic tubes for multi-industry (equipment and energy industries, among others)	Internal-to-the firm and local knowledge, also external knowledge	Diversification (similar technologies, new products and markets)
Gonher	Metallic toys (1958) Local spinoff	Metallic toys		Specialization
Pepri	Toys (plastic-injection) (1969) Local spinoff	Products from plastic injection (consumers products, toys, etc.)	Internal-to-the firm and local knowledge	Specialization (toys) and diversification (same technology for new products and markets)
Vicedo Martí	(1988) Molding for toys (auxiliary industry) Local spinoff	Molding and manufacturing plastic-based products for cosmetics and health-care	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)
ITC Packaging	(1960) toys packaging (1989) packaging for food (ice-cream) (2001) packaging for health care Local spinoff	Molding and manufacturing for food, healthcare and others (In-mold labelling technology, IML)	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)
Flinsa (Gonvarri)	(1972) metallic parts for toys (1988) metallic tubes for toys and other applications Local spinoff	Metallic precision tubes for automotive industry	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)
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	Internal-to-the firm and local knowledge, also external knowledge from the multinational	Diversification (similar and new technologies, new products and markets)
Inden Pharma	(1965) Metallic molding for toys (1989) plastic packaging Local spinoff	Plastics for pharmacy (pharmaceutical and healthcare industries: nasal, ophthalmics, etc.)	Internal-to-the firm and local knowledge, also external knowledge from the pharma industry	Diversification (similar and new technologies, new products and markets)
Inyectados Ibi	(1994) plastic injection Toy auxiliary industry Local spinoff	Plastic injection for industrial components, healthcare and others	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)
Juguetes Picó	(1942) Metallic toys Local spinoff	Transforming metallic tubes (mostly for toys), plastic injection, converted from fabric.	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)
Creaprint	(1987) labels for toys	IML (in mold	Internal-to-the	Diversification

	Local spinoff	labels) labels for food industry and others	firm and local knowledge	(similar and new technologies, new products and markets)
Claudio Reig	(1957) musical toys Local spinoff	Musical toys from different materials (plastic)	Internal-to-the firm and local knowledge	Specialization
Colortec Quimica	(80s) Chemical colors for plastics (toys)	Chemical colors for plastic (shoes, agriculture, etc)	Internal-to-the firm and local knowledge	Diversification (similar and new technologies, new products and markets)

Source: own, from interviews, SABI database and company's own webpages. The description of the Toy Valley districts is based on Hervás-Oliver, J.L. and Sempere-Ripoll, F. (2016) and, Hervas-Oliver, J.L (2021b). It includes the towns of Ibi, Tibi, Onil, Castalla and Biar in the Alicante province of Spain.

PATENTS

We retrieved data from the Invenes[5] database using the "*expert search*" option, through the "DIRE" field that indicates the address of the first applicant. As criteria for the search we utilized the names of the towns that form the Toy Valley ("Tibi", "Biar", "Onil", "Castalla" and "Ibi"). Then, we conducted a double-check and cleaned part of the data. In Table A-1 the final results are shown, accounting for 3,592 patents and utility models, being Ibi the municipality with most patents registered (66,2% of the total), followed by Onil (19,93%). These two municipalities accumulate more than 85% of the total number of patents analyzed. Clearly, Ibi leads the district and it is where the local business associations, the cluster and the AIJU research lab are located. Patents and utility models encompass the period from 1895 up to 2019, all years available. The search was conducted in 2020. See Table A-1 in the Appendix.

We utilized product and IPC methods. For instance, we identified product/technologies like "plastic injection for toys" and then "plastic injection for pharmacy containers (packaging)". This is classified as related (to plastic injection capability). An unrelated product would be, for example, "software for Industry 4.0". Patent citations are not utilized because most of novelties identified are rather utility models, and there is no

[5] https://www.ovtt.org/invenes

database for that in Spain. This measure facilitated the analysis of the product diversification in the territory, tracking local patents for more than one century. These patents and their related products unfold the diversification of the territory since its inception. This is not a relatedness density indicator, but clarifies the evolution of products in the local settings. As regards complexity, we use the knowledge components of each patent. Each patent has different IPCs (international patent codes) that show the different types of knowledge combined. Albeit different from constructing an index of knowledge complexity (e.g. Balland et al., 2019), we track the different ICPs that are gradually incorporated into patents in the focal territory. We combined both methods.

Specifically, the variables "IPC_fields", "Patent", "Utility model", "Year Publication", "Periods" and "Classification" were utilized. The IPC (International Patent Classification[6], IPC) shows the type of technology in each patent. IPC measures the technological distance (and its opposite: technological proximity) as regards the extent to which two fields build on the same knowledge bases (e.g. Teece et al., 1994). In particular, the analysis of IPCs reveals whether different patents are referring to the same knowledge base, that is, its technological foundation. The range of IPCs in the Toy Valley district signals the stock of local capabilities and technologies and, therefore, the products manufactured in the district can be better explained. The distance between technology fields in each patent's IPC observed in the territory contains information that is relevant for the assessment of the distance between patents, as it provides an indicator for monitoring the entrance of new knowledge or evolution of existing knowledge in an industry and territory. Subsequently, the content of patents was read in case of doubt about the IPCs, getting more insights for the patent classification.

Table A-1. Search and final sample of patents and utility models.

Town	Number of results after the search	Number of results after double check
Tibi	0	0
Biar	233	215

[6] http://www.wipo.int/export/sites/www/classifications/ipc/en/guide/guide_ipc.pdf (09.12.2013)
The International Patent Classification (IPC) is a hierarchical patent classification system consisting of over 70,000 different codes used in over 100 countries. It is administered by the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations, and is the only patent classification system used by all patent offices. (Guide to the IPC, 2015, available at http://www.wipo.int/export/sites/www/classifications/ipc/en/guide/guide_ipc.pdf).

Onil	730	716
Castalla	432	257
Ibi	2,400	2,378
Total	3,795	3,592

Source: Own elaboration from Invenes under the search criteria described.

Table A-2. Table of variables

Name of variable	Description	
Title	Title of the patent/utility model	
N_Publication	Number of publication of the patent or UM	
Municipality	Town of the first applicant in the patent/utility model.	
CPI	Code	Number of the international patent classification[7]
IPC_fields	Code	Number of IPC field of different fields that contain the patent or utility model. In this case we consider the first four digits of IPC, version 2006.01
Patent	0,1	Takes value 1 if it's a patent
Utility_model	0,1	Takes value 1 if it's a utility model
Year_Publication	year	Year that the patent or utility model is published.
Periods	1,2,3,4,5	Period 1 (1893-1957), inception; Period 2 (1958-1979), growth; Period 3 (1980-1992), crisis and transformation; Period 4 (1993-2007), diversification started; Period 5 (2008-2019) diversification fully adopted in the territory. Each period takes a natural number from 1 to 5 respectively, according to the year that the patent was published.
Classification	0,1,2,3,4	Indicates the type of product according to its use, it is made from the variable IPC_fields, when there is no IPC code the authors did the classification reading the name of the patent. 0 Others; 1 Packaging; 2 Toys; 3 Industrial components; 4 Furniture (See Appendix)

Source: own

Table A-3. Description of product category per periods on average.

	0 Others	1 Packaging	2 Toys	3 Industrial components	4 Furniture*	Total
Period 1	13.33%	4.29%	66.19%	14.76%	1.43%	100.00%
Period 2	4.31%	3.67%	80.19%	10.54%	0.16%	98.88%
Period 3	4.54%	4.29%	75.33%	11.75%	4.04%	99.94%
Period 4	9.58%	11.78%	45.38%	20.09%	13.16%	100.00%
Period 5	20.28%	21.35%	10.32%	29.89%	18.15%	100.00%

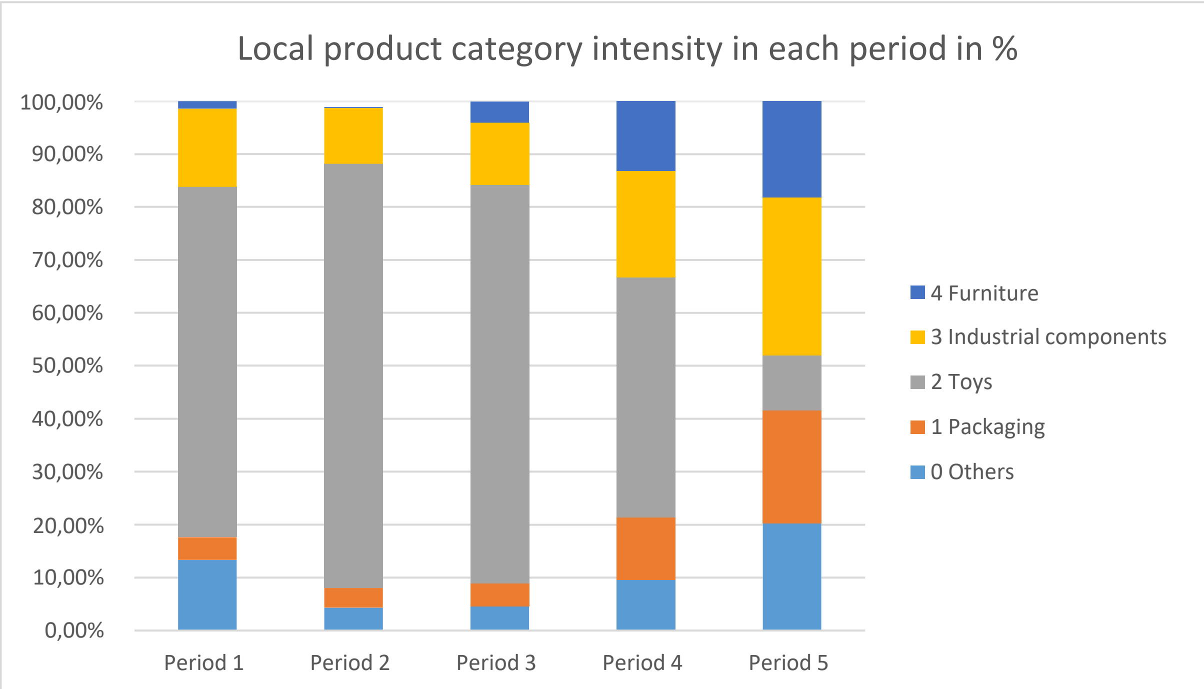
Source: own elaboration from data. *technical furniture with plastic and metallic components

As AIJU members and the AEIJ indicated during interviews, existent toys in the territory are predominantly those that have licenses, such as Clicks by *Playmobil*, those that have large size, such as outdoor swings that complicate transportation and logistics or those that can be customized through 3D printing. Also, the local firms producing toys shifted

[7] IPC codes were taken from:
http://cip.oepm.es/ipcpub/#refresh=page&notion=scheme&version=20060101

to different markets where the same product could be more valuable. For instance, those producing baby carriage toys shifted to real baby carriages that could be customized and delivered much more quickly to the distributor or online shopper. The majority of local firms, however, transited from toys to other products for industries such as healthcare, baby care products (e.g. baby feeding bottle, customized pacifiers), packaging for food (e.g. bag-in-box, carton) or for pharmaceutical products. At the present time, metallic- and plastic-related products and packaging are the most common products.

Figure A-1. Description of products per period on average.



Source: own elaboration from data from patents and utility models.

Limitations: we do not use patent citations, as most of the novelties identified are rather *utility models* and there is no database for their citations in Spain. Localization of spillovers, however, are raised during interviews, by matching local networking and alliances to innovate. Our results are limited for generalization because they are only tested in one single case, albeit the type of qualitative research demanded that focus. Conclusions need to be cautiously interpreted as each district/region settings might different in these mechanisms and their intensity.

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Classification of patents according to IPC (2007)

The product classification was carried out according to the IPC code, for patents without IPC (especially in the first two periods when this type of classification did not yet exist), the authors proceeded to classify the patents based on their name, also when there were two or more IPC codes, the patent was assigned to the most related product. Here is the classification list:

0 Others
A01 AGRICULTURE; FORESTRY; ANIMAL HUSBANDRY; HUNTING; TRAPPING; FISHING
A22 BUTCHERING; MEAT TREATMENT; PROCESSING POULTRY OR FISH
A23 FOODS OR FOODSTUFFS; THEIR TREATMENT, NOT COVERED BY OTHER CLASSES
A24 TOBACCO; CIGARS; CIGARETTES; SMOKERS' REQUISITES
A41 WEARING APPAREL
A42 HEADWEAR
A43 FOOTWEAR
A44C JEWELLERY; BRACELETS; OTHER PERSONAL ADORNMENTS; COINS
A45 (except A45C): HAND OR TRAVELLING ARTICLES
A46 BRUSHWARE
A61 MEDICAL OR VETERINARY SCIENCE; HYGIENE
A62 LIFE-SAVING; FIRE-FIGHTING
A99 SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION
B01 PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL
B02 CRUSHING, PULVERISING, OR DISINTEGRATING; PREPARATORY TREATMENT OF GRAIN FOR MILLING
B03 SEPARATION OF SOLID MATERIALS USING LIQUIDS OR USING PNEUMATIC TABLES OR JIGS; MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS
B04 CENTRIFUGAL APPARATUS OR MACHINES FOR CARRYING-OUT PHYSICAL OR CHEMICAL PROCESSES
B05 SPRAYING OR ATOMISING IN GENERAL; APPLYING LIQUIDS OR OTHER FLUENT MATERIALS TO SURFACES, IN GENERAL
B06 GENERATING OR TRANSMITTING MECHANICAL VIBRATIONS IN GENERAL
B07 SEPARATING SOLIDS FROM SOLIDS; SORTING

B08 CLEANING
B09 DISPOSAL OF SOLID WASTE; RECLAMATION OF CONTAMINATED SOIL
B21 MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL
B22 CASTING; POWDER METALLURGY
B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR
B24 GRINDING; POLISHING
B25 HAND TOOLS; PORTABLE POWER-DRIVEN TOOLS; HANDLES FOR HAND IMPLEMENTS; WORKSHOP EQUIPMENT; MANIPULATORS
B26 HAND CUTTING TOOLS; CUTTING; SEVERING
B27 WORKING OR PRESERVING WOOD OR SIMILAR MATERIAL; NAILING OR STAPLING MACHINES IN GENERAL
B28 WORKING CEMENT, CLAY, OR STONE
B30 PRESSES
B31 MAKING ARTICLES OF PAPER, CARDBOARD OR MATERIAL WORKED IN A MANNER ANALOGOUS TO PAPER; WORKING PAPER, CARDBOARD OR MATERIAL WORKED IN A MANNER ANALOGOUS TO PAPER
B32 LAYERED PRODUCTS
B42 BOOKBINDING; ALBUMS; FILES; SPECIAL PRINTED MATTER
B43 WRITING OR DRAWING IMPLEMENTS; BUREAU ACCESSORIES
B61 RAILWAYS
B62C VEHICLES DRAWN BY ANIMALS
B63 SHIPS OR OTHER WATERBORNE VESSELS; RELATED EQUIPMENT
B64 AIRCRAFT; AVIATION; COSMONAUTICS
B66 HOISTING; LIFTING; HAULING
B67 OPENING OR CLOSING BOTTLES, JARS OR SIMILAR CONTAINERS; LIQUID HANDLING
B68 SADDLERY; UPHOLSTERY
B81 MICROSTRUCTURAL TECHNOLOGY
B82 NANOTECHNOLOGY
B99 SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION
ALL C CODES
ALL D CODES
E01, E02, E03, E04, E21, E99
F01, F02, F03, F04, F15, F99

1 Packaging
B29 WORKING OF PLASTICS; WORKING OF SUBSTANCES IN A PLASTIC STATE IN GENERAL
B41 PRINTING; LINING MACHINES; TYPEWRITERS; STAMPS
B44 DECORATIVE ARTS
B65 CONVEYING; PACKING; STORING; HANDLING THIN OR FILAMENTARY MATERIAL

2 Toys
A45C: PURSES; LUGGAGE; HAND CARRIED BAGS
A63: SPORTS; GAMES; AMUSEMENTS
B62B: HAND-PROPELLED VEHICLES, e.g. HAND CARTS, PERAMBULATORS; SLEDGES
B62H CYCLE STANDS; SUPPORTS OR HOLDERS FOR PARKING OR STORING CYCLES; APPLIANCES PREVENTING OR INDICATING UNAUTHORISED USE OR THEFT OF CYCLES; LOCKS INTEGRAL WITH CYCLES; DEVICES FOR LEARNING TO RIDE CYCLES
B62J CYCLE SADDLES OR SEATS; ACCESSORIES PECULIAR TO CYCLES AND NOT OTHERWISE PROVIDED FOR, e.g. ARTICLE CARRIERS, CYCLE PROTECTORS
B62K: CYCLES; CYCLE FRAMES; CYCLE STEERING DEVICES; RIDER-OPERATED TERMINAL CONTROLS SPECIALLY ADAPTED FOR CYCLES; CYCLE AXLE SUSPENSIONS; CYCLE SIDECARS, FORECARS, OR THE LIKE

3 Industrial components
A44B: BUTTONS, PINS, BUCKLES, SLIDE FASTENERS, OR THE LIKE
B60 VEHICLES IN GENERAL
B62D: MOTOR VEHICLES; TRAILERS
B62L BRAKES SPECIALLY ADAPTED FOR CYCLES
B62M RIDER PROPULSION OF WHEELED VEHICLES OR SLEDGES; POWERED PROPULSION OF SLEDGES OR CYCLES; TRANSMISSIONS SPECIALLY ADAPTED FOR SUCH VEHICLES
E05 LOCKS; KEYS; WINDOW OR DOOR FITTINGS; SAFES
E06 DOORS, WINDOWS, SHUTTERS, OR ROLLER BLINDS, IN GENERAL; LADDERS
F16 ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL
F17, F21, F22, F23, F24, F25, F26, F27, F28, F41, F42

ALL G
ALL H

4 Furniture
A47: FURNITURE; DOMESTIC ARTICLES OR APPLIANCES; COFFEE MILLS; SPICE MILLS; SUCTION CLEANERS IN GENERAL

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[i] 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, Tödtling, and Trippl 2018)
[ii] Kline and Rosenberg (1986) or Chesbrough (2003), among many others.
[iii] Cognitive inertia might occur under this perspective (see Breschi, Lissoni, and Malerba 2003; Glasmeier 1991).
[iv] https://www.museojuguete.com/en/
[v] https://www.aefj.es/
[vi] Following Neffke & Henning (2013), we follow a resource-based relatedness in the interviews.
[vii] Data available upon request.
[viii] https://www.vicedomarti.com/en/history/; founder Mr. José Vicedo.
[ix] https://www.smurfitkappa.com/us/newsroom/2014/opening-of-new-bag-in-box-plant
[x] https://www.itc-packaging.com/en/history/
[xi] A list of IPC codes and their corresponding products can be seen in the Appendix.
[xii] Example: "molded beverage and food containers" or "self-assembly fluid pouch packaging".
[xiii] https://www.actiu.com/en/furniture-airports/ or https://www.actiu.com/en/furniture-education/ as examples