

Journal of
Regional Research
Investigaciones

Regionales

N.º 39 • *Special Issue 2017*

ISSN: 1695-7253

E-ISSN: 2340-2717

Clusters, Industrial Districts and Strategy

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INTRODUCTION

Clusters, Industrial Districts and Strategy

Francisco Puig*, Miguel González-Loureiro**

ABSTRACT: This introductory paper opens the Special Issue on *Clusters, Industrial Districts and Strategy*, based on the debate and comments arisen during the 2016 Conference on Clustering. After some brief notes on the need and the intended scope from a multidisciplinary approach (Regional Science, Economic Geography, Sociology and Business Management), we argue why the knowledge of the context is increasingly relevant for competing successfully in the global marketplace, since context-firm's strategy is a two-way relationship. Cooperative efforts in the forms of clusters, industrial districts or agglomerations can spontaneously arise from a dense population of firms belonging to multiple industries or to the same and related industries along with public actors, or they can be a deliberate, planned and managed effort, which will require the intervention of a governance mode. Whatever the choice is, the result is not always the same. Accordingly, and in light of the pervading differences found across literature and papers presented in this Special Issue, it seems plausible that clustering can be idiosyncratic to the location. Further efforts should be devoted to find contingent recipes for fostering competitiveness in light of the context and the firms collaborating. At the end, we introduce the nine papers of this Special Issue, while encourage scholars to continue this academic conversation.

JEL Classification: L10; L20, M1; R11; O33; O25.

Keywords: clustering; industrial cluster; industrial district; strategy; competitiveness.

Clusters, Distritos Industriales y Estrategia

RESUMEN: Este artículo abre el Número Especial sobre *Clusters, Distritos Industriales y Estrategia*, y está basado en el debate y comentarios recogidos durante la celebración del Congreso Clustering-2016. Tras unas notas breves sobre la necesidad y el alcance pretendido con este Número Especial y desde una aproximación multidisciplinar (Ciencia Regional, Geografía Económica, Sociología, Dirección de Empresas), argumentamos por qué el conocimiento del contexto es cada vez más relevante para competir con éxito en el mercado global, ya que el contexto-

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estrategia de la empresa es una relación de doble sentido. Los esfuerzos cooperativos bajo la forma de clusters, distritos industriales o aglomeraciones pueden o bien surgir de manera espontánea a partir de una alta densidad de empresas que pertenecen a múltiples industrias o a la misma y relacionadas, conjuntamente con actores públicos, o bien pueden ser el fruto de un esfuerzo deliberativo, planeado y dirigido, lo cual necesitará la intervención de una forma de gobernanza. Sea cual sea la elección, el resultado no es siempre el mismo. Por consiguiente, y a la vista de las diferencias encontradas de manera extensiva en la literatura y los artículos de este Número Especial, parece plausible que el trabajo en red *clustering* pueda ser idiosincrático de la localización. Se deben dedicar más esfuerzos investigadores a encontrar recetas contingentes que promuevan la competitividad en función del contexto y cómo las empresas colaboran. Finalmente, presentamos los nueve artículos de este Número Especial, a la vez que animamos a los estudiosos para continuar esta conversación académica.

Clasificación JEL: L10; L20, M1; R11; O33; O25.

Palabras clave: clustering; clúster industrial; distrito industrial; estrategia; competitividad.

In the today's globalized competition, more than ever before a certain type of geographical context is becoming a relevant element for the competitive advantages of firms located there. In those contexts, location and proximity among the variety of actors are the conditions required for the existence of a relational frame that fosters the economic activity within and between firms and territories (Becattini, 1990; Porter, 1990, 2003). Among the diverse modalities these contexts may take (Gordon and McCann, 2000), we will refer to them as clusters and industrial districts when they comprise firms from related activities and institutions around them (McCann and Folta, 2009). These forms have showed to impel a positive spiral of competitiveness improvement within the territory thanks to their capability to create an exclusive ambiance where firms, institutions and people can collaborate efficiently and effectively, exchange competitively valuable knowledge, and boost learning economies (Asheim *et al.*, 2011). During the last 30 years and stemming from several academic disciplines such as Regional Science, Economic Geography, Sociology and Business Management, an impressive amount of studies has proved that the effect of these contexts is remarkable in several structural, behavioural and performance indicators for regions, firms and individuals (Cruz and Texeira, 2010; Lazzeretti *et al.*, 2014). Italy and Spain are among the countries where this effect have been more studied and more interest has attracted among scholars on competitiveness.

However, has always this effect been positive and significant? As this is questioned to the reader, s/he will guess it has not, that the effect has been heterogeneous and variable. And s/he is right. Literature has shown that several hypotheses could not be validated during these years of incessant research activity, that there were some discrepancies between the prediction and what is actually observed. Globalization or the unequal dynamics of contexts have been some of the uncontrollable elements in

investigations that have fuelled those discrepancies (Puig and Marques, 2010). Nevertheless, these disagreements have undoubtedly helped research to evolve toward models that are more refined by including issues frequently underexplored so far. Among them, the firms' behaviour in the form of strategy has stood out from the rest. This includes the responses and actions the firms implement —internationalization, relocation, innovation, differentiation, specialization, outsourcing, offshoring and reshoring...— to adapt to the constantly changing conditions of the firm's environment. So far, most of research conducted within this topic has focused on the positive effect on innovation (Hervas-Oliver *et al.*, 2015), or on technological change (Galletto and Boix Domènech, 2014), although some others has found some negative effects on the firm's economic performance (Potter and Watts, 2010). These opposed results seem to call for further investigation on the role of context. Most of research has been conducted in manufacturing industries (McCann and Folta, 2009), while services remains underexplored (Cuadrado-Roura, 2016).

The study of the firm's strategy requires the understating of its complex mechanisms, its antecedents, the potential moderators and its effects. And yet it is also crucial the understanding of the context where the strategy is applied (Pla-Barber and Puig, 2009). First, because it is the firm's response to the environmental challenges in order to gain a competitive edge (Ronda-Pupo and Guerras-Martin, 2012). And second, because the strategic management process departs from environmental analysis prior to the firm to think of developing its own combination of resources and capabilities to face those challenges better than competitors (Galbraith and Schendel, 1983). Consequently, this Special Issue has focused on the context perspective where the strategy is to be deployed and, in particular, in the clusters and industrial districts.

Hence, how do industrial clusters and districts influence (and are influenced by) the firm's strategy in the global marketplace? The answer can be neither unique nor universal. Consequently, a contingent approach seems more fruitful to deal with contextual differences as it assumes that the result of an event strongly depends on the particular context where it happens (Shen and Puig, 2017). This requires, in a first stage, the identification and analysis of the firm's activity, size, value chain, and locational characteristics. In the next stage, it entails the adoption of the analytical methodology that suits better with the phenomenon under study. Additionally, it requires the specification of the performance metrics to be assessed, since this is a pervasive topic within any scholarly relevant study of strategy and location. Usually, scholars extensively use financial and economic indicators —namely, profitability, sales, productivity— or behavioural/strategic indicators —namely, share of market, innovativeness, survival, degree of internationalization— (Martínez-Fernández *et al.*, 2012). Yet some other areas may have been left apart from the study of this topicality, as recently McCann *et al.* (2002) and Nielsen *et al.* (2017) have suggested.

Why a Special Issue in the Journal of Regional Research about Clusters, Industrial Districts and Strategy? This is rooted in some of the conclusions we reached during the 1st International Conference on Clusters and Industrial Districts (CLUSTER-ING), held in Valencia (Spain) from May 26-27, 2016. Attendees agreed that location

and geographical proximity matter, although their influence can be different in terms of sign and scope. For example, a textile industrial cluster/district from Spain and another from Colombia can be studied and analysed by using the same theoretical frame, but the effect of location on firms will differ because the specific context between both settings is different. In each context, the organizational features of firms, the markets they serve, and how local actors decide to collaborate are key for the understanding of that influence. Yet all those issues do also shape how the context is.

This is why we asked for the collaboration to a relevant group of scholars, who shared their research in CLUSTERING-2016. Now this project comes to its end, we would like to acknowledge their contributions. The goal is to shed light on what we agree and on what we diverge when studying the geographical context of firms. These studies were clearly aligned with this monograph's aim in terms of content and scope, and they entail relevant, rigorous contributions to the topic. We honestly believe that the reader will notice this in the nine articles selected, papers that deal with experiences and cases from five countries (Spain, Italy, Sweden, Colombia, and Brazil), analysing a diversity of industries (manufacturing and services), and related to a wide variety of strategies such as innovation, internationalization, survival and cooperation. The academic contribution is threefold. First, it aims at providing some explanations to the contextual influence on performance. Second and in addition to other factors, whether and to what extent the firm's strategy affects the contextual features, thus context-strategy is a two-way relationship. And third, to introduce new ideas into this academic conversation. We also believe that the findings and conclusions of these papers provide managerial contributions since they suggest managers to be aware about the need for adopting a cooperative attitude, especially in contexts where SMEs are predominant and are in high need of innovations, while relevant efforts from regional innovation systems are expected to provide some guidance (González-Loureiro *et al.*, 2017). From the viewpoint of public policies, the reader can conclude that industrial policies should be location and context-specific, thus the difficulties of scholars to suggest universal recipes.

This Special Issue contains the next nine articles.

The first one, *Inter-organizational Relationships, Knowledge Strategy and Innovation in Clusters of Cultural Tourism*, by Dioni Elche, Ángela Martínez-Pérez and Pedro M. García-Villaverde sheds light on the strategy to acquire, create and transfer knowledge of firms belonging to tourism clusters. The departing point is the agglomeration of firms shaping tourism clusters by means of the interrelation between social capital, organizational knowledge and innovation. In an extensive and detailed analysis by means of a wide variety of statistical techniques, they analyse 215 firms located in UNESCO World Heritage Cities in Spain. The authors show that firms with high levels of bonding and bridging capital carry out activities of exploration and exploration of knowledge through an ambidextrous strategy, and these activities are linked to a better innovation performance. To put it differently, the inter-organizational relationships are crucial for the understanding and explanation of the knowledge strategy and its impact on innovation within tourism clusters.

The second article, *Disruptive Technological Innovations as New Opportunities for Mature Industrial Clusters. The Case of Digital Printing Innovation in The Spanish Ceramic Tile Cluster*, by Francesc Xavier Molina-Morales, Luís Martínez-Cháfer and David Valiente-Bordanova introduces a research about the emergence, development and dissemination of a disruptive technological innovation in an industrial cluster. They present a longitudinal case study triangulated with data from interviews, archival reports, the direct observation of the units of analysis and participant observation in the tile industry of Castellón (Spain). Authors provide evidence that several key actors may inhibit or foster the processes of technological change in locations where there is a dense population of firms from the same and related industries. These findings are relevant in the particular case of disruptive innovations, as it is the case of the introduction of inkjet printing technology in the tile industry. These disruptions are the key for the future of mature industries, as such is the case of the tile industry.

The third article, *the Role of Institutional and Territorial Factors in Innovation: the Case of the Spanish Footwear Components Industry*, by Ángel Belzunegui Eraso, Miguel Ángel Miralles Amorós and M.^a Teresa Pastor Gosálbez, analyses the transformation processes introduced by businesses in the footwear components industry and the importance of the Regional Innovation System in the recent economic context. For so doing, they adopted a qualitative methodology and undertook 63 in-depth interviews to larger firms within the footwear cluster in Alicante (Spain). They studied the extent to what the institutional support—research centres and institutes, universities, Chamber of Commerce— may influence the development of the innovation strategy. Their results seem to point out that inter-firms relationships have a higher influence than inter-institutions ones have. Whether this means a kind of failure of the Innovation System from the side of firms or the institutions is still a controversial issue. They dig deeper in the issue of potential causes, such as the irreconcilable differences in time to market between institutions and enterprises, rooted in the formal bureaucracy of the former. While relationships in the industrial value chain (supplier-focal firm-customers) are the main contributors to the firm's innovation strategy, the lack of relatedness and transfers from the institution setting seem to be a pervasive problem that hinder firms to gain increased levels of innovativeness even though a cluster to exist. Accordingly, the institutional setting may make the difference between successful and unsuccessful industrial clusters when it comes to innovativeness.

The fourth article, *Economic Competitiveness: effects of clustering, innovation strategy and the moderating role of location in the Colombian hotel industry*, by Orietha Rodríguez-Victoria, Miguel Gonzalez-Loureiro and Francisco Puig, sought to evaluate the potential moderator effect that locational externalities may have on the triangular relationship between clustering, innovation and competitiveness. Based on a sample of 131 Colombian hotels, 35% of which were located in tourism clusters, they found a direct positive effect of clustering on competitiveness and an indirect positive effect through innovation. Yet the most remarkable finding is how location moderates the relationship between innovation and competitiveness after controlling for the effect of clustering. When the location offers low resources for the tourism ac-

tivity, then the increase in competitiveness owed to an increase in innovation is higher than when the location holds higher resources available for that. This provides hard evidence of the heterogeneous impact that clustering may have on firms depending not only on how they collaborate, but also on virtually uncontrollable externalities of the location. Accordingly, the firm's innovation strategy should be contingent to the combination of all those factors.

The fifth article, *Location decisions and Agglomeration Economies: Domestic and Foreign companies*, by Enrique Claver-Cortés, Bartolomé Marco-Lajara, Encarna Manresa-Marhuenda, Francisco García-Lillo and Pedro Seva-Larrosa analyses the location decisions adopted by multinationals in order to evaluate the net effect of agglomerations on the those firms' performance. This topic is a current, timely concern because it will shed light on underexplored, relevant issues in internationalization of clustered firms: the use of and seizing on external knowledge. Knowledge spillovers is a pervasive topic although, so far, very few studies have tried to explain the extent to which knowledge leakages may be the other face of the same coin. Authors have used secondary data of 2,906 firms from a Spanish database containing questions about technological innovation (PITEC). These firms belong to medium and high-tech sectors and they have distinguished local and multinational firms within each location and have compared types of locations (technological parks, agglomerations, regional innovation systems). A first result shows that there is no a significant effect of location on those variables. However, when they compare the absorptive capacity of local firms and multinationals they found a relevant source of differences. While co-location is a necessary and sufficient condition for local firms to seize on knowledge spillovers, it is not for multinationals to take advantage of intangible resources within the location such as external knowledge is.

The sixth article, *From Delocalisation to Backshoring? Evidence from Italian Industrial Districts*, by Marco Bettiol, Chiara Burlina, Maria Chiarvesio and Eleonora Di Maria, analyses firms' production-location strategies and backshoring decisions within industrial districts-IDs. The results from a survey of 259 firms in eight Italian IDs show that firms that delocalise productive operations do not change their strategies over time and use the backshoring very infrequently —returning back the activity to the home country—. Moreover, the paper shows that production within IDs is still important to guarantee product quality and access to specialised know-how within the ID. Authors claim that ID location still matters to manufacturing activities although some operations are offshored. There is a relative stability of the internationalisation of production in IDs and the magnitude of backshoring is still a limited phenomenon. Most remarkably, this study combines longitudinal data from three different industries, furniture, mechanics and fashion, so their findings entails that there is a core activity that any ID do not want to be offshored, and it seems that these activities are related to intangible assets as specific know-how, which shapes and is the glue for this socio-economic entity named ID.

The seventh article, *Strategic Responses to Environmental Turbulence: A Study of Four Brazilian Exporting Clusters*, by Angela da Rocha, Beatriz Kury, Rodrigo To-

massini and Luciana Velloso de Souza Araújo, investigates strategic responses to the global economic crisis of four different Brazilian clusters. They analysed producers and exporters of traditional manufactured products that held different levels of export intensity in quite different industries: footwear, beachwear, furniture and wines. Data come from a combination of primary (39 interviews) and secondary sources and the cluster was the unit of analysis. After an exhaustive description of the four clusters in terms of main features, authors dig deeper in the variety of responses these firms adopted—exporting, relocation of productive operations, retrenchment, and differentiation—. The results point out that clusters present different responses depending on their degree of dependence to external markets, the possibility of redirecting production to domestic markets and the level of cooperation within the cluster. Once again, it seems that the combination of external and internal characteristics to the focal firms are idiosyncratic to the cluster originated.

The eight article, *Clusters' Vital Role in Promoting International Competitive Advantage-Towards an Explanatory Model of Regional Growth*, by Aihie Osarenkhoe and Daniella Fjellström, examines the importance of the interaction within and between society's stakeholders and how clusters and networking can contribute to long-term value creation. This strengthens the competitiveness of companies at both the domestic level as well as in international contexts. Authors analyse five Swedish cluster initiatives, a deliberative form of managed and planned cooperation once there is a dense population of firms of the same and related industries in the location. The industries range from aluminium works, to bioenergy, glassworks, furniture and heavy-duty vehicles. They show the perceived benefits of cluster initiatives arisen during in-depth interviews: networking, dialogue and experience exchange. Deeply rooted in these exchange and mutual confidence created by networking, they propose a model for the growth of these initiatives that will have an impact on increased levels of innovativeness and entrepreneurship and, in the end, will increase the cluster competitiveness and regional growth.

The ninth article, *Intra-cluster Cooperation enhancing SMEs' Competitiveness - the Role of Cluster Organisations in Poland*, by Barbara Jankowska, Marta Götz and Cezary Główska, theorises on the impact cooperation has for the smaller firms to overcome the problems stemming from the «liability of smallness» in the global marketplace. In this fine-grained qualitative study of several Polish clusters, they scrutinize the positive impact of clusters by distinguishing the main channels of influence. They found a positive impact of intra-cluster cooperation on the strategic capability and competitive strategies of clustered small firms. They dig deeper in an underexplored topic: whether and how the intervention of dedicated cluster organisations can foster and enable increased levels of cooperation. This emphasizes the idea that outcomes from clusters and IDs can be accelerated if it is planned and managed properly and it requires the intervention of a deliberated governance mode. Authors posit that these organization's role enhance more collaboration exchange of knowledge or other forms of cooperation and if necessary alleviate any conflicts, harmful processes distorting the intra-cluster relations such as abuse of a dominant position within the cluster.

Finally, we do wish that works in this Special Issue on *Clusters, Industrial Districts and Strategy* will inspire additional and profound reflections and investigations.

As this could not be otherwise, this project is the result of a collaborative work. We would like to acknowledge the effort and contributions of the editor and editorial team of the *Journal of Regional Research* and give thanks to them for the acceptance of this project. Our special thanks also includes reviewers; the usual work of them in the background and their scholar munificence has increased the quality of the papers. We would also like to gratefully acknowledge the effort the Organizing Committee and the firms and institutions that collaborate with this annual Conference. We reiterate our gratitude to authors. In short, locations can be more attractive, be a better place for living and working and firms gain a competitive edge if we understand how to use the best outcomes stemming from clustering. The research question opened is whether clustering is so idiosyncratic to the location that scholars can hardly find universal recipes.

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ARTICLES

Inter-Organizational Relationships, Knowledge Strategy and Innovation in Clusters of Cultural Tourism

Dioni Elche*, Ángela Martínez-Pérez*, Pedro M. García-Villaverde*

ABSTRACT: The paper aims to identify the knowledge strategy (KS) developed by the firms belonging to tourism cluster according to their inter-organizational relationships and hence to analyse the impact on innovation. The empirical study is conducted on a sample of 215 firms located in UNESCO World Heritage Cities in Spain (WHCS). The methodology is based on both factor analysis and conglomerates analysis. The findings show that firms with high levels of both bonding and bridging capital carry out activities of exploration and also exploration of knowledge through an ambidextrous strategy. On the contrary, firms with scarceness of links (low levels of bonding and bringing capital) perform few activities of knowledge exploration and exploitation. On the other hand, firms that have high levels of bonding or bridging capital generally implement a punctuated equilibrium strategy. Finally, we prove that firms with an ambidexterity KS exhibit better innovation performance.

JEL Classification: D83; L14; L83; O30.

Keywords: Inter-organizational relationships; knowledge strategy; ambidexterity; innovation; cluster.

Relaciones interorganizativas, estrategia de conocimiento e innovación en los clusters de turismo cultural

RESUMEN: El objetivo del trabajo consiste en identificar la estrategia de conocimiento seguida por las empresas pertenecientes a un clúster turístico en función de relaciones interorganizativas y determinar su impacto en la innovación. El estudio

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Acknowledgements: This research was supported by the Ministry of Economy and Competitiveness of Spain - ERDF [Projects: ECO2013-42387-P and ECO2016-75781-P]. We wish to thank the Guest Editor and the two anonymous reviewers of *Journal of Regional Research / Investigaciones Regionales* the proposed comments and suggestions.

Received: 09 march 2017 / Accepted: 25 july 2017.

empírico se realiza sobre una muestra de 215 empresas localizadas en las Ciudades Patrimonio de la Humanidad de España. La metodología está basada en análisis factorial y de conglomerados. Los resultados indican que aquellas empresas que poseen elevados niveles de *bonding* y *bridging* capital desarrollan actividades tanto de explotación como de exploración de conocimiento a través de una estrategia ambidiestra. Por el contrario, las empresas con escasos vínculos (bajos niveles de *bonding* y *bridging* capital) desarrollan escasas actividades de explotación y exploración de conocimiento. Por otro lado, las empresas que tienen altos niveles de *bonding* o *bridging* capital llevan a cabo una estrategia de equilibrio puntuado. Finalmente, comprobamos que las empresas que desarrollan una estrategia de conocimiento ambidiestra presentan mayor nivel de innovación.

Clasificación JEL: D83; L14; L83; O30.

Palabras clave: Relaciones interorganizativas; estrategia de conocimiento; ambidextrismo; innovación; clúster.

1. Introduction

Over the last decades, due to globalization and increasing of competition, the literature on strategic management has focused on organizational knowledge as critical resource to get competitive advantages, mainly those related to innovation (Lai, Lui and Tsang, 2016). In this context, firms need to look for new knowledge beyond the limits of the organization in order to complement their internal knowledge (Anand, Glick and Manz, 2002). Thus, knowledge transfer with diverse agents becomes increasingly important (Filieri and Alguezaui, 2014).

There is an interesting stream of literature on organizational knowledge in clusters (Grillitsch, Tödtling and Höglinger, 2015), and also some studies on the specific context of tourism clusters (Marco-Lajara, Zaragoza-Sáez, Claver-Cortés and Úbeda-García, 2016). These studies show that geographical proximity facilitates knowledge transfer among agents. However, the traditional approach tends to either overestimate the role of knowledge flows within the cluster or underestimate knowledge that is outside the cluster and that is new, not redundant and thus very valuable for firms. More recently, it has been considered that firms belonging to a cluster should take advantage of internal knowledge but also search and integrate external sources of knowledge in order to improve competitiveness in a global context. There is an open debate concerning the complementary or substitute character of acquired knowledge from internal and external agents to the cluster (Filieri and Alguezaui, 2014). However, there are no studies that analyse how different sources of knowledge of clustered firms are associated with different types of inter-organizational relations and, in turn, how they influence innovation performance. The paper fills this gap in the literature on cultural tourism clusters.

Knowledge is becoming increasingly relevant in an organization, since the choice of an appropriate strategy will determine current competitive capabilities and also its

adjustment with organizational capabilities required in the future, which can guarantee the success of the organization. March (1991) proposes the concepts exploration and exploitation of knowledge. The former implies that firms strive to develop new capabilities in order to create or acquire new knowledge, while the latter focuses on generating capabilities that allow taking advantage of existing knowledge in the organization. Although it is known that both exploration and exploitation of knowledge are critical activities in order to firms can adapt to environmental changes and to succeed, firms can use diverse combinations of them. The strategy of punctuated equilibrium consists of different cycles wherein knowledge exploitation dominates during some periods and knowledge exploration in other periods; while the ambidextrous strategy implies the simultaneous combination of high levels of exploitation and exploration of knowledge (Gupta, Smith and Shalley, 2006). Building on this, questions arise about whether all types of KS are equally viable, and also which entails the greatest impact on innovation.

Many studies have shown that inter-organizational relationships at root of social capital can facilitate access to different resources, mainly information and knowledge (Zhang and Cheng, 2015). Thus, the literature on clusters suggests that knowledge transfer grows not only by mere location in a cluster but, also, due to intense social interactions between agents belonging to the cluster (Yli-Renko, Autio and Sapienza, 2001). Furthermore, firms that establish inter-organizational relationships with agents outside of the cluster obtain access to a wider variety of sources of knowledge, avoiding problems of redundancy of the information and knowledge (Tiwana, 2008). In this perspective, it is assumed that knowledge flows established with close contacts differ from those generated with more distant actors. The former provides «bonding» social capital while the latter generate «bridging» social capital. From this classification, some studies claim that characteristics of social capital generated from distant networks are key to explore new information and knowledge while characteristics of social capital created in close networks are more appropriate to exploit the existing knowledge in the organization (Harryson, Dudkowski and Stern, 2008; Gobbo and Olsson, 2010). Therefore, we propose that the KS implemented by a firm, in terms of punctuated equilibrium or ambidexterity, is related to the different types of social capital that they usually generate.

On the other hand, the development of innovation in a firm requires diverse kinds of knowledge. According to Nonaka and Takeuchi (1995) the creation of new knowledge from the integration of external knowledge with existing one into the organization is key to generate innovation. In the context of a cluster, capacity to innovate is associated with how resourceful a firm is in exchanging knowledge with other agents, both internal and external to the cluster. Since it is shown that the KS implemented in a firm influences its innovation (Bierly and Daly 2007), recent studies point out the importance of striking a good balance between exploitation and exploration of knowledge in order to achieve higher levels of innovation through an ambidextrous strategy (Bednarek, Burke, Jarzabkowski and Smets, 2016).

Thus, the main objective of the paper is to identify different strategies of knowledge developed by firms belonging to cluster according to its bonding and bridging

capital. In addition, we aim to analyse which KS generates higher innovation performance. To this end, first, we identify diverse configurations of relationships established by firms belonging to a cluster of cultural tourism according to the bonding and bridging dimensions of its social capital. In so doing, the KS that prevails in each configuration —punctuated equilibrium or ambidexterity— is determined. From that, we compare firms' innovation performance according to the KS implemented.

This paper contributes the existing literature by identifying combinations of bonding and bridging capital on the one hand and of knowledge exploitation and exploration strategies on the other hand. These configurations are then analysed in relation to observed levels of innovation among firms belonging to a cluster. Another theoretical contribution is that the paper reinforces links between social capital theory and the territorial agglomerations approach, by examining the KS developed by firms located in a tourist clusters. Specifically, the empirical study focuses on the cultural tourism industry, analysing firms located in WHCS. This work proves that tourism clusters are territorial areas in which diverse configurations of social capital coexist that implies different KSs and, hence, heterogeneous innovation performance.

The paper is organized as follows. First, the theoretical context that justifies this research and hypotheses are posed. Afterwards, we describe the methodology and discuss the results. Finally, we present the main conclusions and implications for research and practice.

2. Knowledge strategy in tourism clusters

Over last decades there is an increasing interest on studying organizational knowledge because of it is considered a crucial driver of competitive advantages (Lai *et al.*, 2016). Many studies focus on cooperative relationships as a mechanism to acquire, create and transfer knowledge (Nonaka and Takeuchi, 1995), and thus new models of value creation and competitive advantage emerge through the knowledge-based economy. Knowledge has a rather strategic character in a organization based on its nature and the way in which it can be acquired and transferred (Teece, 1998). From this approach, it is claimed two types of knowledge: codified knowledge, which can be explicitly formulated and transferred as information and, tacit knowledge, which can be only transferred through individual and organizational learning. The process of organizational knowledge creation encompasses both tacit and codified knowledge so that both types of knowledge are considered to be complementary rather than substitute. In this paper, tacit knowledge plays a key role since it is rooted in the social network, so geographical and cultural proximity facilitate knowledge transfer and, hence, transaction costs are reduced (Balland and Rigby, 2017). Thus, firms belonging to a cluster can take advantage of informal contacts that are established with close agents in order to exchange tacit knowledge.

In the organizational context, KS is defined as a set of strategic choices that configure and drive processes of organizational learning and, hence, determine the

knowledge base of a firm (Bierly and Daly, 2007). According to the two types of knowledge coined by March (1991), exploitation involves the development of capacities to take advantage of knowledge existing, and it is associated with refinement, production, efficiency, selection, implementation and execution of current knowledge that a firm owns. On the other hand, exploration consists in bringing about new capacities to create or acquire new knowledge, so this activity is related to search, variation, assumption of risks, experimentation and discovery for the generation of new knowledge (Gobbo and Olsson, 2010).

Exploration and exploitation of knowledge are clearly different activities and require specific organizational capabilities and cultures for their development and implementation. However, team-based structures, an organizational culture that values and boosts change, open channels of communication, and human resource practices that foster creativity and innovation can generate appropriated capabilities to exploit and also explore new knowledge (Úbeda-García, Claver-Cortés, Marco-Lajara and Zaragoza-Sáez, 2016). From this, Knott (2002) points out that exploitation and exploration are complementary but not substitute strategies. In this sense, the simultaneous combination of exploitation and exploration activities requires the creation of structures, processes and cultures that are very difficult to balance, but ambidexterity can play a key role to succeed. Thus, firms seek solutions carrying out hybrid KSs, such as ambidexterity and punctuated equilibrium (Tushman and O'Reilly, 1996).

The punctuated equilibrium model describes a KS that follows a sequential pattern of long periods of exploitation and short periods of exploration. This model adopts a discontinuous approach to explain how organizations respond to change, so they act with diverse cycles of knowledge that range from stages of exploration to stages of exploitation. On the contrary, ambidexterity is a KS draw on the synchronous combination of exploration and exploitation activities. The implementation of an ambidextrous strategy requires a great effort on the part of a firm because of resources for exploitation and exploration are necessarily very different. According to O'Reilly and Tushman (2013), the ambidextrous strategy from the structural¹ approach implies not only having a organizational structure with different units for exploration and exploitation, but also the development of different organizational capabilities, systems, incentives, processes and cultures, which must be also internally aligned. Therefore, these firms have quite complex organizational structures and cultures, and they not only accept willingly any conflict, but they generally use it as encouragement for the process of new knowledge creation (Bierly and Daly, 2007).

¹ The literature points out two approaches of ambidexterity that are referred to the structure and the context of an organization (O'Reilly and Tushman, 2013). The structural ambidexterity is based on separate and different organizational units for exploration and exploitation, but which are held together through a strategic objective common, a global set of values that are linked to optimize shared assets (O'Reilly and Tushman, 2004). The contextual ambidexterity consists of behaviour of individuals to seek the balance between exploration and exploitation and is defined as the ability to simultaneously demonstrate alignment and adaptability in an organization (Gibson and Birkinshaw, 2004).

Ambidexterity and punctuated equilibrium are radically different mechanisms and there is not enough empirical evidence justifying the viability of one strategy versus the other (Gupta *et al.*, 2006). However, recently some studies support the idea that an ambidextrous strategy yields more benefits because of exploration and exploitation activities must be differentiated but, in turn, both must be integrated to generate value for the organization (Bednarek *et al.*, 2016).

Generally, firms do not own enough resources of knowledge so they have to look for them beyond its boundaries. In this sense, clusters of firm in tourism industry become an interesting context because of numerous networks created in which information and knowledge flow freely (Marco-Lajara, Claver-Cortés, Úbeda-García and Zaragoza-Sáez, 2016). Clusters consist of a set of conglomerate firms located within geographical boundaries, taking advantage of agglomeration economies. However, firms cannot survive only with assets within a cluster, but they must seek new resources outside the agglomeration boundaries to succeed (Sorensen, 2007). Spatial proximity facilitates the transfer of tacit knowledge that circulate within a tourism cluster, involving diverse agents located in the destination such as small hotels and restaurants, which only establish relations with local agents, for instance, local suppliers. Moreover, mobility of employees in this area also contributes to exchange tacit knowledge among firms located in a tourism destination. While external knowledge can be obtained from fairs and exhibitions, for example FITUR. Also, if local firms belong to a hotel chain that operates in different cultural contexts might get new and very different ideas.

Tourism firms can develop punctuated equilibrium strategies that consist in a period where prevails exploitation of internal knowledge followed by period in which prevails exploration of external knowledge. They can also implement an ambidextrous strategy by combining simultaneously exploitation of internal knowledge and exploration of external knowledge to the cluster. The success of firms located in a tourism cluster is drawn mainly on asymmetries of flows of knowledge originated at different levels within the agglomeration (Matusik and Hill, 1998). Therefore, each firm within a cluster must develop a specific KS, by striving to balance exploration and exploitation activities, according to their need for knowledge (Bierly and Daly, 2007). In this sense, the literature supports that knowledge within a firm depends on social capital generated by means of its social networks, which encompass both relations with internal and external agents to the cluster. In this process, absorptive capacity plays a critical role, both in identification and acquisition of external knowledge, as well as in its assimilation and application (Zahra and George, 2002). Thus, firms must develop this capacity in order to absorb knowledge from inter-organizational relationships. From social capital approach, this paper analyses the influence of bonding and bridging capital on KS developed by firms located in a tourism cluster.

3. Social capital in tourism clusters

The literature on social capital holds that networks of relationships provide a great value for organizations because they allow to access to wider range of resources

that are embedded in such relations (Lin, 2001). Thus, social capital refers to actors' ability to achieve benefits from a strategic location in a social network or other social structures (Porter, 1998). Many studies analyzed inter-organizational relationships and social capital in clusters (Li, Veliyath and Tan, 2013), and also in the tourism industry since local agents generally share antecedents, interests and culture (Gibson and Birkinshaw, 2004; García-Villaverde, Elche, Martínez-Pérez and Ruiz-Ortega, 2017).

It is wide known that social capital is a multidimensional concept, so Putnam (2000) posed to study social capital two dimensions: bridging and bonding social capital. A firm's bonding capital refers to relationships networks built from links with agents belonging to the cluster, by considering ties and frequency of contacts between the members of this agglomeration. Drawn on the argument of strength of ties and density of network, bonding capital offers clustered tourism firms exchange of high-quality information and tacit knowledge. On the other hand, bridging capital connects firms located in a cluster with agents belonging to diverse and remote social circles, thus facilitating access to a great variety of information and knowledge. The networks theory claims that bridging capital is created from weak links that build non-dense network where arise structural holes (Adler and Kwon, 2002). Thus, bridging capital creates ties that connect tourism firms with diverse groups that are also very heterogeneous, while bonding capital connects these firms only with members of internal groups to the cluster where there is usually more homogeneity among its members (Putnam, 2000). However, these perspectives are not mutually exclusive and both bonding and bridging social capital are needed in order to improve competitiveness of firms in tourism clusters. Thus, some studies suggest building relationships that combine bonding and bridging capital, so that firms might take advantage of both types of linkages according to their specific circumstances (Molina-Morales, Martínez-Fernández and Torló, 2011).

4. Hypotheses

The knowledge that a firm is able to create depends, to a great extent, on social capital generated by its network of relationships (Zhang and Cheng, 2015). Firms establish links with diverse agents that provide them with access to information and fosters knowledge transfer, so from these stable relations, social capital makes easier the conditions to generate new knowledge (Nahapiet and Ghoshal, 1998). In the context of tourism clusters, social capital plays a crucial role as the main mechanism to knowledge transfer. The benefits for firms placed in a relationships network might be very different depending on their contacts, for instance, relationships established with internal or external agents to the cluster what entails generate different kinds of knowledge. In this sense, it is known that each type of social capital —bonding and bridging— contributes to acquisition of different types of knowledge, which draw on both exploitation and exploration strategies (Gilsing and Duysters, 2008).

Therefore, from the association of social capital —bonding and bridging— and KS —exploration and exploitation— can be obtained a matrix that contains four

configurations of firms —Table 1—. Next, we pose the hypotheses that connect the two dimensions of social capital with the two strategies of knowledge, after that we compare innovation performance in each configuration.

Table 1. Configurations

Bonding capital	<i>High</i>	Punctuated equilibrium in a cycle of exploitation (high exploitation and low exploration)	High ambidexterity (high exploitation and low exploration)
	<i>Low</i>	Low ambidexterity (low exploitation and low exploration)	Punctuated equilibrium in a cycle of exploration (high exploration and low exploitation)
		<i>Low</i>	<i>High</i>
		Bridging capital	

4.1. Punctuated equilibrium strategy: bonding capital and exploitation of knowledge

The literature on clusters points out that knowledge acquired by firms from their relationships with agents located within the cluster is quite redundant, which, however, is suitable to develop a KS based on exploitation. On the one hand, homogeneity existing among clustered firms entails that the flows of information and knowledge circulating in the cluster become quickly redundant (Expósito-Langa and Molina-Morales, 2010). On the other hand, these firms generally do not trust external information, so they tend to discard ideas generated outside the cluster, considering also that their ideas are faced competitors. For this reason, clustered firms increase the use of internal information even though it is very homogeneous what enhances their redundancy due to overexploitation. Moreover, in the context where capital bonding prevails, firms generally consider that all of them are exposed to the same opportunities and threats, so they develop alike routines to face environmental changes (Atuahene-Gima and Murray, 2007). Since opportunities are redefined constantly, firms are more predisposed to develop activities of knowledge exploitation (Molina-Morales *et al.*, 2011). In brief, in a context of high level of bonding capital and low level of bridging capital, firms will tend to implement a cyclical punctuated equilibrium strategy, by combining successive stages of high-exploitation and low-exploration. From these arguments, we propose the first hypothesis:

H1: The higher the level of bonding capital when bridging capital is low, the greater the probability that the KS involves high level of exploitation and low level of exploration (punctuated equilibrium).

4.2. Punctuated equilibrium strategy: bridging capital and exploration of knowledge

Social capital theory supports the idea that firms, from their relations network with external agents to the cluster, can access to more diverse, novel and non-redundant knowledge that are the characteristics needed to develop a strategy of knowledge exploration (Sorensen, 2007). This is because structural holes allow firms to establish contacts with agents placed in social circles with very heterogeneous background, experience, knowledge and skills that grant access to novel and non-redundant sources of information and knowledge (Expósito-Langa and Molina-Morales, 2010). Firms located in a network with structural holes has potentially more opportunities to explore new ideas, because they have access to multiple domains of specialization of knowledge (Tiwana, 2008). In addition, new information is maximized if contacts are not connected with each other, since non-redundant links provide unique knowledge. Therefore, for firms using bridging capital provided from relationships with diverse and external agents to the cluster it will be easier to develop a KS of exploration (Tiwana, 2008). In summary, in a context of high level of bridging capital and low level of bonding capital, it is likely that firms carry out a punctuated equilibrium strategy, but in this case, with repeated stages of high level of exploration and low level of exploitation. According to this argument, we pose the second hypothesis:

H2: The higher the level of bridging capital when bonding capital is low, the greater the probability that the KS involves high level of exploration and low level of exploitation (punctuated equilibrium).

4.3. Ambidexterity knowledge strategy

Many studies emphasise the complementarity of both dimensions of social capital —bonding and bridging— in order to create an optimal structure of network (Harrison *et al.*, 2008). These two dimensions are necessary to develop an ambidexterity KS. Relationships with remote agents, which generate bridging capital, allow access to cognitively distant sources of knowledge and, thus, create access to diverse and novel information. Thus, firms should ensure access to this new knowledge and also, in case it is valuable, they must be able to absorb and apply it within their organizations. However, to integrate knowledge from distant contacts a firm needs another kind of relations network in which is generated bonding capital (Gobbo and Olson, 2010). Thus, in the context of a cluster, firms should strive for a balance between their relationships with agents of non-redundant networks that allow them to access a wide range of cognitive knowledge, and agents located in redundant networks, which make easier triangulation and absorption of knowledge (Gilsing and Duysters, 2008).

Therefore, firms that are very socially active and entertain numerous relations with internal and external agents to the cluster can achieve high levels of both bonding and bridging capital. This, in turn, will pave the way to capabilities to exploit and explore knowledge through ambidexterity strategy. On the contrary, firms that are

isolated with few external and internal contacts will have more difficulties in developing suitable capabilities to explore and exploit knowledge, so it is likely that the strategy implemented is low level of ambidexterity. Thus we propose the following hypotheses:

H3: The higher levels of bonding and bridging capital, the greater the likelihood that the KS yields high levels of exploration and exploitation (high ambidexterity).

H4: The lower levels of bonding and bridging capital, the greater the likelihood that the KS yields low levels of exploration and exploitation (low ambidexterity).

4.4. Knowledge strategies and innovation

A wide literature on the antecedents of innovation in firms belonging to a tourism cluster emphasises the role of social capital and, also of the KS implemented by these firms (Sorensen, 2007). It has been argued that social capital facilitates the acquisition of new knowledge and recombination of existing knowledge, which, in turn, leads to development of innovation (Filieri and Alguezaui, 2014). Although there is a lot research about KS, these studies have not provided clear findings about which KS is most effective in terms of innovation (Bierly and Daly, 2007). Knowledge is a key input in the process of innovation, from the generation of new ideas phase, in which exploration activities are crucial, to implementation phase that depends on the exploitation of knowledge. In this sense, firms that carry out strategies of exploitation and exploration simultaneously are generally more innovative. Therefore, ambidexterity strategy is increasingly important to carry out successfully all phases of the innovation process (Bierly and Daly, 2007; Bednarek *et al.*, 2016). However, a firm that focuses on exploration activities, avoiding exploitation, will undergo high experimental costs before achieving relevant results of innovation (March, 1991). On the other hand, firms that develop a KS of exploitation, excluding exploration, will not achieve high levels of innovation performance (Atuahene-Gima and Murray, 2007).

If firms seek to improve innovation performance, they must develop dynamic capabilities in order to adapt to current changes by means of knowledge exploitation and, in turn, new resources for future through knowledge exploration activities (Gibson and Birkinshaw, 2004). Therefore, only firms that are able to implement an ambidexterity KS, consisting of high levels of both bonding and bridging capital, will achieve better innovation performance (Lazer and Friedman, 2007). Following these arguments, we propose the following hypothesis:

H5: The configuration that implements the ambidexterity KS, with high levels of both bonding and bridging capital, will achieve higher innovation performance relative to the remaining three configurations.

5. The study setting

The tourism industry, despite the economic crisis, is a key sector to Spanish economy in terms of both growth and employment. However, as new destinations rise on the horizon tourism firms need to respond to the competitive threat with strategies based on innovation and sustainable development. In this sense, in spite of being widely known for sun-and-beach tourism, cultural tourism in Spain has grown in recent years. The rise in the flow of tourists in WHCS confirms this. In this industry, coordination between firms and institutions is strategically important for the development of a complete touristic experience which, in turn, benefits the competitiveness of firms. WHCS are a context where it is possible to put in place significant mechanisms of cooperation and coordination by integrating public and private agents in order to enhance destination's competitiveness and, hence, attract and satisfy a greater amount of tourists.

The paper focuses on tourism firms located in WHCS, since, in a previous study, Martínez-Pérez, García-Villaverde and Elche (2016) proved that these cities are tourism clusters. The listed cities by UNESCO in Spain are: Alcalá de Henares, Ávila, Cáceres, Córdoba, Cuenca, Eivissa (Ibiza), Mérida, Salamanca, Santiago de Compostela, Segovia, San Cristóbal de la Laguna, Tarragona and Toledo. From SABI and Camerdata databases we set the study population that consists of 2,037 firms of different branch of tourism, following Lazzarretti and Capone (2008), we also identify these activities from the CNAE-09. Since in these cities 95.6% of tourism firms have less than 10 employees, we propose as an additional condition not to include firms with less than 3 employees, guaranteeing so a minimum organizational and operational structure that allow analyse their strategic behaviour.

Through a postal and online survey, we collected 215 valid questionnaires, with a response rate of 10.55% and a sampling error of 6.32%. We tested the non-response bias and results did not show significant differences between managers who responded and those who have not replied. Furthermore, to avoid the response bias due to manager perceptions we sent another questionnaire to a second manager within the firm. We obtained two questionnaires for a subsample of 15.81% (34 firms) and carried out a mean differences test between responses of the senior and the second manager. Results show no significant differences for the variables of interest. In addition, the factor Harman test confirms that there is no common method bias. The items of the variables were measured with a 7-point Likert scale. Table 2 summarises the variables, the measurement scales and the sources.

As previously explained, and following Putnam (2000), social capital consists of bonding and bridging capital. We consider that both dimensions are crucial to analyse the association between social capital and KS in firms belonging to a tourism cluster. These concepts were measured with multi-item scales previously used in the literature. Bonding capital is related to social interactions that arise in a relationships network (Nahapiet and Ghoshal, 1998) and, it is composed of ties and configuration of a network. The ties are referred to strength of relations and they are measured with

Table 2. Variables of the questionnaire

<i>Variable</i>	<i>Dimension</i>	<i>Items</i>	<i>Literature sources</i>
Social capital	Bonding capital	The firm connects frequently with its contacts	Maula, Autio y Murray (2003) y Molina-Morales y Ares-Vázquez (2007)
		In the firm, the contacts are personally known	
		In the firm, there are close social relationships with its contacts	
		The resources and information exchanged with its contacts were similar	
		The frequent firm's contacts know each others	
		The firm's contacts that provide useful information know each others	
	Bridging capital	Many the firm's contacts are specialized in a great variety of activities	Tiwana (2008)
		Many the firm's contacts have very different and diverse experiences	
		Many the firm's contacts have abilities and skills which are complementary	
Knowledge strategy	Exploitation	Valuable existing knowledge elements were identified, combined and reused	Revilla, Prieto y Prado (2010)
		Existing knowledge and competences related to existing products/services were used and adjusted	
		New and existing ways of doing things were integrated without hindering efficiency	
		Lessons learned in other areas of the organization were put in operation	
	Exploration	Product problem areas generating customer dissatisfaction were discovered and solved through creative ways	
		Problem areas generating customer dissatisfaction were discovered and solved through creative ways	
		New knowledge, methods and technological ideas were introduced	
		Many new novel and creative ideas were produced by «thinking outside the box»	

Table 2. (continue)

<i>Variable</i>	<i>Dimension</i>	<i>Items</i>	<i>Literature sources</i>
Innovation		Products or services	Doloreux y Shearmur (2010)
		Production process	
		Delivery process	
		Market and sale process	
		Business strategy	
		Managerial techniques	
		Marketing techniques	

a three-item scale adapted from Maula, Autio and Murray (2003). The configuration means density of a network that is measured using a three-item scale adapted from Molina-Morales and Ares-Vazquez (2007). Bridging capital reflects the dispersion of a network, which allows access to new and diverse resources through structural holes. Following Tiwana (2008) we use a three-item scale that values the diversity of knowledge, abilities and background of relationships.

In this paper, the KS refers to a firm's choice about the balance between exploitation and exploration activities that led to strategies of punctuated equilibrium or of ambidexterity. The KSs of exploitation and exploration are measured according to Revilla, Prieto and Prado (2010). Exploitation is valued through a four-item scale that estimates the degree of product development from experience and the integration of knowledge. On the other hand, exploration is measured by means of a four-item scale that defines the degree to which the development of new products introduces new ideas and new knowledge.

In relation to innovation, previous studies focused on service sector suggest taking into account technological and non-technological innovations. Thus, this variable is measured by a scale, first proposed by Doloreux and Shearmur (2010), which encompasses seven aspects of innovation: product, process, delivery, marketing, business strategy, management and marketing techniques. The degree of novelty was also considered to include both significant changes and radically new innovations. To avoid biases in time fluctuations and approximate the notion of sustainability of innovation, respondents were asked about innovation over the last five years.

6. Empirical results

first, we test the robustness of the variables through confirmatory and exploratory factor analyses. The confirmatory factor analysis with Varimax rotation yielded a value

of Cronbach’s alpha for social capital = 0.849 (density = 0.796 and strength = 0.782). The Kaiser-Meyer-Olkin (KMO) value is 0.758 (> 0.6) and the Bartlett’s sphericity test is significant (Chi-square = 1024.824; df = 36; sig. = 0.00). From these analyses, we obtained three factors with an explained variance of 42.65%. The factor loads exceeded 0.685. Also, the exploratory factor analysis showed satisfactory goodness-of-fit indices ($\chi^2 = 61.11$, df = 24, NFI = 0.929, CFI = 0.955, IFI = 0.956, RMESA = 0.07). In relation to the reliability of scales, the alpha of Cronbach for the KS is 0.929 (exploitation = 0.923 and exploration = 0.910). The factor analysis performances two factors, one associated with exploitation and another with exploration, and also all tests showed satisfactory results (Kaiser-Meyer-Olkin > 0.60 [0.869]; and p -value < 0.00 [Chi-square = 1480.747; df = 28; sig. = 0.00]). The explained variance is 67.04% and the factor loads exceeded 0.766. From exploratory factor analysis, the goodness-of-fit indices were all satisfactory ($\chi^2 = 75.65$, df = 19, NFI = 0.917, CFI = 0.936, IFI = 0.936, RMESA = 0.08). Likewise results of factor analysis for innovation variable were suitable (Cronbach’s alpha = 0.967; KMO = 0.902; Chi-square = 1625.087; df = 21; sig. = 0.00). In this case, from the factor analysis with Varimax rotation was obtained one factor whose explained variance is 78.45% and the loads exceeded 0.814. The goodness-of-fit indices were satisfactory ($\chi^2 = 40.73$, df = 14, NFI = 0.957, CFI = 0.970, IFI = 0.970, RMESA = 0.08).

Subsequently, we carried out a conglomerates analysis in order to identify diverse configurations of inter-organizational relationships in terms of social capital —bonding and bridging—. First, we determine the optimal number of groups by means of a hierarchical cluster analysis (Ward’s method) based on Euclidean distance. This analysis is complemented with the criterion of Ferguson and Ketchen (1999) to expand the number of groups and improve the explanatory power of results. Having considered the agglomeration coefficient, that is, the squared Euclidean distance between each case, we decided that four is the optimal number of conglomerates. Afterwards, we carried out a K-means cluster analysis to group the firms in each conglomerate. These results based on final centres are presented in Table 3.

Table 3. K-means conglomerates analysis of social capital

	<i>Cong. 1 Low-Low n = 24</i>	<i>Cong. 2 High-High n = 83</i>	<i>Cong. 3 High-Low n = 35</i>	<i>Cong. 4 Low-High n = 73</i>	<i>F</i>	<i>p</i>	<i>Differences between groups *</i>
Bonding capital	2.56 (0.66)	5.38 (0.66)	5.20 (0.75)	3.93 (0.69)	139.071	0.00	C1<C2,C3,C4; C2>C1,C4; C3>C1,C4; C4>C1; C4<C2, C3
Bridging capital	3.15 (0.92)	5.76 (0.80)	2.87 (1.01)	4.62 (0.55)	146.359	0.00	C1<C2,C4; C2>C1,C3,C4; C3<C2,C4; C4>C1,C3; C4<C2

* Scheffé test $p < 0,05$

Conglomerate 1 includes 24 firms that exhibit low levels of both bonding capital and bridging capital. Conglomerate 2 contains 83 firms characterised by high levels of both bonding and bridging capital. Conglomerate 3 comprises 35 firms that present high level of bonding capital and lower level of bridging capital. Conglomerate 4 consists of 73 firms with low level of bonding capital and high level of bridging capital. Results from ANOVA and the Scheffé test showed differences statistically significant between pairs of conglomerates.

Afterwards, we analyse in each configuration the association between types of KS —exploitation and exploration— and types of social capital —bonding and bridging—. To do so, we carried out ANOVA and the Scheffé test —Table 4— to confirm the hypotheses. Besides exploitation and exploration individually, the analysis includes an interaction term between exploitation and exploration strategies that yields the ambidexterity strategy. Table 4 shows the descriptive statistics (means and standard deviations), ANOVA analysis and the Scheffé test for the four conglomerates in terms of social capital. As indicated by the ANOVA analysis, results revealed significant differences between bonding and bridging social capital that a firm requires to develop its KS that can be exploitation, exploration or ambidexterity.

Table 4. ANOVA test of knowledge strategy

	<i>Cong. 1</i> <i>Low-Low</i> <i>n=24</i>	<i>Cong. 2</i> <i>High-High</i> <i>n=83</i>	<i>Cong. 3</i> <i>High-Low</i> <i>n=35</i>	<i>Cong. 4</i> <i>Low-High</i> <i>n=73</i>	<i>Total</i>	<i>F</i>	<i>p</i>	<i>Differences</i> <i>between groups*</i>
Exploitation	4.18 (1.28)	5.61 (0.97)	5.19 (1.03)	4.88 (1.04)	5.13 (1.13)	14.03	0.00	C1<C2,C3, C4; C2>C1,C4; C3>C1; C4>C1; C4<C2
Exploration	4.23 (.23)	5.52 (0.99)	4.66 (1.42)	5.02 (1.13)	5.068 (1.21)	10.02	0.00	C1<C2,C4; C2>C1,C3; C3<C2; C4>C1
Expt*Expr	18.89 (9.35)	31.48 (9.55)	25.15 (11.37)	25.22 (9.29)	26.93 (10.51)	12.58	0.00	C1<C2; C2>C1, C3, C4; C3<C2; C4<C2

* Scheffé test $p < 0,05$

Specifically, firms with high level of bonding capital and low level of bridging capital —conglomerate 3—, have higher values of exploitation (5.19) than exploration (4.66), according to what is established in hypothesis 1. Also, as per hypothesis 2, firms with low level of bonding capital and high level of bridging capital —conglomerate 4— show higher levels of exploration (5.02) than exploitation (4.88). However, the Scheffé test showed that the differences between these two configurations, in terms of exploitation and exploration, are not statistically significant, so that hypotheses 1 and 2 cannot be corroborated.

On the other hand, firms that present high levels of both bonding and bridging capital —conglomerate 2— show a high KS of ambidexterity, with high exploitation

(5.61) and high exploration (5.52), as per hypothesis 3. In addition, the difference of exploitation in conglomerate 2 with respect to the conglomerates 1 and 4 is statistically significant and the difference of exploration in conglomerate 2 with respect to the conglomerates 1 and 3 is also statistically significant, so hypothesis 3 can be confirmed.

On the contrary, firms with low levels of bonding and bridging capital —conglomerate 1—, are characterized by low exploitation (4.18) and low exploration (4.23), that is, a KS of low ambidexterity, as per hypothesis 4. Moreover, in conglomerate 1, the difference of exploitation with respect to the conglomerates 2 and 3 is statistically significant. Likewise, the difference of exploration in conglomerate 1 with respect to conglomerates 2 and 4 is statistically significant. Therefore, from these results hypothesis 4 can also be confirmed.

Similarly, we analysed the multiplicative interaction of exploitation by exploration to evaluate the joint effects, and results showed that there are significant differences for conglomerate 1 (low values for both exploration and exploitation) and 2 (high values for both exploration and exploitation). Therefore, it is considered the KS of conglomerate 1 as low ambidexterity and the KS of conglomerate 2 as high ambidexterity. These results reinforce the corroboration of hypotheses 3 and 4.

Finally, we compared innovation in the four conglomerates to identify the configuration that are more innovative, so that we can determine which KS yields better innovation performance. The results of the ANOVA and the Scheffé test —Table 5— show that firms with high levels of bonding and bridging capital —conglomerate 2— exhibit higher innovation performance (4.71) compared to other conglomerates. In addition, the differences of innovation of conglomerate 2 compared to the others are statistically significant. Results from these analyses suggest acceptance of hypothesis 5.

Table 5. ANOVA test of innovation

	<i>Cong. 1</i> <i>Low-Low</i> <i>n = 24</i>	<i>Cong. 2</i> <i>High-High</i> <i>n = 83</i>	<i>Cong. 3</i> <i>High-Low</i> <i>n = 35</i>	<i>Cong. 4</i> <i>Low-High</i> <i>n = 73</i>	<i>F</i>	<i>p</i>	<i>Differences</i> <i>between groups*</i>
Innovation	3.95 (1.10)	4.71 (1.00)	3.99 (0.94)	4.35 (1.06)	7.27	0.00	C2>C1, C3, C4

* Scheffé test $p < 0,05$

7. Discussion and conclusions

Knowledge is widely considered as a strategic resource to achieve competitive advantages and a key antecedent to explain the KS is social capital. The literature

on territorial agglomerations has contributed significantly to study the connection between social capital, organizational knowledge and innovation. So far, however, there has been little discussion about the connection between inter-organizational relationships and KS, by studying also its impact on innovation in the context of tourism clusters.

The present study contributes in many ways to the literature. First, we identified the KS implemented by tourism firms located in a cluster according to their bonding and bridging capital. Specifically, the findings show that a firm with a great deal of internal and external relationships to the cluster generally develop ambidexterity strategy, by combining knowledge exploitation and exploration activities. Thus, high levels of bonding and bridging capital foster both exploitation of previously existing knowledge and exploration of new knowledge. Conversely, when a tourism firm does not invest in maintaining internal and external relationships, the KS will be low ambidexterity that involves low levels of both exploration and exploitation knowledge activities.

On the other hand, when either internal relationships or external relationships to the cluster in a firm prevail the KS is generally a punctuated equilibrium. Our results partially show that firms with high level of bonding capital and low level of bridging capital have a higher level of exploitation than exploration, developing a KS of punctuated equilibrium that is focused on the exploitation. Thus, the higher level of bonding capital, the higher level of knowledge exploitation, since dense networks and strong links allow firm to share knowledge base of cluster that is quite homogeneous, which will encourage exploitation of available knowledge.

Moreover, when a firm exhibits low levels of bonding capital and high levels of bridging capital, exploration predominates over exploitation. In this case, KS of punctuated equilibrium prevails over knowledge exploration. This is because relationships with external agents allow firms to access to diverse and novel knowledge, which is inherent to exploration activities. Therefore, in the case of both strategies of punctuated equilibrium —prevailing exploitation or prevailing exploration—, they are adjusted only moderately to configurations.

In short, we consider that the implementation of a particular KS is associated to relationships established by a firm, which generate specific types of social capital. Therefore, the results of this study point out that the adoption of ambidexterity or punctuated equilibrium strategies is related to bonding and bridging capital developed by a firm.

In addition, we have identified which KS is associated with higher levels of innovation. In this sense, firms with high levels of bonding and bridging capital with ambidexterity KS present higher levels of innovation compared to firms within other configurations. Thus, although it has been argued that exploitation and exploration are substitute strategies since they require very different resources and organizational structures, we show that maintaining a suitable balance whit both strategies is a key factor for improving innovation performance (Bednarek *et al.*,

2016). In this way, we conclude that it is important for firms to strike a balance between exploitation and exploration activities in order to generate higher levels of innovation.

Overall, our results show that firms engage unique and idiosyncratic patterns of relationships within an agglomeration and, consequently, that they have different exposure to new ideas, knowledge and opportunities. Therefore, the mere fact of belonging to a tourism cluster does not provide a firm with access to more and better sources of knowledge. On the contrary, it is the firm's set of capabilities for managing available knowledge and establishing relationships that matter.

Therefore, tourism firms located in a cluster must strike a balance between non-redundant networks with access to a cognitive variety, and redundant networks for triangulation and knowledge absorption. On the basis of this, the recommendation is that firms combine close relationships established within the cluster with links with external agents, in order to develop simultaneously exploitation and exploration KS that contribute to improve innovation performance.

In relation to the limitations of this study, we point out the exploratory approach of KS and social capital. Although this fact hinders the possibility of obtaining conclusive results in the adjustment between pairs of variables, however, we analysed jointly relationships and strategies from a configurational approach.

On the other hand, this study has a static character so that is not possible to analyse the evolution of the configurations obtained. To overcome this limitation, we propose to carry out a longitudinal study to study the mobility of firms between the four configurations and their impact on their long-term results. Another limitation is the focus on cultural tourism, which might entail problems for the generalizability of the results. However, we consider that the characteristics taken into account in this study are common to other types of tourism. This suggests some relevance to other sectors of activity, though with due caution. In any case, it is desirable to continue studying the different configurations related to social capital and KS in other tourism industries.

8. References

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Disruptive Technological Innovations as New Opportunities for Mature Industrial Clusters. The Case of Digital Printing Innovation in the Spanish Ceramic Tile Cluster

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ABSTRACT: Over the last few decades, many studies have focused on the role that incremental innovations play in cluster contexts. However, few authors have analysed the impact of disruptive innovations on these entities. The present research analyses the emergence, development and dissemination of a disruptive technological innovation in an industrial cluster. In particular, we study the case of the introduction of inkjet printing technology in the Spanish ceramic cluster as a paradigm of how a disruptive innovation can impact the industry's value chain. This technological change ended up revolutionizing what was considered a mature and stable sector. In short, we will describe how a disruptive technological innovation is capable of renewing the life cycle of a cluster favouring the recovery of competitiveness and, even, creating new opportunities for diversification.

JEL Classification: O30; O32; O33.

Keywords: disruptive technological innovation; industrial cluster; digital printing; inkjet technology; ceramic tile industry.

Innovaciones tecnológicas disruptivas como nuevas oportunidades para los clústeres industriales maduros. El caso de la tecnología de impresión digital en el clúster cerámico español

RESUMEN: En las últimas décadas, muchos estudios se han centrado en el papel que desempeñan las innovaciones incrementales en el ámbito de los clústeres. Sin embargo, pocos autores han analizado el impacto que las innovaciones disruptivas o radicales han tenido en estas agrupaciones territoriales. La presente investigación analiza la generación, desarrollo y difusión de una innovación tecnológica disruptiva en el seno de un cluster industrial. En particular, estudiamos el caso de

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Received: 09 march 2017 / Accepted: 20 september 2017.

la introducción de la tecnología de impresión digital en el clúster cerámico español como paradigma del impacto que una innovación tecnológica disruptiva puede tener sobre la cadena de valor de una industria. Este cambio tecnológico ha revolucionado lo que se había considerado un sector maduro y estable. En conclusión, vamos a analizar cómo una innovación tecnológica disruptiva es capaz de renovar el ciclo de vida de un cluster, favoreciendo así la recuperación de la competitividad e, incluso, creando nuevas oportunidades para la diversificación de las empresas integrantes.

Clasificación JEL: O30; O32; O33.

Palabras clave: Innovación tecnológica disruptiva; clúster industrial; impresión digital; tecnología inkjet; industria cerámica.

1. Introduction

In the last decades, radical or disruptive innovations have received increasing attention from various authors (Charitou and Markides, 2002; Christensen, 1997; Tellis, 2006). Unlike incremental innovations, radical innovations generate important transformations in products, markets or technologies, leading even to the obsolescence of existing ones (Chandy and Tellis, 2000).

In this work, we analyse the territorial dimension of these discontinuities, adopting the concept of *cluster* as a frame of reference (Becattini, 1979; Porter, 1990). It is important to point out that we consider a cluster as a network within a production context in a geographically defined area (Boschma and Ter Wal, 2007; Parrilli and Sacchetti, 2008). Most clusters are characterized by the prevalence of small firms, which have comparatively greater access to external knowledge resources than firms in other contexts. This fact is relevant since it can become an important source of innovation for cluster's firms.

However, the capacity of an agglomeration to create and develop disruptive innovations has been widely questioned for a long time by different authors in cluster literature. The literature developed by these authors argues that the dynamics of clusters seem to be much more appropriate for the generation and development of incremental or contextual innovations, to the detriment of radical or disruptive ones (Maskell, 2001). On the one hand, the proximity between companies, which facilitates the frequency of contacts and, on the other hand, the proximity between the actors, leads to the formation of a dense network structure, as well as strong relationships among the different actors. These characteristics often hinder the diffusion of new ideas as well as exclusive or more radical innovations (Molina-Morales, 2002).

In order to overcome the aforementioned limitations regarding generation of radical advances, many authors defend the need to open the cluster to external sources of knowledge (Belussi, Sammarra and Sedita, 2008). In that sense, authors as Sammarra (2005) or Biggiero (2006), proposed a selective relocation of certain activities out from the cluster. Other authors, such as Giuliani (2011), have focused on the role

played by technological *gatekeepers* in providing new ideas, knowledge or technologies which are subsequently developed and disseminated within the cluster.

The foregoing reflections and considerations have motivated our investigation. As far as we know, authors who have focused their approaches in the context of the cluster have rarely analysed the process leading to the generation and diffusion of disruptive innovations. These authors have typically focused on descriptions of the main actors, as well as their connections and other related issues. Our approach tries to go one step further and aims to focus on how clusters can achieve the development and diffusion of disruptive innovations which are able to reshape both the internal and external relationships in them.

With this aim, this work focuses on analysing the appearance of disruptive technological innovation (Markides, 2006), in the heart of the Spanish ceramic tile cluster. We refer to the so-called digital printing technology or inkjet technology. We will use this case to illustrate how this cluster has been able to capture a new technology coming from abroad and later, to develop it internally, adapting it to the cluster idiosyncrasy and even spreading the adapted technology successfully beyond its boundaries.

Finally, our study shows how the deep knowledge acquired by key players in the cluster, as well as the new skills they developed, provide them with new competencies that can be used in other industrial sectors. In fact, the new technology has created many diversification opportunities for those companies which realized their potential and successfully transferred this knowledge to other industrial fields similar to the ceramic one.

2. Theoretical framework

2.1. Disruptive innovations

Nowadays, companies and organizations are constantly struggling to create and introduce product, process and service innovations in the markets (Bayus, Griffin and Lehmann, 1998). In fact, a company's innovation capacity has probably become one of the best indicators of value creation for the company (Tsai and Ghoshal, 1998). In the context of our research, we consider the distinction between incremental and disruptive innovations to be particularly relevant.

The first approach to the generic concept of disruptive innovation is due to the Schumpeterian notion of *creative destruction* (Schumpeter, 1942). Later, the differentiation between the concepts of incremental and disruptive innovation was introduced by Abernathy y Utterback (1978) and by Abernathy y Clark (1985). Unlike incremental innovations, disruptions produce fundamental changes, revolutions in technology, clearly diverging from existing practices (Ettlie, 1983; Ettlie, Bridges, and O'Keefe, 1984). These innovations are important ways of expanding and developing new markets, as well as providing new functionalities which, in

turn, radically change the existing links of the market. It leads to the obsolescence of not only products but also technological and market capacities (Bower and Christensen, 1996; Christensen and Raynor, 2003; Danneels, 2004). As the interest of researchers increased, this concept has widened its scope to encompass different types of innovation. Currently, under the term *disruptive innovation* we will find business model innovations, radical product innovations or technological ones (Markides, 2006). The concept of disruption in the innovation literature has emerged recently as something strategically important (Assink, 2006; Charitou and Markides, 2002; Gilbert, 2003; Govindarajan and Kopalle, 2006; Henderson and Clark, 1990).

2.2. Creation and diffusion of innovations in cluster contexts

Clusters present peculiar dynamics regarding the generation and development of innovations. Most of the literature describes how the fact of belonging to a cluster generates a positive effect that catalyses the innovation of those companies who belong to it (Inkpen and Tsang, 2005; Tallman, Jenkins, Henry, and Pinch, 2004). However, as it has been proposed in other different researches, these companies need to combine the close and intense relationships, naturally generated in the cluster, with distant and out-of-the-cluster ones in order to access to global sources of knowledge (Corò and Grandinetti, 1999).

In the attempt of describing the inter-organizational relationships within industrial clusters, the metaphor of the network has been widely used; in this, physical proximity and sense of belonging are key elements that facilitate trust, reciprocity and other common values (Antonelli, 2000). From a relational perspective, the cluster is described as a cohesive and dense network made up of strong contacts. As a result, companies can potentially benefit from a certain efficiency when exploiting the opportunities that have arisen through the exchange of high-quality information, tacit knowledge and cooperative exchange.

On the contrary, following the same logic, the companies in the cluster may have problems to access to new and unique information. For example, Glasmeier (1991) in terms similar to those of Harrison (1994), described how Swiss watchmakers presented weaknesses in responding to disruptive technological changes from outside the district; and thus generated a competitive disadvantage.

In a way, the above argument is controversial, since there are many counterexamples that describe how industrial clusters are able to access new opportunities. In fact, other cases show that the existence of these industrial concentrations benefits the companies that integrate them both in relation to exploitation and exploration advantages. Saxenian (1991), for instance, found out that, in the rapidly changing environment of the information technology industry, especially in Silicon Valley, firms had abandoned the large number of distant relationships with suppliers to establish instead a small and selected number of relationships nearby.

3. Empirical framework

3.1. Context of the research

The present study focuses its research context in the ceramic industry and more specifically in the Spanish ceramic tile cluster. On the other hand, it is based on the analysis of the digital printing technology introduction in the cluster. The digital printing technology could be considered as a disruptive technological innovation as we will expose subsequently.

3.1.1. The ceramic industry and the Spanish ceramic tile cluster

In general terms, the manufacturing tile companies are grouped worldwide in the form of clusters or industrial districts. The ceramic tile industry is considered as a highly dynamic and competitive industry where technological advances, focused mainly on processes and products, are frequent (Russo, 1985). The result is an agile sector which is continuously moving towards high-technical and aesthetical products, quality excellence, efficiency and processes optimization. The strategy of this industry is mainly based on the reduction of energy consumption and environmental impact, the increase of flexibility and reduction of the productive cycle (Budí-Orduña, 2008).

This ceramic sector is also characterized by its intensity in terms of knowledge transmission. Mechanisms such as the constant creation of companies, the mobility of human resources and an informal channel of communication among the members of the cluster community are the basis of this characteristic (Molina-Morales, 2002).

The Spanish ceramic tile cluster is located in the province of Castellón and covers all activities of the ceramic industry value chain. Previous research has identified this territorial grouping as the paradigm of an Marshallian-type industrial cluster (Boix, 2009). This industry includes, on the one hand, the end-product companies—which are engaged in the production of pavements and ceramic tiles—and, on the other hand, a wide range of companies engaged in related secondary activities, such as, distribution of raw materials, manufacturing of frits and enamels, development of chemical additives, manufacturing of machinery, or other services such as, trading services. In addition, this cluster includes a number of public and private institutions as well as a set of organizations and associations that provide technical, logistic and knowledge support. Finally, R&D centres, the local university, local vocational training centres, business associations and trading companies also support and guide production companies towards business excellence and continuous improvement.

The Spanish ceramic tile cluster produced in 2016 the 94% of the total of the ceramic tiles manufactured in Spain. The 80% of Spanish ceramic tile companies are located in this area (ASCER, 2016). It is composed of about 100 end-product companies and over 1000 related-companies that are performing secondary activities. The business volume achieved in 2016 reached 4800 million of euros (ANFFECC, 2016; ASCER, 2016).

Focusing exclusively on the end-product companies, its annual production volume has reached in 2016 the 492 million of square meters. They generated in 2016 a turnover of 3,316 million of euros. These companies export the 80% of the total sales volume. The Spanish ceramic tile cluster is the first producer and exporter in Europe and the second exporter in the world. Finally, the Spanish ceramic tile industry is considered the third contributor sector to surplus of the Spanish coffers (ASCER, 2016).

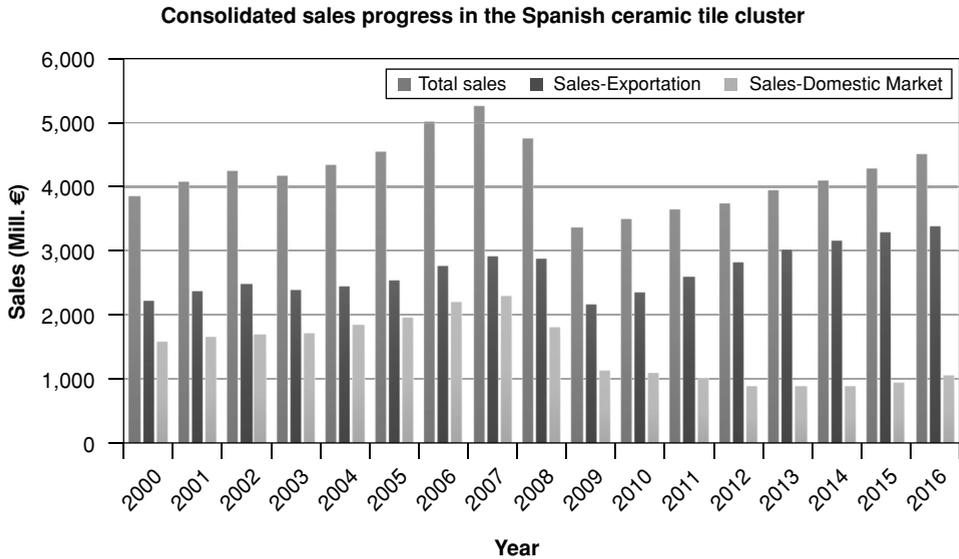
In order to contextualize the innovation in the period [2000-2016], Table 1 and Figure 1 show the evolution of the cluster from a business point of view performed by the end-product manufacturers and by the frits, enamels and digital ceramic inks manufacturers (which are the main secondary industry of the cluster itself). In this respect we must emphasize that innovation was widely introduced in the cluster around 2009-2010. Unfortunately, we are not able to directly infer that the change of trend in the evolution of the business was exclusively due to this fact.

Table 1. Evolution of sales of ceramic tiles manufacturers and frits, enamels and digital ink manufacturers

<i>Total sales of ceramic tile companies (mill. €)</i>				<i>Total sales of frits and digital inks companies (mill. €)</i>			
	<i>Total sales</i>	<i>Exporting sales</i>	<i>Domestic sales</i>		<i>Total sales</i>	<i>Exporting sales</i>	<i>Domestic sales</i>
2000	3.137,50	1.872,10	1.265,40	2000	726,20	376,50	349,70
2001	3.302,50	1.987,80	1.314,70	2001	789,30	405,80	383,50
2002	3.420,10	2.059,30	1.360,80	2002	835,90	458,00	377,90
2003	3.317,50	1.939,10	1.378,40	2003	860,00	483,00	377,00
2004	3.477,00	1.977,30	1.499,70	2004	885,00	505,00	380,00
2005	3.650,20	2.040,90	1.609,30	2005	911,00	532,00	379,00
2006	3.982,20	2.183,10	1.799,10	2006	1.033,10	602,00	431,10
2007	4.166,00	2.295,00	1.871,00	2007	1.097,50	641,00	456,50
2008	3.671,00	2.210,00	1.460,00	2008	1.087,60	700,27	387,33
2009	2.591,00	1.673,00	918,00	2009	794,02	529,57	264,45
2010	2.547,00	1.746,00	801,00	2010	976,98	640,79	336,19
2011	2.597,00	1.892,00	705,00	2011	1.065,73	733,27	332,46
2012	2.656,00	2.082,00	575,00	2012	1.109,36	768,55	354,75
2013	2.800,00	2.240,00	560,00	2013	1.159,32	792,10	367,21
2014	2.900,00	2.328,00	575,00	2014	1.202,16	845,62	356,53
2015	3.095,00	2.452,00	643,00	2015	1.194,79	853,77	341,02
2016	3.316,00	2.570,00	746,00	2016	1.203,23	843,02	360,22

Source: elaborated by authors from ASCER (2016) and ANFFECC (2016).

Figure 1. Consolidated sales of ceramic tiles manufacturers and frits, enamels and digital ink manufacturers

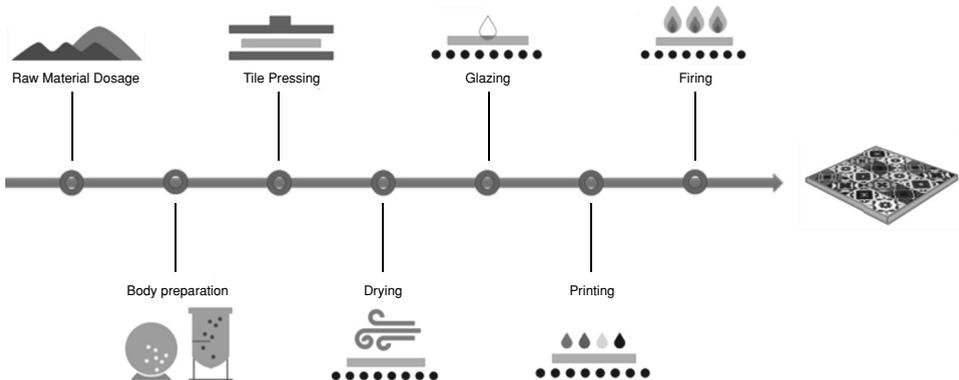


Source: elaborated by authors from ASCER (2016) and ANFFECC (2016).

3.1.2. How new technology impacts on ceramic tile manufacturing process

The disruptive technological innovation described in the present research is based on the introduction of digital printing technology (inkjet technology) as a new technique of tile decoration. In general terms, the ceramic tile manufacturing process consists of seven basic stages (see Figure 2).

Figure 2. Ceramic tile manufacturing process



Source: elaborated by authors.

In this context, it is important to highlight that decoration stage, in the ceramic industry, is one of the most relevant in the business value chain. In fact, decoration is the most important way to differentiate from competitors and to take position in the market. In addition, a significant part of the total manufacturing cost belongs to decoration. It is estimated that decoration cost constitutes from 30% to 50% of the total direct manufacturing cost.

Furthermore, decoration of tiles involves providing them with design and colour by means of a printing technique. For decades, this procedure has been carried out by the screen printing technique. The screen printing technique is a fully mechanical process which is performed by manual adjustments and therefore, it is rigid, inefficient and irreproducible.

3.2. Data source

3.2.1. Participant observation

We understand participant observation as the process that empowers researchers to learn about the activities which are being studied in their natural setting through observation and participating in their activities (Martínez, 2006). In our case, members of the research group have participated for a long period of time in the phenomenon under study being in permanent contact with the most relevant actors of the technological change. Moreover, they have participated actively in the development and diffusion of such change. Our research has benefited from the fact that one of the researchers has developed part of his professional career in one of the leading companies of the Spanish ceramic tile cluster. As a technical manager, taking responsibility of an applied digital inks research department, this author has collaborated in the development of the new technology through his investigations, obtaining information from the phenomenon under study from an internal perspective (Mayring, 2002). In this way, we have been able to observe the phenomenon: (a) in its natural situation; (b) in real time; (c) with a preferential situation to access to information related to the phenomenon (Punch, 2013).

From 2002 to 2016, we received the impressions and testimonies of those agents who were directly involved in the establishment, development and promotion of ink-jet technology worldwide. We observed from a preferential position the impact that this new technology produced in the value chain of the ceramic tile industry, not only in Spain but also in other countries such as Italy, Brazil, China or India.

On the other hand, we had the possibility of having a constant and durable contact with companies and actors in diverse countries such as Chile, Thailand, Portugal, Italy or Canada which, despite the fact of not being industries linked with ceramic manufacturing, they have been connected in some way with digital printing.

3.2.2. Interviews and other secondary sources

In order to understand and analyse the most relevant aspects of the present study, we have used triangulation techniques (a combination of different methods and data sources). We have conducted numerous interviews, around 50, with actors that have different professional profiles such as company managers, technical managers, commercial managers and manufacturing line managers or laboratory technicians. The interviews were carried out both for members of the Spanish ceramic tile cluster and members of other ceramic tile clusters in different places around the world. We had the opportunity to meet with other relevant figures as well which, not belonging to the ceramic tile industry, are directly linked to the innovation under study. The companies or organizations interviewed are listed below:

- New technology suppliers (digital ceramic printer manufacturers).
- New material suppliers (digital ceramic ink manufacturers).
- Digital components suppliers (electronic components manufacturers for digital printing which belong to different inkjet clusters such as the Japanese or the English inkjet clusters).
- Chemical products suppliers. These components are part of the digital ceramic inks (solvents and additives suppliers).
- Tile manufacturers. These companies used the old printing technology and have assimilated the new technology over the time.
- Companies from diverse industries which adopted the new technology in recent past.
- Companies from diverse industries that were about adopting the new technology. These companies were willing to benefit from the ceramic sector experience in order to rapidly introduce the innovation in their respective sectors.
- Technological institutes, not only those which belong to the ceramic field but also those belonging to other sectors such as textiles, plastics or building materials where digital printing had already been introduced or were about to.

We performed semi-structured interviews where the information obtained was recorded and analysed in order to get a global overview about how, from different points of view (technical and business), the changes in the value chain of the ceramic tile industry were being developed.

Along with this constant and close source of knowledge, data and information were also collected from a variety of secondary sources such as internal industry documents or reports, academic publications and well-informed opinions describing the inkjet phenomenon in all its magnitude.

3.3. Analysis method

Our research is based on a case study as a method of analysis. This method allows us to explore the phenomenon in its own context making use of a variety of sources and data. The data comes largely from documentation, interviews, direct

observations, participant observation and contacts (Yin, 1989). This ensures that our research addresses the phenomenon from different points of view and provides a holistic understanding of it. Through these stories, participants have expressed their own points of view and this has allowed researchers to better understand the actions of the participants (Lather, 1992).

Yin (2003) classifies case studies in explanatory, exploratory, and descriptive. According to this classification, our approach can be categorized as a descriptive case study as it describes a phenomenon as well as the actual context in which it occurs (Yin, 2003).

This approach, has allowed us to know «how and why» this technology has become in one of the most important sources of innovation in recent decades in the ceramic tile industry.

4. Results

4.1. Description of the disruptive technological innovation: digital printing as a revolutionary way of decorating ceramic tiles

We consider the innovation under study as disruptive because it radically changes the way in which the tiles are printed. Tile printing technology shifts from a mechanical technique to a non-contact and digital one. The new printing system (which may be comparable to a home paper printer) is mainly based on software which process images and a digital inkjet system that shoots the ceramic dye on the tile. The basis of the innovation lies in the substitution of a mechanical and non-reproducible technique by a digital one taking into account everything that the digital term means.

The origin of this new technology goes back to 1998, when a Spanish computer engineer —whom we could consider a *visionary agent*— designed and developed a digital tile printing prototype based on a printhead technology which was previously developed in inkjet clusters both from England and Japan. Later, this computer engineer founded Kerajet, a company that nowadays is the world leader in its sector (Albors-Garrigos and Hervas-Oliver, 2013).

Since the launch of the first digital printer in 2000, tile digital printing has undergone a series of further developments and improvements have been continuous. In fact, the massive adoption of the technology did not take place immediately after the innovation's emergence. A period of eight years elapsed before a real and effective diffusion of technology. In fact, it is estimated that in the period comprising 2000 and 2010, just around 100 printing machines were installed worldwide, while from 2010 to 2015 the number of machines installed (see Table 2) reached approximately the figure of 6,500 (Ferrari, 2016). It was on the first aforementioned period —more specifically between the years 2000 and 2008— when the

innovation appeared and evolved up to the point of being considered as a robust technique, competitive and efficient enough to be massively adopted by the ceramic tile industry worldwide. At this early stage of development, three key factors can be considered as responsible for the innovation's success. These three factors can be summarized as follows:

- The initial resistance to change shown by some of the traditional technological leaders was counteracted by the emergence of new actors associated with emerging technology. They were led by the *visionary agent* who developed the technology in a first place. We are referring to digital ceramic printer manufacturers (led by the aforementioned company called Kerajet) and to digital ceramic ink manufacturers, who quickly developed new skills and specific knowledge related to inkjet technology. Indeed, in the early stages, Italian machinery companies —which were technological leaders at that moment— were very reluctant to adopt the innovation. They faced this threat trying to improve their own leading technology in an effort to persist in a technological environment much more controllable by them.
- The new players, who already had very strong ties within the ceramic tile cluster, because they were members of it, were able to develop new ties with diverse external agents to the ceramic sector. This fact was, from a strategic point of view, a key point in the stage of consolidation for the new technology. Key external agents included printhead manufacturers, colour management software developers, microelectronics manufacturers or manufacturers of ultra-fine grinding systems.
- From a technical point of view, during this period, new technology improved and became feasible enough to be introduced as a reliable substitute of the traditional ceramic decorating process. These advances were crucial for the massive adoption of the technology. They were mainly focused on two fields:
 - *Printhead technology*: printhead manufacturers early realized that the ceramic sector had a big potential in terms of business and decided to adapt their printheads to those new ceramics materials which were not printed before. They modified the printhead design to be more reliable and to increase the printing quality.
 - *Digital ceramic ink technology*: ink formulations evolved from water-based soluble inks to oil based-pigment dispersion inks. This fact led to a reduction in the cost of the inks as well as to an increase of their reliability. Besides, chromatic possibilities were widened as pigments offer a wider colour variety. In conclusion aesthetic possibilities were extended at a lower cost.

In summary, on the early stage of the innovation, some key factors led to the consolidation of the digital tile printing technology making the innovation into a success story. In fact, data in Table 2 shows the successful evolution of the conversion rate to the new technology in the world ceramic tile industry (number of decorative digital lines installed relative to existing decorative lines, digital and traditional). By 2015, the 72% of the world's decoration lines were digital (Ferrari, 2016).

Table 2. Evolution in time of decorative lines conversion rate to digital technology. Number of digital printers installed over the last five years

<i>Year</i>	2010	2011	2012	2013	2014	2015
Digital printers installed yearly	—	397	951	2,049	1,537	1,216
Total number of digital printers in operation.	333	730	1,681	3,730	5,267	6,483
Conversion rate to new technology	5%	9%	21%	45%	60%	72%
Total number of estimated decorative lines	—	—	8,000	8,400	8,800	9,000

Source: Elaborated by authors from Ferrari (2016).

4.2. Main consequences of innovation

Although, in a first approximation, this technological innovation may seem subtle or minor (it is simply a matter of evolving from analogue to digital), when analysing the consequences that derive from it, we can talk about a successful case. In fact, this innovation modifies and improves in a great extent different aspects of the ceramic tile industry, beyond the simple technical considerations.

The changes that digital printing has produced in the ceramic industry can be divided into: (a) sectorial leadership; (b) production process; (c) competitiveness and (d) product portfolio.

In terms of sectorial leadership, as we have introduced in the previous section, technological leaders faced innovation in different ways. This fact led to a major shift in leadership positions within the cluster. While some leaders —Italian machinery manufacturers— lost their dominant position, other actors —the Spanish manufacturers of frits and enamels— followed with interest the innovation since its appearance. As soon as they perceived the new opportunity that was coming up, they design a strong plan of investment focussed in R&D in order to adapt their business to the new technology. As a result, Spanish manufacturers of frits and enamels became the main producers of ceramic inks to supply the new printers. They soon created new and successful business units, achieving a stronger position and consolidating a technological leadership that still continues today. In relation with cluster roles, the case study shows how some actors that we could consider as *gatekeepers*, due to fact that they behave as focal agents that mobilize the knowledge in the clusters (Agrawal and Cockburn, 2003), lost this intermediation role being replaced by a series of new technological leaders (among them the computer engineer who acted as a *visionary agent* of the new technology). This case reinforces the thesis of some authors who express the difficulty that the traditional gatekeepers have to introduce real new knowledge in the cluster (Molina-Morales, 2002).

Regarding the manufacturing process benefits, the innovation has completely changed the layout of the printing lines as well as the manufacturing speed. The ink-jet technology allows not only to shorten the space required for the printing stage but also to increase the celerity of the manufacturing process.

Furthermore, and in relation with competitiveness aspects, the innovation has improved the efficiency of the printing process allowing to increase the average manufacturing quality and to reduce most of the costs associated with the decoration process. In fact, one of the major consequences on this point is the gap reduction between high-quality and low-quality producers. In fact, the new decorative technique stabilizes the quality making it more regular. It is precisely this point the one that has led to a transversal adoption of the innovation by every single category of ceramic tile manufacturers, both those dedicated to low-cost product and those who bet on a differentiated high-end product.

On the other hand, the introduction of the digital printing, has reduced the threshold for an economy of scale as far as manufacturing costs of short lots doesn't increase significantly. In fact, costs associated to traditional ceramic tile decoration are relatively higher than those associated to digital even for large production lots. We are considering costs associated to wastes, the defective finished products (which are undeniably linked to traditional printing technology) and fruitless time consumption due to a continuous need of re-adjustment of the traditional machinery to avoid manufacturing defects (line breaks and workforce requirements). Digital decoration reduces these costs to virtually zero which makes it a much more competitive technology.

In terms of product portfolio, the digital printing technology has, somehow, opened new opportunities. The industry perceives now as feasible what was thought to be impossible with the traditional technique. Large tile formats, a wide variety of designs and a new and broad range of colours are the main elements that have favoured the expansion of the company portfolios.

4.3. Implications of the innovation in the basic strategic lines of the companies and the consequences on the overall strategy of the Spanish ceramic tile cluster.

The consequences regarding the adoption of the digital printing technology have a two-level impact on business strategy. On the one hand, there is an impact on basic business strategy for cluster firms but on the other hand, there is an impact on the overall strategy of the Spanish ceramic tile cluster.

4.3.1. Impact on companies' basic business strategies

As a result of our research, we may conclude that the disruptive technology allows ceramic tile companies to concurrently address the two basic strategies: product differentiation and cost reduction. Under this new perspective, companies can reconsider their strategic choice, since they can opt for new competitive positions. In accordance with the main strategic options proposed by Porter (1985), we can clas-

sify the main changes derived from the appearance of the digital printing technology based on the impact in terms of product differentiation or cost leadership.

Regarding product differentiation, it is important to emphasize that, as described above, the new technology enhance the aesthetic properties of the manufactured products, as well as the product portfolios offered by the companies. Both the design performance and the development of new products have benefited enormously from this technological change.

There are a variety of examples that could be used to explain the effect produced by the innovation on product differentiation. Tile formats, for example, can now be larger, as new non-contact technology makes it feasible. Products are richer, as well, in terms of graphic detail and amplitude of chromatic range. In addition, new product development process itself has been greatly simplified, allowing design departments to work faster and more efficiently and to expand the number of prototypes. Consequently, time-to-market of new collections has been reduced considerably.

Regarding cost leadership, the shift from an analogue to a digital technology has led to the elimination of two low-efficient sub-stages linked to traditional printing process; the preparation of coloured dye and the colour set-up of the product. This drives to an increase in production efficiency and a reduction in decoration costs. In addition, costs associated with consumable materials (such as traditional silk screen displays) have been reduced. On the other hand, new technology reduces downtimes traditionally associated to ceramic decoration lines. The necessary adjustments to fit the graphic and tonality problems are reduced considerably since they are no longer manual. Generally speaking, downtimes are a major problem in the ceramic tile sector as in other industries operating continuously. They not only reduce the efficiency of the process, but also produce low-quality products, reducing profitability eventually.

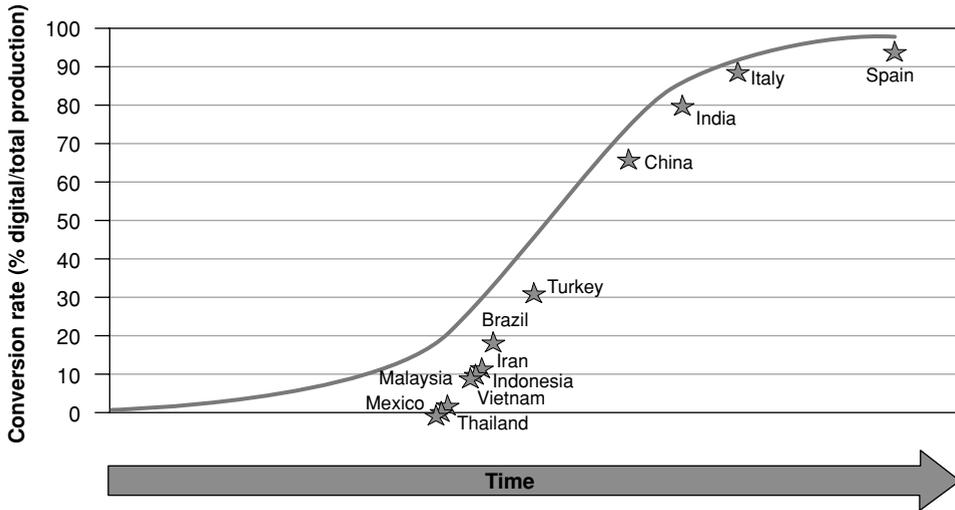
Logistic costs are also significantly reduced. Manufacturing managers can shorten production batches because to switch from one printing pattern to another is, in digital, easier, faster and less costly. As a direct consequence, stocks of intermediate and final products can be limited and the company's response can be adapted quicker to the market demand.

Finally, linked to the aforementioned productive and logistic advantages, firms' financial needs can be reduced. In fact, working capital requirements are lower due to the fact that the stocks of final product, secondary-quality products, raw materials and intermediate products are reduced.

In order to reinforce our conclusion, Figure 3 shows how, in 2015, four countries have fully adopted digital printing technology. They are Spain, Italy, China and India. It is well known in the sector that, on the one hand, Spain and Italy are markets focused on product differentiation strategy while, on the other hand, the strategy of China and India is based mainly on cost reduction. Furthermore, in terms of competition among companies, digital technology has shortened the competitive gap between those manufacturers who were focused on a product differentiation strategy

and those whose strategy was cost reduction. Indeed, in a situation where legal protection of designs is not frequent, imitation is relatively easy, so any company is able to replicate any market-leading product in a reasonable time and without incurring significantly higher costs.

Figure 3. Conversion rate of decorative lines to digital in 2015. Level of digital printing penetration by country



Source: Ferrari (2016).

4.3.2. Impact on the overall strategy of the Spanish ceramic tile cluster

The innovation under study has shown a global strategic value for a cluster as an entity beyond the individual firms' strategic value previously mentioned. The mature Spanish ceramic tile cluster has been renovated and nowadays it is considered as a paradigm of industrial innovation case. The ceramic industry in Spain is currently deemed as a model of dynamism and modernization that is able to compete with many other ceramic tile clusters around the world in terms of cost or quality.

In addition, this important value is not only perceived by other ceramic tile districts but also by other different industries which are using traditional printing and are willing to carry out a technological transformation as well. The use of printing as a method for adding value to the final product is a paramount aspect for many industries, not only for ceramics. Different industries, such as wood panelling, fiberce-ment boards, glass, corrugated boards or the textile industries, among others, entrust an important part of their competitive strategy on design and, therefore, on printing. Nowadays different sectors are benefiting from the ceramic technological leaders' expertise to reduce uncertainty and accelerate the technological shift.

In conclusion, industrial digital printing has given the Spanish ceramic tile cluster the opportunity to open new diversification strategies. Significant firms from different subsectors such as ceramic printer manufacturers, ink producers or peripheral equipment manufacturers are successfully penetrating other industrial sectors.

5. Results and conclusions

This work addressed the processes which lead to creation, development and diffusion of a disruptive technological innovation in the context of an industrial cluster. At the same time, we wondered if it is possible to create such kind of innovations in a mature cluster beyond the usual incremental ones. Findings of the case study revealed that the usual cluster dynamics may prevent present *gatekeepers* from leading these radical changes. Lack of a distant vision from the cluster itself, limited resources, or the fact of being focused on short-term challenges can be inhibiting factors of more radical solutions.

In this context, the new actors, or *visionary agents*—which may come even from outside the clusters—are called to play a decisive role as sources of innovation. These actors are able to supply clusters with new ideas or original visions far from the clusters' state of the art. In our opinion is interesting to highlight how in this case, innovation was created by a *visionary agent*, an actor that did not belong to conventional *gatekeepers* (companies, local institutions or support organizations) (Molina-Morales and Martínez-Cháfer, 2016).

Findings of this case revealed that disruptive innovations can be generated in other contexts that are different to large companies where organizational structures usually are able to perfectly align R&D resources towards an innovative idea. In clusters as entities this point is more difficult as there isn't an articulated hierarchy or a coordination in the actions.

This research work has addressed the analysis of the innovation consequences from two different perspectives: (a) the ceramic tiles industry's value chain; (b) the role played by cluster members. In our opinion, the success of a disruptive innovation in a cluster will be influenced by these two elements. In other words, a deep impact of the innovation on the industry value chain alongside a close cooperation among relevant actors (*gatekeepers*) will be a good recipe. When this happens, the cluster's internal and external relationships are reconfigured and, as a consequence, not only the individual firms' strategies are reconsidered, but also the overall clusters' strategy.

Renewal of industrial clusters through disruptive technological innovations is shown in this research. In our opinion, the case study contributes to the present discussion on the future of industrial clusters. Radical innovations, by increasing the competitiveness of firms and by opening up new opportunities, may become key elements to rejuvenate those clusters which are considered to be at the end of their life cycle. In addition, as opportunities may be opened not only in the same industry, but

also in different sectors, radical innovations can be considered as powerful levers for industrial clusters' diversification.

In our opinion, our paper's findings mainly contribute to two different academic research lines. On the one hand, the group of studies which are focused on radical or disruptive innovations analysed by authors such as Christensen (1997), Markides (2006) or Tellis (2006) among others. These authors emphasize the importance of this type of innovations that allow the creation of new markets, beyond the mere incremental improvement of existing ones. On the other hand, this work supports the authors who have raised the need to redefine the internal and external relations of the clusters (Biggiero, 2006; Sammarra, 2005).

Finally, this paper presents a series of limitations, some related to the peculiarities of the case and others due to the descriptive approach we have used. We have performed a case study based on the specific conditions of this case. Therefore, we appeal to caution in generalization of conclusions, which might be suitable to other clusters or industrial realities. This research attempts to take a first step towards a more ambitious and broader analysis. To explore a comparative analysis of different disruptive technological innovations in the context of other clusters should be a potential future challenging research.

ACKNOWLEDGEMENTS

Financial support provided by the Spanish Ministry of Economy and Competitiveness (Project number ECO2015-67122-R) is gratefully acknowledged.

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The Role of Institutional and Territorial Factors in Innovation: the Case of the Spanish Footwear Components Industry

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ABSTRACT: The industrial fabric of the province of Alicante has long been made up of various types of agglomerations of companies, including local productive systems, industrial districts and clusters. These enterprise systems are currently facing challenges to their competitiveness brought about by global markets and transformations in technology and production. In this paper we analyze the transformation processes introduced by businesses in the footwear components industry and the importance of the Regional Innovation System in the recent economic context. We demonstrate how companies in the footwear sector have sought various alternatives, especially innovation strategies, internationalization, diversification towards different productive sectors, and specialization in different market segments. We also analyze the role of the Regional Innovation System of the Valencian Community (Spain) (e.g. the Chamber of Commerce, technological institutes, universities and innovation policies) in these transformation processes.

JEL Classification: R30; R50.

Keywords: innovation; diversification; regional innovation system; industrial district.

El papel del factor institucional y territorial en la innovación: el caso de la industria de componentes del sector calzado

RESUMEN: El tejido industrial de la provincia de Alicante ha sido y es un escenario de aglomeraciones de empresas denominadas de diferentes formas como sistemas productivos locales, distritos industriales, clústeres, etc. Estos sistemas empresariales se enfrentan a transformaciones tecnológicas, productivas y a mercados globalizados que plantean retos a su competitividad. En nuestro estudio ana-

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Received: 30 march 2017 / Accepted: 20 september 2017.

lizamos los procesos de transformación que han protagonizado las empresas del sector de componentes del calzado y la importancia del Sistema Regional de Innovación ante el reciente contexto económico. Mostramos como las empresas del sector han seguido distintas alternativas destacando las estrategias de innovación, internacionalización, diversificación hacia distintos sectores productivos, y especialización en segmentos del mercado. Y analizamos también el papel que juega el Sistema Regional de Innovación Valenciano (Cámara de Comercio, institutos tecnológicos, universidades, políticas de fomento de la innovación,...) en estos procesos de transformación.

Clasificación JEL: R30: R50.

Palabras clave: innovación; diversificación; sistema regional de innovación; distrito industrial.

1. Introduction

The need to innovate has always been an important factor in the survival of all types of organizations. In its broadest sense, innovation is understood as the transformation of processes that enable an organization to perform its tasks more efficiently and more effectively. From this perspective, innovation is synonymous with adaptation. As economic globalization has continued to develop, innovation has become a major ally for companies since it radically changes the sources of added value creation (Pavón and Hidalgo, 1997; Escorsa and Valls, 2005; Vázquez, 2005; Morcillo, 2006; Nieto, 2008; Puig and Debón, 2012). This situation has been reinforced by the impact of the financial crisis that began in 2007, which highlighted once more that it is no longer just companies that must compete with other companies from elsewhere in the world but also entire economic territorial regions, i.e. social and business ecosystems are also now competing on a global scale (Gómez and Vaquero, 2015). In this context, innovation has adopted a crucial role in today's economy.

To better understand innovation as a business strategy, case studies are needed that illustrate how this strategy has been incorporated in changing environments. As an object of study, innovation processes have acquired their own identity and have now become a consolidated area of research. However, this does not mean that further research cannot be conducted into certain issues related to the undoubtedly prominent role territory has acquired because of how it affects the incorporation of innovation into industry (Méndez, 1998). In this paper we present the results of a study conducted in a specific industry (the footwear industry) to determine the dynamics of innovation displayed by companies in a certain business ecosystem. We will attempt to determine to what extent these companies rely on the institutional context to implement their innovation strategies. By «institutional context», here we mean one of the components of the Regional Innovation System (RIS). In answering this question, we also aim to identify other key sources of innovation.

Our initial hypothesis is that the innovation dynamics of companies in the footwear components industry in a given socio-business ecosystem (the city of Elche) depend more on the network of inter-company relations than the use of institutional elements and resources. In other words, innovation is characterized more by the internal dynamics and logic of the business network, which to some extent are autonomous from the institutional framework.

Our analysis confirms our hypothesis that the informal and autonomous links between companies play a more important role in innovation than institutional factors, represented here by the entities and institutions of the RIS. Innovation also depends on factors such as market orientation (since exporting companies are more innovative) but not on company size (since no significant relationship exists between company size and innovation). A certain amount of cooperation within the business system is relevant when adopting an innovation strategy. In our case study, therefore, we discuss the notion of ecosystem of innovation (Navarro, Benavente and Crespi, 2016; Marquerié, 2016) (which is supported by cross-learning), the sharing of productive experiences, and a territorial location that serves as a framework for innovation (to some extent it also makes up for the institutional RIS deficiencies identified by the stakeholders themselves).

Following this introduction, we briefly describe the productive sector analysed in this study and report the high degree of business concentration in the footwear components industry in the province of Alicante, Spain. We then present several key concepts behind the theoretical framework we have used to analyse this sector. Next we describe our methodology and present our most important results. Finally, we provide a summary, by way of conclusion, discuss our findings, identify possible future lines of research, and make several brief recommendations for the sector.

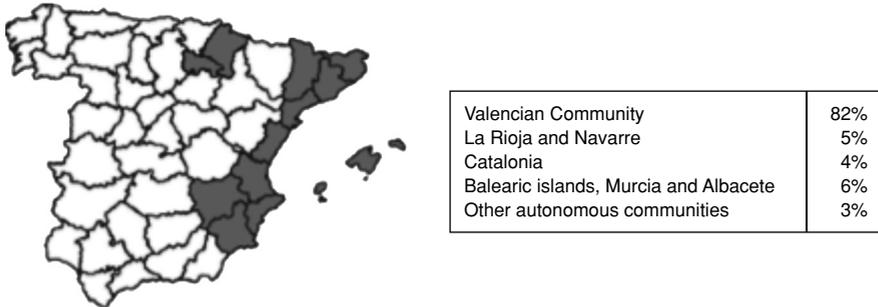
2. The footwear components industry in Spain

The Spanish footwear components sector is characterized by high territorial concentration. The Valencian Community is home to 82% of Spanish footwear components companies and 65% of workers in the sector, mainly located in the towns of Elche¹, Elda-Petrel, Villena and Vall d'Uxó. Figure 1 shows the Spanish provinces that are home to the most companies in this sector.

A high percentage of the manufacturing industry of the Valencian Community is found in the province of Alicante. Production and exports are currently increasing in the footwear and footwear components industries both in the province and in the Autonomous Community as a whole. At the start of the 21st century, the footwear components sector was severely affected first by globalization (turnover bottomed out in 2005) and then by the recession. However, the footwear components industry

¹ Of the companies in the sector located in the Valencian Community, approximately 60% are found in the town of Elche (AEC Activities Report, 2016).

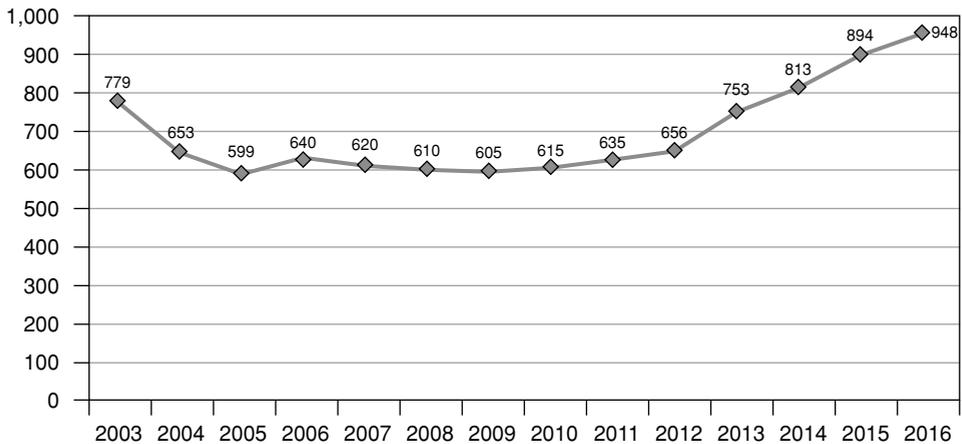
Figure 1. Autonomous communities in which footwear is manufactured



Source: Report on the activities of the Spanish Association of Footwear Components Companies (AEC 2016).

has recovered to the extent that in 2016 turnover was higher than it was when the recession began (see chart 1). In the 2015-2016 financial year, employment in the sector increased by 6%. The Spanish footwear components industry currently comprises over 1,200 companies, most of which are SMEs, which generate roughly 11,000 direct jobs and 3,500 indirect jobs².

Chart 1. Turnover of Spanish footwear components companies that are members of the AEC. Million euros



Source: Report on the activities of the Spanish Association of Footwear Components Companies (2016).

The importance of the footwear and footwear components sectors in the town of Elche is clear from the following data (Elche Annual Statistics Reports, 2016): of the

² The Spanish Association of Footwear Components Companies (AEC) has around 210 affiliated members. Some of these members are groups of companies made up of subsidiaries representing a total of roughly 700 firms (AEC Activity Report, 2016).

8,024 companies operating within the municipality³, 857 (10.6%) concentrate their economic activity on the leather and footwear industry. Of the 73,763 workers affiliated to the Social Security system, 13,514 (18.32%) are employed in the manufacturing industry, of whom 8,926 (12.1% of all affiliated workers and 66% of industrial workers) are employed in the leather and footwear industries⁴.

It is this sector's economic importance to the region that led us to investigate how companies in the sector behave, what competitiveness strategies they employ, and how they are reacting to the current economic situation.

3. The Regional Innovation System

Several approaches, each adopting a different starting point and a different conception of innovation as a factor for development, have been proposed to explain how innovation is produced via different variables. However, whichever definition is used, any analysis of innovation needs to consider aspects related to company competitiveness, which we may call the economic/competitive approach, as well as aspects included in what we may call an ecosystem of innovation, which includes the social and institutional fabric in which the companies operate.

Innovation has therefore been analysed using different approaches and different conceptual frameworks, including local production systems (Garofoli, 1986), innovative *milieux* or learning regions (Maillat, 1995), industrial districts (Marshall, 1919), national innovation systems (Lundvall, 1992), regional innovation systems (Lundvall, 1992), clusters (Porter, 1990), and ecosystems of innovation (Marquerie, 2016). Each of the economic forms mentioned above is characterized by certain variables. However, each one considers innovation as the core variable for explaining not only the competitiveness of a company but also the generation of knowledge within a system or territory. Each of these approaches considers territory as the context of development from the socioeconomic and demographic perspectives as well as from the physical perspective.

The theoretical model that best fits the sector we are analyzing here is the Regional Innovation System. Navarro (2007) states that the concept of RIS appeared for the first time in a study by Cooke (1992). The author also indicates that no concept of RIS has yet been fully accepted. Asheim and Gertler (2005: 299) define a RIS as «the institutional infrastructure that supports innovation in the productive structure of a region». Cooke *et al.* (2003) assert that regional innovation systems are made up of two subsystems. The first of these is a subsystem of knowledge generation, which is made up of all the social, economic and educational agents (universities, technology transfer agencies and laboratories, etc.). The second is a subsystem of knowledge exploitation made up of companies that adopt the knowledge acquired and exploit it commercially by generating innovative goods and services.

³ Excluded from these numbers are those employed in agriculture, domestic work and fisheries.

⁴ Elche Annual Statistics Reports, 2016. Labour market.

According to Heijs, Buesa and Baumert (2007), the concept of RIS has its origin in the merging of Marshall's industrial district theories (1919), Perroux's growth poles theory (1955) and Porter's clusters theory (1990). Heijs, Buesa and Baumert (2007: 32) cite Lundvall (1992) when defining a regional innovation system as the «elements and relationships that interact in the production, diffusion, and deployment of new and economically useful knowledge whose roots [are located] within the borders of a nation or state». Olazarán, Albizu and Otero (2008: 28) assert that the conceptual framework of RIS includes, for example, elements of evolutionary and institutional economics, social theories and economic geography, and terms such as industrial districts, innovative *milieux* and learning region. They also state that, within an RIS, «innovation is conceived as an interactive learning process both within the company and between the company and other organizations».

The concept of RIS is controversial or has been subject to criticism due, for example, to a lack of clarity and accuracy (Doloreux, 2004; Hommen and Doloreux, 2003; and Anderson and Karlsson, 2004). The above studies highlight the lack of clarity in the scope and influence of its components and agents.

Analyses of RIS have acquired a certain relevance in the literature on economics and the sociology of organizations since they include aspects related to territorial development. On the one hand, companies, as socio-economic agents, are capable of organizing amongst themselves, creating knowledge and innovation exchange networks, consolidating know-how, and producing through the prism of economies of scale. On the other hand, public authorities (both national and regional governments) began to create public and public/private institutional organizations to help the regional productive sectors. These include technological institutes, technology transfer offices, business innovation centres, and local employment and development agencies. Moreover, in certain regions the interrelationships between universities, scientific laboratories and the productive fabric have been stimulated in order to improve innovation, commercialization, management and training, etc.

In summary, a RIS is a set of public, private and public/private infrastructures whose objective is to support the productive fabric in a region through interactions between the economic and social agents in that region (to promote innovation, commercialization, and culture, etc.).

The Regional Innovation System with which the companies analysed in this paper collaborate includes the following institutional agents: universities (the Miguel Hernández University of Elche (UMH), the National Distance Education University (UNED), and the University CEU Cardenal Herrera), technological institutes, and organizations such as the Chamber of Commerce, the Valencian Export Institute, the Valencian Institute of Economic Research (IVIE), the Valencian Institute of Finance (IVF), the *Sociedad de Garantía Recíproca* (SGR) (mutual guarantee society), and the European Business and Innovation Centre (CEEI).

To characterize the RIS that collaborates with the companies analysed in this study, we began with the model developed by Fernández de Lucio, Gutiérrez, Azagra

and Jiménez (2000, 2001), which was based on Lundvall's (1992) definition of innovation and the Sábato triangle⁵. This model defines certain elements and divides them into the following environments:

- The scientific environment, which mainly consists of university research groups and public and private research organizations.
- The technological and advanced services environment, which encompasses companies that provide goods and advanced equipment and services, engineering consultancy companies, technological centres, and business research associations.
- The financial environment, which comprises the private financial entities (venture capital, seed capital, business angels, etc.), which aim to provide the system with the resources needed to develop and execute projects.

Fernández de Lucio *et al.* (2000, 2001) combined these aspects to characterize RIS as having a small company size, weak coordination between their institutional elements, poor adaptation of these elements to the productive environment, weak advanced services, a practically non-existent private financial environment, and a lack of leadership.

The strengths of a RIS, on the other hand, include their promotion of channels for establishing interrelationships between business agents, their proactive nature mainly in the commercial context, and their response to changes in market demand (though the degree of cooperation between **companies** could be extended). Other strengths include the existence of a technical culture in the productive environment and **their** absorption capacity, which has a direct effect on the innovation process.

4. Methodology

We analysed 41 companies in the Spanish footwear components industry. This analysis also served to describe this industry in Elche in the context of the RIS. Our structural sample included the largest companies in the sector, those with the highest turnover, and some of the smaller ones. The companies we selected were or have been members of the Spanish Association of Footwear Components Companies (AEC). Of these 41 companies, nine were in fact groups of companies, i.e. made up of at least two companies. The final number of companies in the sample was therefore 63. Every phase of the footwear production system was covered in our sample. All companies were representative of the sector because of their age, size or degree of innovation. Of the 41 companies we interviewed, 28 (68.3%) were current members of

⁵ The Sábato triangle is a scientific-technological policy model that states that an effective scientific and technological structure requires three agents. The first of these is the State, which develops and performs the function of designing policy as well as the scientific and technological infrastructure. The second is the scientific technological infrastructure, which produces and supplies technology. And the third is the productive sector, which requests the technology. The Sábato triangle indicates that if this structure is to work, there must first be a constant interrelationship between all the agents.

the Association, while 13 (31.7%) were not. Of these, some had once been members but for various reasons were no longer.

To determine the context in which the sector is based, we gathered information on companies in the sector from secondary sources (studies, data and reports). For our qualitative approach, we conducted semi-structured interviews with the managers of the companies in the sector in order to determine their strategies and their opinions of the various RIS agents. With this information we aimed to identify their needs as well as any perceived deficiencies.

Our semi-structured interviews covered the following areas:

1. Motivation for innovation. Why and how do companies innovate?
2. Instruments for innovation. What mechanisms do companies use to innovate?
3. External relations for innovation. What role do external agents play in the innovation processes of these companies?
4. Problems to innovate. What problems do companies find when innovating?
5. Public policies for innovation. How are public policies in support of innovation working?
6. Regional innovation systems. Evaluation of the Regional Innovation System.

The script for these interviews was inspired by the questionnaire used by Olazarán, Albizu and Otero (2008) in their study entitled «Innovation in small and medium-sized industrial enterprises in Gipuzkoa», which we expanded and adapted using another questionnaire from the research project entitled «Enterprise, organizational changes and new technologies in the petrochemical complex of Tarragona», by Purcalla *et al.* (2010).

From the variables contained in the script/questionnaire, we drew up *ad hoc* indexes that we later used to identify possible correlations between the variables. Table 1 shows the indices and variables from which they were created.

From these variables, which were mostly dichotomous and comprised Yes/No responses, we added the categories with affirmative answers in order to draw up specific indices, and constructed proxy variables that could be treated quantitatively. Similar analyses can be found in earlier studies by Purcalla *et al.* (2010) and Ahedo, Pizzi and Belzunegui (2014).

All indices were constructed from the original qualitative variables. The scores for the indices were obtained from the sum of the scores on the original variables divided by the maximum score a company could obtain in the summation. Only for the variable *Company market* (five response categories) did we weight the responses (attaching greater value to the responses *national market* and *international market*). For all indices, the maximum value was 1 and the lowest value was 0. The higher the value assigned to a company (the closer the value to 1), the more innovative the company is or the greater propensity to innovate, greater market intensity or greater use of the regional innovation system's resources the company will have. We should bear in mind that the final scores are not absolute in a quantitative or ratio sense but scores

Table 1. Synthetic indices

	<i>Variables of origin</i>
INNOVATION INDEX	<ol style="list-style-type: none"> 1. Innovation in technology. 2. Innovation in marketing. 3. Innovation in organization. 4. Innovation in process. 5. Innovation in machinery. 6. Innovation in product.
MARKET INTENSITY INDEX (MII)	<ol style="list-style-type: none"> 1. Exporting company. 2. Company market (weighted in favour of national or international market). 3. Innovation in marketing.
REGIONAL INNOVATION SYSTEM RESOURCES INDEX (RISRI)	<ol style="list-style-type: none"> 1. Uses public programmes to promote innovation. 2. Uses technological institutes. 3. Uses ICEX/IVEX. 4. Uses CEEI. 5. Uses SGR. 6. Collaborates with universities. 7. Has worked with the ICO.
PREPAREDNESS TO INNOVATE INDEX (PII)	<ol style="list-style-type: none"> 1. Employees receive incentives to introduce innovation. 2. Collaborates with the Chamber of Commerce. 3. Innovation programmes. 4. Patents. 5. Strategic innovation plan. 6. Budget for innovation. 7. Disseminates a culture of innovation in the company.

Source. Authors' own.

whose origins are qualitative variables and whose interpretation must therefore also be qualitative and/or approximative.

The meanings of the various indices are as follows:

- Innovation index. This reflects whether the innovation is localized or general, i.e. how many environments it encompasses. Higher values indicate an innovation's greater degree of penetration.
- Market Intensity Index. This comprises three indicators, two of which are related to the product's target market while the other identifies whether the company innovates in marketing. The highest values are for companies that innovate in marketing and deploy strategies for market internationalization.
- Regional Innovation System Resources Index. This comprises a range of institutional resources that are available to companies. Combining the use of these resources leads to high values for this Index. Companies whose innovation depends more on these resources have higher values for this Index.

- Preparedness to Innovate Index. This is calculated by adding several innovation-related aspects, including whether the company has an innovation strategy (plans, programmes, budgets and an internal innovation culture). Companies with innovation strategies that are more clearly defined, explicit and incorporated into their corporate culture have the highest values for this Index.

These *ad hoc* indexes serve to define the profiles of innovative companies in the sector. The theoretical-empirical coherence of these indices is illustrated by the high positive and significant correlations between them, especially between the Innovation Index, the Market Intensity Index and the Innovation Disposition Index, as well as by the more moderate correlation between the Innovation Index and the Regional Innovation System Resources Index.

In summary, we first made a descriptive analysis of the variables contained in the script/questionnaire. We then conducted a bivariate analysis between the indices and some of the relevant variables to determine whether there was any association between them using a matrix of correlations and hypothesis tests based on contingency analysis.

5. Results

Our analysis reveals that several of the companies studied have been operating for over 60 years. Most (49%) are run by the second generation of managers, while 39% are run by the first generation and 12.5% by the third.

Most companies (58%) are small in terms of their number of employees, while 12% of the companies have at least 100 employees, 20% have between 26 and 49 employees, and 10% have between 50 and 99 employees.

Of these companies, 15% have a turnover of up to one million euros, 61% have a turnover of between one and five million euros and 24% have a turnover of over five million euros. Average turnover is 4.9 million euros, while the median turnover is two million euros⁶.

Turnover is increasing and positive for 65.9% of the companies, negative for 12.2% and stable for 22%.

Of the companies, 68.3% are exporters while the remaining 31.7% are not. There is no relationship between company size and whether it is open to external markets. There is also a statistical relationship between being an exporting company and having a positive trend in turnover, though the significance of this relationship is borderline (95% confidence interval). A positive trend in the turnover of a company could therefore be ensured by opening up to external markets.

⁶ As expected, there is a strong relationship between the number of employees, which is a measure of the size of the company, and the turnover. The Pearson correlation coefficient was 0.736.

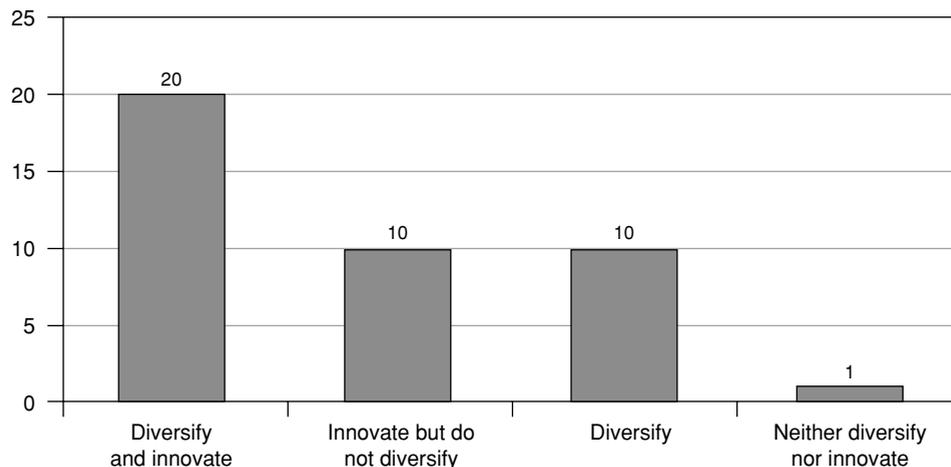
However, when the managers were asked what their company’s main market is, they qualified the exporting nature of their company somewhat: 41.5% said that their market is fundamentally international, while 39% prioritized the national market, 17% prioritized the provincial market, and 2.4% prioritized the regional market. These data show that many companies may be following an exportation strategy only occasionally or intermittently.

With regard to personnel, 36.6% of the companies employ university graduates in both administration and production, while 26.8% employ them exclusively in administration. Those employed in administration have degrees in Economics and Business Sciences or Diplomas in Labour Relations, while those employed in production and R&D have degrees in Chemistry and Engineering, etc.

We also found that 36.0% of the companies have no employees with regulated training. Nevertheless, the employees of these companies, known as ‘technicians of life’, do have ample experience (10-15 years in the company).

With regard to company strategy, there are no significant differences between the large, medium or small companies, i.e. size does not determine whether the company diversifies and/or innovates ($p > 0.05$) (see Chart 2).

Chart 2. Company strategies



Source: Authors’ own.

Of the companies in our sample, 63.4% stated that it is the manager’s decision whether to innovate (in conjunction with their staff, middle managers and collaborators). Only three of the companies interviewed have a specific strategic plan for innovation, though 29.3% of them have a structure in place that is responsible for innovation in products, processes, marketing, organization and/or technology (in addition to university graduates, they have employees who are qualified on account of their experience).

The areas of innovation are shown in Table 2. Almost every company innovates in products (95.1%), while three quarters of the companies (75.6%) innovate in machinery. These two types of innovation are closely linked. Also important is innovation in processes (63.4%). The figures are not so high when it comes to innovation in organization (22%), marketing (2.4%) or technology (4.9%). These figures indicate that the technology used is versatile enough to develop both product and process innovations and that the purchase or acquisition of new machinery is not considered to be technological innovation since it is not generated within the system or company.

Table 2. Percentage of companies that innovate or do not innovate in certain areas

<i>Innovation</i>	<i>Yes (%)</i>	<i>No (%)</i>
In product	95.1	4.9
In process	63.4	36.6
In marketing	2.4	97.6
In organization	22.0	78
In technology	4.9	95.1
In machinery	75.6	24.4

Source. Authors' own.

We have calculated correlation coefficients from the Market Intensity, Regional Innovation System Resources, Preparedness to Innovate and Innovation indices in order to determine whether significant relationships exist between them (Table 3):

Table 3. Correlations between the indices

	<i>Market Intensity Index (MII)</i>	<i>Regional Innovation System Resources Index (RISRI)</i>	<i>Preparedness to Innovate Index (PII)</i>	<i>Innovation Index</i>
Market Intensity Index (MII)	1	.438** .004	.264 .095	.959** .000
Regional Innovation System Resources Index (RISRI)	.438** .004	1	.459** .003	.433** .005
Preparedness to Innovate Index (PII)	.264 .095	.459** .003	1	.273 .084
Innovation index	.959** .000	.433** .005	.273 .084	1

** Correlation is significant at the 0.01 level (bilateral). Source. Authors' own.

The drivers of the Innovation Index are the Market Intensity Index and the Regional Innovation System Resources Index, both of which have clearly significant correlations with the Innovation Index. This may be taken as a result, though this type of analysis does not clearly reveal any unidirectional relations. The Preparedness to Innovate Index may act as an independent variable and as a dependent variable within the system. However, this index does not have a significant relationship with the Innovation Index, which indicates that while preparedness to innovate is generated and developed with a certain market autonomy, it is supported by the institutional elements of the RIS.

We found significant correlations between the Market Intensity Index and both the Innovation Index ($r_{x,y} = 0.959$) and the Regional Innovation System Resources Index ($r_{x,y} = 0.438$). We also found significant correlations between the Regional Innovation System Resources Index and both the Preparedness to Innovate Index ($r_{x,y} = 0.459$) and the Innovation Index ($r_{x,y} = 0.433$). Clearly, the greatest influence occurs between market orientation and intensity on the one hand and innovation on the other.

Cooke *et al.* (2003) reported that the RIS comprises two large subsystems. The first of these is a subsystem of knowledge generation, which is made up of all the social, economic and educational agents (universities, technology transfer agencies, and laboratories, etc.). The second is a subsystem of knowledge exploitation, which is made up of companies that adopt the knowledge acquired and exploit it commercially by generating innovative goods and services. The data we present below show that the companies make greater use of the second subsystem than they do of the first, which confirms our hypothesis that, when it comes to innovation, the companies operate with a certain autonomy regarding the institutional subsystem.

The vast majority of companies are generally aware of public programmes for innovation, though only 36.6% of them actually use them (see Table 4).

Table 4. Percentage of companies that use innovation promotion programmes

	%
Companies that use innovation promotion programmes	36.6
Companies that do not use innovation promotion programmes	63.4
Total	100.0

Source. Authors' own.

We found that participation in innovation promotion programmes is low. When the company managers were asked why they did not participate in these programmes, they outlined the following reasons:

«Document processing is far too complicated and bureaucratic. It has no bearing on reality. They treat what they offer as a necessity for our companies. We prefer more agile and simple preferential lines of credit rather than a subsidy. It is not company policy to apply for

a subsidy. The company has a plan mapped out. If a subsidy arrives, great, but if it doesn't, we have to carry on. The subsidy has to fit the company, not the other way round. They would need a separate department just to manage it. A large outlay is needed to be able to manage, develop and execute this kind of initiative» (Quotes extracted from various interviews).

When managers were asked whether, if public funds were unavailable, they would be prepared to invest in innovation, most responses were affirmative, i.e. the managers would innovate even if such funds did not exist. However, they also recognized that it is always better if incentive schemes are available for innovation. Some managers who use these schemes stated that they would be more cautious about innovating or that they would be affected financially. In general, however, 88% of the sample clearly expressed their decision to innovate regardless of whether such incentive schemes exist.

This reveals the impetus and importance the footwear components industry attaches to innovation processes and, more specifically, to product innovation and diversification. Both of these strategies are directly associated with the sources of innovation, which, as Table 5 shows, for this sector are mainly suppliers and customers.

Table 5. Sources of innovation

<i>Sources of innovation</i>	<i>YES</i>	<i>NO</i>
Customers	70.7%	29.3%
Trade fairs	31.7%	68.3%
Suppliers	61.0%	39.0%
Technological institutes	4.9%	95.1%
Other sectors of economic activity	7.3%	92.7%

Source. Authors' own.

The fact that technological institutes are hardly used as a source of information is striking. In fact, only 5% of companies stated that a technological institute is their source of innovation, while the main sources of innovation are customers and suppliers (70.7% and 61%, respectively). These data are consistent with those of Carter and Williams (1959), who argued that fluid communication with the market (customers and suppliers) is one of the most important factors behind successful innovation. These data also confirm that the innovation carried out by the companies is *ad hoc*, i.e. it is neither planned nor programmed (68.3% admit that they do not plan their innovation).

However, when asked whether they use technological institutes in their innovation processes, 58.5% of companies claimed to work or to have worked with them (though this does not mean that they are sources of innovation) (see Table 6). Moreover, practically one in two companies has a favourable opinion of technological institutes.

Table 6. Innovation tools used by companies

	%
Companies that use or have used technological institutes	58.5
Companies that have relations with universities	22
Companies that have relations with the European Business and Innovation Centre	7.3
Companies that belong to an innovation cluster	2.43
Companies that do not use technological institutes	41.5

Source. Authors' own.

All those interviewed knew about the IMPIVA network (now IVACE, the Valencian Institute for Business Competitiveness) but only 58.5% of the companies use or have used it. At first we believed that the Technological Institute for Footwear and Related Industries (INESCOP) would be the centre of reference for these companies. However, since the footwear components industry covers a wide range of products, the companies tend to use any technological institute that is more in line with the type of products they manufacture. Opinions on these agencies were diverse: as is reflected in the interviews, evaluations ranged from *Excellent* to *They do not provide enough support*.

Every company has heard of these agencies. However, after seeing their responses to the survey, we asked the managers why they do not use their services. The answers were wide-ranging:

«They could do more things, support us more. Their prices are high, and several private companies are more agile and more economical. They are only set up for the subsidies. In the end, they don't solve the problem and they have to find other ways to solve it. They do not support the various sectors. They are oblivious to what really goes on in the sector». (Quotes extracted from various interviews).

Collaboration with organizations of the RIS, which are at the core of the System's institutional context, may be considered moderate if we take into account how many companies actually work with them (see Table 7).

Table 7. Company collaboration on innovation with various organizations

<i>Sources of Innovation.</i>	<i>Percentage of companies that collaborate</i>	<i>Percentage of positive evaluations for the collaboration</i>
ICEX/IVEX	41.5%	19.5%
CEEI	7.3%	12.2%
SGR	2.4%	7.3%
Universities	22.0%	22.0%
Chamber of Commerce	39.0%	14.6%
ICO	12.2%	7.3%

Source. Authors' own.

The organizations with which the companies most collaborate are ICEX/IVEX (41.5%), the Chamber of Commerce (39%), and the universities (22%). However, in general, the evaluations by the companies are not positive (the evaluations were made by both collaborating and non-collaborating companies).

At this point it is interesting to know the companies' evaluations of the role played by certain public instruments in opening markets and promoting innovation. In general, the companies do not have a favourable opinion of organizations such as ICEX/IVEX or the Chamber of Commerce (see Tables 8 and 9), complaining that they are too bureaucratic and do not achieve the objectives for which they were created (e.g. commercial expansion). Some companies do believe they are necessary, however.

Table 8. Company collaboration with IVEX

	%
Companies that use or have used IVEX	41.5
Companies that have not used IVEX	58.5
TOTAL	100

Source. Authors' own.

We found that 58.5% of companies did not use the services of IVEX and that 61% did not use the services of the Chamber of Commerce. These data confirm the belief that the resources of the sector's institutional subsystem are under-used.

Table 9. Company collaboration with the Chamber of Commerce, Industry and Navigation

	%
Companies that use or have used the Chamber of Commerce, Industry and Navigation	39
Companies that do not use the Chamber of Commerce, Industry and Navigation	61
TOTAL	100

Source. Authors' own.

Among the reasons given for not using the services of IVEX, ICEX or the Chamber of Commerce, the managers cite:

«The network is impressive but it is not being used as it should. They are not agile organizations; it's more profitable to do it yourself than to wait for these institutions to respond. They are not very useful; there are private companies today that do the same thing much better, opening up markets themselves and providing business contacts. Our company is currently following another strategy. There's too much bureaucracy. They are not practical». (Quotes extracted from various interviews).

In line with our earlier observation regarding the *ad hoc* nature of innovation with little planning or structure, 56% of the companies reported that they self-finance their innovation, while 39% also obtain external finance. Only 2.4% rely exclusively on external finance for their innovation.

Interestingly, 88% of the companies value their location in the so-called ‘Shoe Valley’ very highly. Since this is a location where contacts between companies are established, level of proximity has a role in the innovation processes. The reasons given by the managers to justify their location are:

«It is our original market; we were born in this region. We have a wide range of suppliers that are a source of innovation (materials, and products related to their production). It’s still part of their local and provincial market. We should not forget that the location with highest production of footwear in Spain is the Vinalopó Valley (Elche, Elda, Petrel, Villena, etc.). Qualified manpower is available for this production. Locating in this productive atmosphere generates positive synergies and competition between clients and suppliers, which leads to proactive attitudes on behalf of the companies. A wealth of knowledge and know-how and an entrepreneurial spirit have amassed in this region». (Quotes extracted from various interviews).

6. Conclusions

Our study confirms that companies in the footwear components industry basically use their relationships with other companies in the region to introduce innovation. This does not mean that other ways to promote innovation, e.g. collaborating with other agents (e.g. technological institutes) or attending trade fairs (usually overseas), do not take place. Companies also use consultancy firms and organizations that provide advanced services. Most companies also keep in direct contact with suppliers and customers, which helps them directly or indirectly to keep a close eye on technological developments.

Indirectly, they also employ an informal brainstorming process with their R&D teams and workers to discuss how a given process, product or innovation may be implemented. In most companies, this brainstorming activity does not take place through formally established processes but as the information becomes available and the company’s needs arise. A reverse/re-engineering process is employed informally to obtain information about new products and processes. Since the companies in the sector are small or medium-sized, any knowledge about an innovation spreads quickly through the organization.

Depending on the type of product they manufacture, the companies’ production processes involve using their own technology, adapted outsourced technology or outsourced technology (franchises). Producers of chemical products, and even some producers of machinery, use their own technology while companies that manufacture soles, laces, thread or leather use adapted outsourced technology.

The most important sources of innovation are customers and suppliers. One way to acquire innovation is by attending sectoral trade fairs or other fairs where a poten-

tial application exists for their products. We understand that this task may be part of a technology watch process. These innovation sources are components of the business network subsystem that forms part of the RIS. Similarly, only 5% of the companies in our sample stated that they use technology centres as their source of innovation, though most companies know about them.

Every manager interviewed said they were familiar with the IMPIVA network (now IVACE) and 58.5% of the companies reported using it. However, as we mentioned earlier, they do not use it as a source of innovation. Initially we believed, due to its name, that the companies would naturally use the Technological Institute for Footwear and Related Industries (INESCOP). However, since the footwear components industry covers a wide range of products, the companies tend to use a range of Spanish (e.g. AITEX, AIJU, IBV, AIDICO, ITENE, AIDIMA) or foreign (e.g. SATRA (Shoe, and Allied Trades Research Association)) organizations. The companies also employ the services of inspection, verification and testing bodies such as SGS or organizations such as the CDTI (Centre for Industrial Technological Development). We found that companies initially used the original institute for the footwear sector but after diversifying production joined other organizations whose products they believe fall more within their field of action.

The companies' overall assessment of the RIS, based on the responses of the managers we interviewed, is that it is important to have the support of all the entities, institutions and bodies that make up the RIS as an institutional subsystem but that these do not act decisively enough on issues regarding innovation in this sector. Technological institutes are undoubtedly important but, according to the managers, they should be closer to small and medium-sized companies and expand their range of activities from testing and trialling to also include the acquisition of subsidies. Nine companies in our sample (22%) have a relationship with a university. In general, however, there is little connection between the universities and the business world and so the synergies that could be developed between them are under-exploited.

The companies do not have a very favourable opinion of instruments such as IVEX/ICEX or the Chamber of Commerce, Industry and Navigation, whose objectives include expanding the markets. In our sample, 58.5% of companies stated that they have never used the Valencian Export Institute and 60.1% stated that they have never used the Chamber of Commerce. The companies complained that these organizations are not agile enough, are too bureaucratic, and do not fulfil the objectives for which they were set up, arguing that private companies are better at opening up markets and providing contacts. Some companies do see them as necessary, however.

According to the companies, public innovation policies have not worked as anticipated. The level of participation (36.6%) is not very high. Only 29.3% provided a positive assessment, complaining that they are too bureaucratic, that paperwork is too difficult to process, and that the companies have to fit the subsidy rather than the other way round. Some managers admitted that this may be due to a lack of knowledge on their part. They also expressed the opinion that it is better to have them whether they actually use them or not. Most managers (88%), when asked whether

they would innovate if these programmes did not exist, replied that they would innovate in exactly the same way.

In short, in this paper we have focused on the footwear components industry (mainly in the city of Elche) in order to analyse part of the business fabric of the Valencian Community. Among other issues, we have highlighted the strategies employed by these companies to tackle the financial recession. These include innovating within their sector and diversifying their products. Our data show that the companies base their innovation strategies mainly on formal and informal relationships between regional businesses, though relations with institutional agents of the RIS are not ruled out. However, these agents are less important for the innovative strategies of these companies. Indeed, companies have more confidence in their own internal dynamics than in the institutional agents operating in the region. For this reason they attach great importance to their location in the 'Shoe Valley' as a source of innovation. Location is therefore highly relevant as a space where multiple interactions between companies (suppliers and customers, etc.) can take place. The innovation strategies of these companies involve using all the resources at their disposal, including the institutional resources of the RIS. However, their inter-company relationships, their connection to the market via clients and suppliers, and the synergies produced through sharing a given location appear to be more important for them. This mode of operation and this way of meeting the challenges of innovation are consistent with the fact that innovation is largely implemented without a specific organizational structure or medium- or long-term planning.

In this paper we have studied a subsector of industrial activity in a specific territory. Our findings shed light on an extensive field that focuses on the interaction between the economic and institutional stakeholders responsible for territorial development. In future studies it would be interesting to investigate the relationships between companies and universities, technological institutes and other RIS agents in order to promote innovation in companies located in a given territory and thereby help to increase their quality, competitiveness and productivity.

One limitation of this study is the fact that the sample was structural in nature and therefore did not cover the whole complexity that may arise in the business environment of 'Shoe Valley'. However, as we mentioned earlier, when selecting the 41 companies we attempted to represent the wide range of possible situations. Another limitation concerns the analysis, since these results cannot be generalized. However, they do illustrate the trends in the behaviour of the companies in this territorial context. The information we present here has been obtained exclusively from the companies in our sample. It would be interesting and indeed necessary in future studies to gauge the opinion of the institutional agents of the RIS. This would provide information about how these agents view the development of the sector and their relationships with the companies within it. Finally, we believe that specific sectoral studies of other industries that collaborate with institutional agents are needed in order to determine whether the observations we have made in this study can be extended to other areas. This comparative element is essential in studies that relate companies to

their territory because it identifies the role played by institutional agents of the RIS in other sectors.

From the information obtained in this study we can make the following recommendations regarding the links between the various RIS agents:

- The procedures involved in acquiring RIS public innovation funds should be simplified. This requires setting up teams of technicians with members from companies and the agencies responsible for facilitating access to such funds.
- Relationships between companies and universities on innovation issues should be strengthened by establishing a medium-term action plan to enable the transfer of knowledge from the universities to the business fabric.
- The structure of RIS institutional agents should be simplified since the current perception among companies is that there are too many of them and that their competencies overlap.
- Companies should be advised to create stable in-house innovation structures that can plan innovation processes in the medium and long term. These structures could involve the participation of staff from technological institutes that provide support in the sector.
- The proper functioning of the Valencian Innovation System should be promoted. The autonomous government of the Valencian Community, companies, universities and other agents should combine their efforts and criteria so that the Community can indeed become «a learning region».

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Economic Competitiveness: Effects of Clustering, Innovation Strategy and the Moderating Role of Location in the Colombian Hotel Industry

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ABSTRACT: Clustering in service industries has scarcely been investigated, while there is huge evidence of a positive impact on innovation and competitiveness in the case of manufacturing industries. We address this by exploring the potential moderator effect that location externalities have on the triangular relationship between clustering, innovation and competitiveness. In this empirical study of 131 hotels located nationwide in the emerging destination of Colombia, we found a negative moderated mediation effect. The impact on competitiveness is higher when the location holds low levels of resources. We uncovered and discuss one of the reasons for explaining the heterogeneous impact of clustering on service firms.

JEL Classification: D22; L83; R11; O33; O25.

Keywords: industrial cluster; organizational innovation; hotel industry; colombia; competitiveness.

Competitividad Económica: los efectos del clustering, la estrategia de innovación y el rol moderador de la localización en la industria hotelera colombiana

RESUMEN: El clustering en las industrias de servicios ha sido escasamente investigado habiendo extensivas evidencias de su influencia sobre la innovación y la competitividad en el caso de industrias manufactureras. Afrontamos esta carencia mediante la exploración de un posible efecto moderador que las externalidades de la localización tienen sobre la relación triangular entre el clustering, la estrategia de innovación y la competitividad. En este estudio empírico de 131 hoteles localizados por todo el país del destino emergente Colombia, encontramos un efecto

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Acknowledgement: This article was supported by the Funds for Special Actions of Research from the Universitat de València (UV-INV-AE16-488900).

Received: 19 july 2017 / Accepted: 31 october 2017.

moderador mediado que es negativo. El impacto sobre la competitividad es mayor cuando la localización tiene niveles bajos de recursos. Exponemos y discutimos una de las razones que explica el heterogéneo efecto que tiene el clustering sobre las empresas de servicios.

Clasificación JEL: D22; L83; R11; O33; O25.

Palabras clave: cluster industrial; innovación organizativa; industria hotelera; colombia; competitividad.

1. Introduction

The clustering of firms within a certain location —clustering— plays a crucial role on boosting innovation and firm's competitiveness (Asheim *et al.*, 2011; Alborns-Garrigos and Hidalgo, 2012). Yet there is a vast empirical evidence of a positive impact within manufacturing industries (McCann and Folta, 2009), the evidence in service industries is still scarce, which is even minimal in the tourism industry (e.g. Gomelezj, 2016; Rodríguez-Victoria *et al.*, 2017). In this industry, there is an additional factor that should be added to the equation: the location's resources that firms can use for tourism purposes, including natural resources and communication infrastructures boosting connectedness and relatedness thanks to proximity (Kourtit, 2016). The critical debate is whether local competitiveness is mainly explained by the territory or whether it is a question of specialization or even of value and volume in a certain territory (Boix and Trullén, 2010; Galleto and Boix Domenèch, 2014). This is particularly relevant in service industries since the impact is heterogeneous and is deeply rooted in low territorial levels, namely regional and urban (Cuadrado-Roura, 2016). Consequently, location and clustering should be investigated jointly but considering them as different variables that may interact, with a particular focus on innovation as a key driver of competitiveness and growth as a response to the research agenda raised by Cuadrado-Roura (2016) for the «*new services economy*» and the issue of spatial concentration of services in major cities.

Clustering speeds up the process of innovation by means of the knowledge spillovers effect (Expósito-Langa *et al.*, 2010; Hervas-Oliver *et al.*, 2015). This entails the collaboration of firms from related activities that are located proximal, which results in improved processes and products. Additionally, location matters in the tourism industry since the supply strongly depends on the place's natural resources and related hospitality activities (Tsai *et al.*, 2009). This shapes the location attractiveness for the tourism operators and the tourists themselves. The effect of the location can be even stronger in emerging tourism destinations, since these activities represent a significant portion of the regional and national GDP (WEF, 2015). Further, in places such as Latin America and the Caribbean, there have been actively public policies promoting the deliberative collaboration between firms in terms of clusters, where hotels are the main actors to attract visitors. Consequently, it is quite likely that clustering of hotels, innovation and location interact in ways we still ignore.

To address this challenge, we have conducted an empirical study among a sample of 131 hotels located nationwide in Colombia. We controlled for the effect of internal variables such as the implementation of a set of organizational innovations and size, external factors relative to the location and the networking of hotels in each location (clustering). The key research question is whether the relation clustering-innovation-competitiveness is similar to that observed in manufacturing industries and the role that location plays once the networking effect is considered. We theoretically contribute to the explanation of the heterogeneous effect that these variables may have on competitiveness in this particular industry and type of destination by including an analysis of moderation. Our practical implications will help both public bodies and hoteliers improve the destination's competitiveness in the global marketplace. To do so, we first provide the background for the expected relationships. In a next section, we explain the method used to explore the triangular relation by means of OLS and using the PROCESS macro in SPSS (Hayes, 2013). After the discussion of results and implications for theory and practice, we provide the main conclusion and argue why location plays a moderating role in this industry.

2. The impact of clustering, innovation and location on the hospitality industry's competitiveness

2.1. The impact of clustering on innovation and on competitiveness in the tourism industry of emerging destinations

The tourism industry is overall globalized in competition and markets, while there are a number of changes that challenge the consolidated tourist destinations (WEF, 2015). Firms competing in this industry should strive to respond differently if they want to be competitive. This is particularly relevant for emerging tourist destinations, which should first reach a preference position among the big wholesalers in this value chain (Dwyer and Kim, 2003).

Following Porter (1990, 2003), among the variety of options to do so, collaborating while competing has proved to be particularly fruitful when the local industry includes small to medium-sized enterprises and the number of competing tourist destinations is medium to high. Spatial density is a precondition for this form of deliberative collaboration to arise, while the active collaborative behaviour within the cluster is a necessary and sufficient condition for this density to be labelled as clustering (Molina-Morales and Martínez-Fernández, 2003).

Yet the effects of clustering have extensively been investigated in the manufacturing industry. One of the most studied effects is the increased level of innovativeness within clusters due to the knowledge spillovers, essentially by means of knowledge exchange within the cluster that may take either formal or informal forms (Hervás-Oliver *et al.*, 2015). In the less frequently studied service industries, this effect has also been proved in the particular case of the tourism industry. The firms belonging to

the cluster are more likely to capture the market changes and they do so quicker than non-clustered counterparts are able to do (Novelli *et al.*, 2006; Hjalager, 2010). This yields an increased capability to speed up the process of market knowledge absorption that leads to the adoption or implementation of new technologies, new productive systems or new methods of commercialization. Nordin (2003) found that, in the tourism industry, this is due to the regular interaction among firms and also between firms and institutions.

Yet the location features should be separated from the clustering of firms within the location since the contextual features is an external characteristic a firm can hardly control. Within the clustering effect, we are referring to the role of relational networks that happen in tourist destinations that are highly dense in terms of number of firms within the industry and related activities, following the arguments of Molina-Morales and Martínez-Fernández (2003). Thus, the critical issue is whether the firm collaborates actively in the cluster.

In addition to the impact of clustering on innovation, clustering was also found to have an impact on the firm's competitiveness (Camisón and Forés, 2015). There is empirical evidence in the tourism industry supporting the idea that clustered firms hold a superior performance relative to isolated counterparts (e.g. Chung and Kalnins, 2001; Enz *et al.*, 2008; Peiró-Signes *et al.*, 2015). However, the vast majority of these studies were conducted in developed economies. Following the argument of Rodríguez-Victoria *et al.* (2017), in developing economies there exists a kind of minimum differentiation effect, earlier developed by Hotelling (1929): firms closely located in an emerging tourist destination will tend to follow a similar strategy that will reinforce the effect of clustering in terms of the destination positioning in the global marketplace. This will yield a superior competitiveness. Accordingly, clustering will provide benefits to tourism firms that will take the form of increased levels of both innovation and competitiveness.

In addition, Campo *et al.* (2014), found that there is also an impact from innovation to increased competitiveness in their review of ten studies in the tourism industry. Nordin (2003), Carvalho and Sarkar (2014) and Pereira-Moliner *et al.* (2015) are some examples applied to developed economies, while Tseng *et al.* (2008) found a positive impact of innovation on hotel performance in Taiwan. Two literature reviews have also found this in the tourism industry (Hjalager, 2010; Gomezelj, 2016). Due to the triangular relationship between these constructs, it can be argued that there is a positive, induced effect of clustering on competitiveness through innovation, but there can also be expected a direct relationship between clustering and competitiveness in light of the empirical findings in both manufacturing and service industries. Furthermore, there is also evidence of the positive link from innovation to competitiveness. Accordingly, we propose the triangular relationship as follows:

Hypothesis 1: Clustering has a positive impact on the implementation of innovations in firms of emerging destinations.

Hypothesis 2: Clustering has a positive impact on the economic competitiveness of firms in emerging destinations.

Hypothesis 3: The implementation innovations has a positive impact on the economic competitiveness of firms in emerging destinations.

2.2. The moderator effect of location

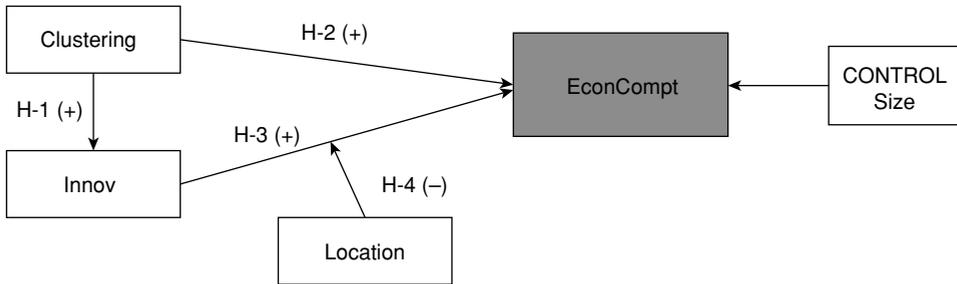
Although the latter hypotheses have only been studied marginally in developed economies, the original contribution of this study is the exploration of the moderator effect that location may play. We have argued that clustering is different to the configurational features of the location that firms can hardly control. Among these characteristics, natural resources, infrastructures and institutional settings are relevant in the case of emerging tourist destinations (Orfila-Sintes and Mattsson, 2009). Natural resources are frequently the locational advantage of many emerging tourist destinations. Thus, the more resources there are available in the location for tourism, the more likely it is that hotels perform well.

As shown earlier, innovation has been proved to be determinant in the tourism industry. However, there is the possibility that the impact of innovation on competitiveness differs depending on the levels of innovation and the environmental setting. The regional innovation system tends to support in a lesser extent the surrounding firms' innovative efforts in emerging than in developed economies (Asheim *et al.*, 2011). Within emerging destinations, we can also found differences in terms of locational support to firm's innovation. Thus, when the location offers fewer resources, any improvement will have a higher impact than if the improvement is implemented in locations with more resources available. In fact, Chung and Kalnins (2001) found that the effect of agglomeration was lower in suburban than in rural areas of Texas (USA). Marco-Lajara *et al.* (2014) found that business agglomeration had a negative effect on the performance of hotels in a densely populated destination such as Benidorm (Spain). This seems to point out that the effect of innovation and clustering may be heterogeneous depending upon the locational features.

The overall argument may be due to the curve of marginal returns. When the firms depart from low levels of competitiveness, higher gains in such construct can be achieved. However, it is increasingly harder to maintain the same level of improvement as firms in the location increase their competitiveness. In addition to this, if the location can only offer marginal support for tourist firms, any innovation implemented will have a much higher impact on their competitiveness than if such innovation were implemented in another location. This is because the sources of improvements are scarcer in the former than in the latter location. Accordingly, our moderation hypothesis claims that the location moderates the relation between the implementation of innovations and competitiveness of tourist firms in emerging destinations (see figure 1 for the scheme of hypotheses), so that:

Hypothesis 4: In locations with low levels of tourism resources available, innovations will have a higher impact on firm's competitiveness than it will have in locations with high levels of tourism resources available.

Figure 1. Scheme of tested hypotheses



3. Methods

3.1. Population and sample

In order to test our hypotheses, we chose an emerging tourist destination such as Colombia and targeted hotels as the unit of analysis of tourist firms. This is because hospitality industry is the third major contributor to inward foreign currency in Colombia after petrol and coal. Hotels accounted for the majority of contribution of hospitality industry to GDP in 2014 (81%) according to DANE¹ data. The selection of hotels instead the full hospitality industry was required since the list of innovations to be implemented may differ if different types of activities were included. In this country, the world arrival of international tourists has increased 4.7% from 2013 to 2014 according to UNWTO data (2015). This country has implemented public policies trying to foster the creation of cluster initiatives, while it had performed poorly in innovation indicators (3.2 according to WEF indicators, 2015). These figures illustrates how well Colombia is representative of emerging tourist destinations, which is the target of our research.

We surveyed a sample of 131 hotels located nationwide. They were geographically representative of the population of 1,424 hotels according to the Chi-square test (see table 1). That population was available at last date of consultation (February 2014), according to the last official census of hotels made by DANE in 2013. The survey was performed between March and April 2014. We surveyed directly to CEOs of hotels since they are responsible of the main decisions relative to location, innovations to be implemented, whether to actively participate in a cluster and economic decisions relative to prices and the like.

3.2. Variables

We measured competitiveness in economic terms, while we introduced three explicative variables of hotel’s competitiveness: the implementation of organizational innovations, clustering and location. In addition, we controlled for size.

¹ National Administrative Department of Statistics of Colombia (DANE)

Table 1. Sample features and representativeness

	% Sample	% Population 2014	Chi-squared statistic
Atlantic Coast	19.4%	30.4%	0.04
Medellín	17.1%	25.2%	0.02
Bogotá	23.9%	32.2%	0.02
Pacific Coast	39.6%	12.2%	0.61
Sum of Chi-squared statistics:			0.69

CompetEcon: it is the variable for measuring the hotel's economic competitiveness by means of a multi-item 7-point Likert scale. Following Aiginger and Vogel (2015), we asked respondents to measure this in comparative terms as worse/better performance than competitors. We included four items that are most often used for measuring hotel performance (Sainaghi, 2010): Occupation, Tariff, Total Incomes, and Lodging Incomes. We averaged this in a single factor.

OrgInnov: this is our proxy measure of innovation. We asked respondents to rate the level of implementation of organizational innovations since Castellacci (2008) found that hospitality firms mainly developed process innovations. Additionally, Cuadrado-Roura (2016) also highlighted that most industries are transitioning towards a digital economy, so most of these innovations have to do with how these service firms, strongly rooted in the territory, address the main contemporary challenges owed to the digital servitization and globalization. Accordingly, we extracted 14 innovative organizational practices that practitioners considered as the most relevant to be implemented in Colombian hotels (as mentioned in the RedHotech, 2013 report). We included a 7-point Likert scale for measuring the level of implementation and averaged this into a single variable.

Location: this variable should measure whether the availability of resources within the location help hotels to develop their activity. We introduced a 7-point scale and asked respondents to express whether they feel that the location had a positive impact on the hotel's performance. We explicitly asked to exclude the potential effect that clustering within that location may have and asked specifically to only consider the location in terms of available resources for the hotel and tourist.

Clustering: this is a dummy variable. Two criteria should be met for this to take the value 1: the hotel should be located in a highly dense location of hotels and the manager should declare his/her hotel actively participated in the cluster. For the first issue, we used the suggestion of O'Donoghue and Gleave (2004) relative to the threshold of at least 1.4 in the location quotient-LQ as defined by Cromley and Hanink (2012). The LQ is the quotient of quotients, with numerator as the number of hotels in a region divided by the total number of firms in that region regardless their industry and, the denominator as the same expression referred to the country. Forty-six of the surveyed hotels (35%) met the criteria and were classified as "clustered".

Control variable: size. This variable was measured in terms of number of employees. This control variable was introduced in both equations.

All the scale and control variables were transformed with a natural logarithm and then were standardized (with the exception of the dummy variable) to eliminate the potential effect of different units and to have a known distribution of data following a Normal distribution with mean 0 and standard deviation of 1. The logarithm transformation should be considered to interpret the estimated coefficients since they will inform about the effect of marginal changes in explanatory variables on competitiveness. Table 2 reports the main descriptive statistics for each variable. Means and standard deviations are for untransformed variables, while correlations are reported after the transformations performed since they were used in the regression analysis.

Table 2. Descriptive statistics

Variable	Mean(a)	s.d. (a)	[1]	[2]	[3]
[1] Innov	6.1	0.55			
[2] Size	46.6	57.05	0.24**		
[3] Location	6.4	0.87	0.43**	0.06	
[4] EconCompt	6.1	1.01	0.65**	0.21*	0.57**

(a) Mean and s.d. are for the untransformed variables since the transformation yields normalized variables with mean 0 and s.d. equal to 1. Correlations are for the transformed variables (natural log and standardized).

(*) correlation significant at the 0.05 level (2-tailed).

(**) correlation significant at the 0.01 level (2-tailed).

3.3. Statistical method

Hypothesis (1) entails a positive impact from clustering to the hotel's economic competitiveness (represented in equation [1]). Equation [2] shows the expected signs in the specification of the main equation.

$$[1] \text{ OrgInnov (hotels)} = \alpha_i + \beta^*_1 \times \text{Clustering} + \varepsilon_i$$

$$[2] \text{ CompetEcon (hotels)} = \alpha_i + \beta_1 \times \text{OrgInnov} + \beta_2 \times \text{Location} + \beta_3 \times \text{Clustering} - \beta_4 \times \text{Location} \times \text{OrgInnov} + \beta_5 \times \text{Size} + \varepsilon_i$$

For the sake of simplicity, we have used the macro PROCESS (v. 2.15) for SPSS of Hayes (2013) to test the triangular relationship and the moderated mediation of our model. We asked the method to perform a bootstrapping of 5000 replications bias corrected to reach significance levels of estimations, which is a more powerful approach than performing the Sobel test, since this test works well only in large samples and simple mediation models (Preacher and Hayes, 2008; Hayes, 2013). PROCESS performs ordinary least squares regressions.

The model explicit in figure 1 includes a mediation model with a moderation, which Hayes (2013) considers a conditional process model since the impact of clustering and innovation on competitiveness is conditional to the levels of location. An index is computed as a statistical test for the moderated mediation hypothesis (see Hayes, 2015). In our study, this value is the slope of the line relating the size of the conditional effect of clustering on competitiveness through innovation to the moderator *location*. This is computed as the estimation of the impact of clustering on innovation multiplied by the beta estimated for the interactive effect of location and innovation on competitiveness. A bootstrapping confidence interval will test this. Our hypothesis H4 requires that this index be significantly negative and that the estimated beta for the interactive effect of innovation and location on competitiveness be significantly negative.

4. Results

Table 3 yields the results of estimates for equations [1] and [2]. Estimates for equation [1] showed that clustering has a significant positive effect on innovation implementation after controlling for the significant positive effect of size. Model 3 in Table 2 shows that size is irrelevant to explain hotel's competitiveness. The ANOVA was significant at p -value below 0.005 and the overall explanatory power of competitiveness is moderately high in model 3 (R-square of 0.63). In the explanation of competitiveness, there is a significant and positive impact of the implementation of organizational innovations (0.43) and clustering (0.26). This latter effect should be understood as the direct impact. Yet there is a significant indirect impact from clustering to competitiveness through innovation ($0.385 \times 0.260 = 0.100$) that yields an estimated total impact of 0.36. These results lend support to hypotheses H1 to H3 regarding the triangular relationship between clustering, innovation and competitiveness.

The effect of location on competitiveness is non-significant while the interactive effect of location and innovation on competitiveness is significantly negative (-0.19). Furthermore and following Hayes (2015), the estimation of the index of moderated mediation is significantly different from zero and the 95% confidence interval contains negative values with a point estimation of -0.077 , obtained after 5,000 resamples. This means that the effect of clustering on competitiveness through innovation at conditional values of location has a negative slope. For a better understanding of the interactive effect, we have depicted the interactive effect of location and innovation in Figure 2. This interactive effect holds since the simple slope test is significant at p -value < 0.001 . As the level of resources available in the location increases, the effect of OrgInnov on competitiveness decreases and it is higher for territories holding low than it is for locations with high availability of resources. Accordingly, there is empirical evidence that hypothesis H4 holds. Furthermore, our evidence validates also the conditional effect of clustering on competitiveness by means of the moderated mediation of innovation and location.

Table 3. OLS regressions results

<i>Dependent variable:</i> <i>zLnOrginnov</i>	<i>Unstandardized coefficients</i> <i>(t-value)</i>		
Variable	Model 1	Model 2	
Intercepts	0.000 (n.s.) (0.00)	-0.135 n.s. (-1.18)	
Size (LN employees)	0.242 (**) (2.83)	0.260 (**) (2.83)	
Clustering	—	0.385(*) (2.35)	
R-square	0.06	0.09	
Adjusted R-square	0.05	0.08	
F-value for change in R-square	8.02 (**)	4.76 (*)	
<i>Dependent variable:</i> <i>zLnEcon-Comp</i>	<i>Unstandardized coefficients</i> <i>(t-value)</i>		
Variable	Model 1	Model 2	Model 3
Intercepts	-0.562 (**) (-2.17)	-0.283 n.s. (-1.44)	-0.008 n.s. (-0.10)
Size (LN employees)	0.189(**) (2.51)	0.080 n.s. (1.48)	0.035 n.s. (0.60)
zLnOrgInnov	—	0.437 (***) (6.89)	0.436 (***) (5.36)
zLnLocation	—	0.313 (***) (5.10)	0.077 n.s. (0.80)
Clustering	—	0.247 (*) (2.07)	0.266 (*) (2.36)
OrgInnov x Location	—	—	-0.199 (*) (-2.05)
R-square	0.047	0.556	0.630
Adjusted R-square	0.039	0.542	0.615
F-value for change in R-square	6.33 (*)	48.1 (***)	24.9 (***)
Index of moderated mediation for Model 3	-0.077 CI at 95%: (-0.184, -0.012)		

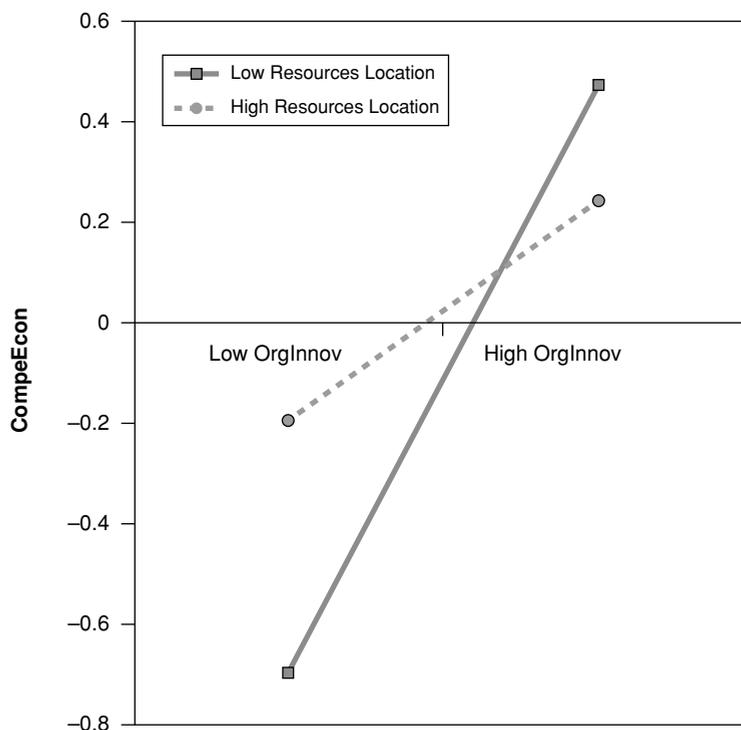
All ANOVAs were significant at p -value < 0.005.

(*) significant at p -value < 0.050.

(**) significant at p -value < 0.010.

(***) significant at p -value < 0.001.

n.s. not significant.

Figure 2. Interactive effect of Location and Innovation Implementation

5. Discussion, implications and limitations

One of the relevant findings of this study is that, in emerging destinations, hotels located in a place where the density of hotels is high and that participate actively in networking (i.e. clustering) perform better than isolated hotels or those hotels that decide not to collaborate. In few words, clustering exerts a positive direct impact on competitiveness. Additionally, it provokes an induced positive effect by means of easing the implementation of a set of organizational innovations. This is in line with most of research on the effect of industrial clusters on innovation and competitiveness in both manufacturing and hospitality service industries (Chung and Kalnins, 2001; Enz *et al.*, 2008; McCann and Folta, 2009; Camisón and Forés, 2015; Peiró-Signes *et al.*, 2015). Our result is contrary to that of Marco-Lajara *et al.* (2014), who found a negative effect of densely populated destinations and business agglomeration in Spain. In emerging destinations, the effect of both clustering and innovation on competitiveness is positive.

A second finding is the interactive effect of location and innovation on competitiveness in emerging destinations. The resources available for tourism purposes in the destination interact with the implementation of organizational innovations so the

impact that can be expected from innovation is higher when the location lacks such resources or the level of availability is low. This may imply that innovation is particularly relevant for those places that hold low levels of tourist attractions related with natural resources or communication infrastructures. A marginal implementation of any organizational innovation will boost increased levels of competitiveness in these locations. However, the bad news is that the expected return of innovations on competitiveness will be lower when there are external resources in the location that are useful for the tourist. This is because the organizational innovations the hotel implement loses its relevance in the tourist's mind since in those places external resources may be more attractive. Similar results were obtained in developed countries such as Nordin (2003), Carvalho and Sarkar (2014) and Pereira-Moliner *et al.* (2015), and there are some examples applied to developed economies, while Tseng *et al.* (2008) found a positive effect of innovation on competitiveness in the Taiwanese hospitality industry. So far, we could not find similar investigations to which we could compare our results in terms of the partial mediation relationship.

A third relevant finding is the negative index of moderated mediation found. This means that clustering is negatively moderated in an indirect manner by means of the interaction above-mentioned. Thus, the effect of clustering on competitiveness is heterogeneous and is conditioned by the interaction between the type of location and the level of innovations implemented by clustered hotels. Clustering in locations with high levels of resources will have a lower impact than clustering in locations with low levels of this type of environmental resources. This will help explain partly the heterogeneous effect of clustering depending on innovations the firm implements and the availability of resources within the location it operates. Some other investigations have tried to explain that heterogeneous impact of clustering on innovation or competitiveness by means of differences internal to the firms, such as different absorptive capacity (Cohen and Levinthal, 1990), in particular among SMEs (e.g. Hervas-Oliver and Albors-Garrigos, 2009). Yet our contribution is the distinction between internal features within the cluster —i.e. how firms relate in a certain territory or *clustering*— and externalities related to the particular location. Future research should investigate the potential combinative effect of all (differences in absorptive capacity, clustering, and location).

The implication of these findings is that hotels should reflect on the type of innovations that are to be implemented depending upon the context where hotel is located. Hoteliers willing to open new hotels in emerging destinations should also consider carefully the type of location and its impact on clustering, innovation and the hotel's competitiveness. Public policy-makers should also think of shifting the type of innovations that are to be supported depending on contextual factors since not every location requires the same support. Accordingly, public policies trying to foster clustering and/or innovation should be defined in terms of the particular context.

Our findings shed light on a pervasive debate of whether all the clustered firms benefit from clustering in the same extent. We found that they do not. Yet further empirical research is required in other contexts and industries, even in manufactur-

ing industries. While clustering is beneficial in emerging destinations, the impact of innovation among clustered firms is lower when the location contains higher level of resources than when the location lacks these resources. In short, clustering is increasingly more beneficial for innovative purposes when the location has limited availability of resources for the main economic activity the firm develops. This type of moderated mediation is frequently excluded from analysis even in manufacturing industries, so it deserves further investigations.

Some limitations call for caution in interpreting our results. We only tested this in an emerging tourist destination. Further empirical research in emerging destinations is required to be able to generalize the finding of moderated mediation. Comparative studies between emerging and developed destinations will also be beneficial for the extension of this finding. We chose to measure clustering as a discrete choice in terms of whether or not the hotel collaborates actively. We acknowledge this simplification and recommend scholars to measure this as a continuous or scale variable in the future, since it is likely that the level of involvement in the network may differ across hotels and/or locations and this may have a different impact on firm's competitiveness.

Nevertheless, our results are pointing out the existence of heterogeneous effects of clustering on firms that strongly depend on location. Thus, location and clustering can be regarded as intertwined factors that deserve further attention in the quest of whether some places are more fertile areas than others for the development of this deliberative networking of firms within a certain territory, industry and type of economy.

6. Conclusions

This study raised the question of the impact that three constructs have on service firms' competitiveness for the particular case of emerging economies, namely collaborating deliberately in an industrial cluster –clustering, the implementation of innovations and the location. To do so, we have surveyed 131 hotels located nationwide in Colombia, an emerging tourist destination. Among them, 35% were located and collaborated actively in a cluster of hotels. So far, this has been studied separately while empirical evidence of the effect of clustering on service firms and on emerging economies is still scarce.

We have found that clustering is paying off in this type of destinations since it has a positive direct and indirect impact on hotel's competitiveness. Accordingly, public policies fostering this type of collaborative arrangements should continue to support them in light of this positive result. The indirect impact is similar to that of manufacturing firms, since we found that clustering eases innovation and this improves competitiveness.

Yet this indirect impact is contingent to the level of innovations implemented and the location features relative to the availability of resources for tourism pur-

poses. We found that externalities linked to the location moderates that partially mediated relationship. If there are low levels of resources available in the location, the impact of innovation on competitiveness is higher than if there are high levels of resources. Finally, that interactive effect between innovation and location affects the mediated relation of clustering and competitiveness through innovation. Thus, public policy-makers should consider carefully the particular features of the location, the idiosyncratic relationships within clusters and the level of innovations these firms implement before designing supportive tools. Further, all public and private actors should expect different levels of return depending on the values these three constructs take.

From the practitioners' viewpoint, hotels in emerging destinations need to implement organizational innovations and collaborate actively in a cluster if they want to obtain high levels of competitiveness in this global industry. Additionally, the direct impact of clustering on both innovation and competitiveness is signaling that hoteliers should consider carefully whether there is a cluster in those locations they explore before opening new hotels. Not only is this relevant for the potential externalities around the cluster, but also for the particular case where externalities within the location do not offer enough resources for tourism. Furthermore, the spatial configuration of tourism activities may be partly explained by these intertwined relationships of the three constructs and locational externalities. It seems plausible that hotel's decisions relative to where to locate the hotel, the extent to what the firm will collaborate in the local cluster and the type and level of implementation of organizational innovations is influenced by these locational externalities.

This goes beyond the merely consideration of proximity advantages in spatial configurations in the tourism industry. We contribute to the debate around whether clustering is an issue grounded in the territory or is a question of specialisation or even a question of volume and value (see Boix and Trullén, 2010; Galleto and Boix Domènech, 2014). Following the conclusions of the review of cluster research of Cruz and Teixeira (2010), we found that clustering should be worked at the ground level. Not only is it a feature pertaining to the territory, it is a question of how well both levels are combined, the territory and the active participation in a highly dense population of firms. Clustering of hotels provide a more visible destination for the tourism agents. Yet this is only a first step in the quest for global competitiveness to meet the constantly changing demands from customers and the arising of other emerging destinations. To maintain the level of competitiveness in this industry, firms should continue innovating. Tourists select the destination depending on the first issue of visibility and, after that, they choose the hotel depending on how well it meets their requirements. Thus it is a question of multileveled factors pertaining to the location, the clustering and finally to the firm's course of action within that location.

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Location Decisions and Agglomeration Economies: Domestic and Foreign Companies

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ABSTRACT: The international expansion of multinational enterprises (MNEs) is one of the topics most frequently discussed amongst international business scholars. In particular, decisions regarding firm location and its effects on performance have received great attention. The results obtained in the study about this relationship are inconclusive, though, since a large number of studies have been conducted from very different perspectives. One of these perspectives suggests that the location in agglomerations allows MNEs to benefit from potential knowledge spillovers encouraging innovation and local adaptation. However, this co-location increases the risk of imitation by domestic companies as well. Furthermore, the acquisition by each firm of the external knowledge generated by means of concentration depends on its internal capabilities, and especially on its absorptive capacity. The aim sought with this work consists in analyzing the location decisions adopted by MNEs in an attempt to clarify the following issues: Are MNEs more likely to be established in agglomerations? Which companies benefit the most from geographical proximity in terms of innovation, domestic or foreign ones? What is the role of absorptive capacity? The results obtained in the analysis, carried out with a sample of firms and using data from a survey conducted in 2013 by PITEC, reveal the differences between foreign and local companies when it comes to using external knowledge.

JEL Classification: D83; F23; L25; M16; R30.

Keywords: location choice; multinational enterprise; innovation; agglomeration; knowledge; absorptive capacity.

Decisiones de localización y economías de aglomeración: empresas domésticas y extranjeras

RESUMEN: La expansión internacional de las empresas multinacionales (EMNs) constituye uno de los tópicos más analizados por los académicos e investigadores. En

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Received: 30 may 2017 / Accepted: 25 september 2017.

particular, una línea de investigación que ha recibido gran atención es la relativa a las decisiones sobre localización y sus efectos sobre la rentabilidad empresarial. A pesar de este interés y como consecuencia de la diversidad de perspectivas adoptadas, los resultados sobre la relación entre localización y rentabilidad no son concluyentes. Una de estas perspectivas sugiere que la localización en aglomeraciones permite a la EMN beneficiarse de los flujos de conocimiento que allí se generan, lo cual facilita la innovación y la adaptación local. Sin embargo, la co-localización también aumenta el riesgo para las EMNs de ser imitadas por las empresas domésticas. Además, para cada compañía la adquisición del conocimiento externo generado con la concentración empresarial depende de sus capacidades internas, especialmente su capacidad de absorción. En este contexto, el objetivo de este trabajo consiste en analizar las decisiones de localización adoptadas por EMNs con la intención de clarificar los siguientes aspectos: ¿Tienden las EMNs a localizarse en aglomeraciones empresariales? ¿Qué empresas se benefician más de la proximidad geográfica en términos de innovación, las domésticas o las multinacionales extranjeras? ¿Qué papel juega la capacidad de absorción? Los resultados obtenidos en el análisis, el cual ha sido realizado con una muestra de empresas a partir de la base de datos del PITEC 2013, revelan las diferencias existentes entre las empresas multinacionales y locales en lo que se refiere al uso del conocimiento externo generado con las aglomeraciones.

Clasificación JEL: D83; F23; L25; M16; R30.

Palabras clave: localización; empresa multinacional; innovación; aglomeración; conocimiento; capacidad de absorción.

1. Introduction

The study about multinational enterprises (MNEs) and, particularly, about their foreign direct investment (FDI) activities has aroused great interest within academia (Dunning, 2001). In parallel, great attention has also been paid to the possible existence of positive and/or negative effects on innovation derived from location and, more specifically, from the concentration of firms within a single geographical space (Marshall, 1920; Jacobs, 1969; Jaffe *et al.* 1993; Almeida, 1996, Audretsch & Feldman, 1996; Eaton & Kortum 1999; Bottazzi & Peri, 2002; Verspagen & Schoenmakers, 2004).

Being able to access potentially useful knowledge, sometimes of a tacit nature (Malmberg & Maskell, 2002) is one of the arguments justifying the establishment of subsidiaries or affiliates in external markets by multinationals. Nevertheless, because each geographical context has its own idiosyncrasy, the interaction model prevailing in each region will be different, and their lack of familiarity with the specific conditions of the local environment (e.g. institutional and cultural aspects) places MNEs in a disadvantaged position with respect to local firms in terms of access to external knowledge. Furthermore, it can also be stated from the dynamic capabilities approach that co-location neither necessarily ensures access to external knowledge nor its exploitation, which will ultimately depend on each firm's absorptive capacity.

This paper has a twofold aim: firstly, to help reduce the extensive «dissociation» that exists between the literature on agglomerations and that focused on MNEs (Hervás *et al.*, 2015); and secondly, to analyze the decisions about the location of Spanish subsidiaries of MNEs, trying to shed light on the following issues: Does the agglomeration level characteristic of an area or region influence the innovation of the firms based there? If that is the case, which firms are benefited or damaged to a greater extent by physical proximity in terms of innovation: local firms or foreign ones? What role does absorptive capacity play in this context?

The development of these ideas has its starting point in the establishment of several hypotheses based on the literature review offered in the next section. These hypotheses will be the subject of a contrast with a sample in Section 3, where a description of the methodological aspects is provided as well. Section 4 brings together our findings, which show the differences found between autochthonous and foreign companies, their discussion being reserved for Section 5.

2. Literature review

The innovative activity undertaken by MNEs has experienced significant transformations in recent times: along with the classical function of technology transfer from the parent company to its subsidiaries, other functions have become consolidated which refer to the search for technological assets at an international level and the creation of new technological capabilities on those bases. This new dynamic has been favored by an increase in the complexity that characterizes innovative processes, which require a combination of internal and external knowledge (Chesbrough, 2003).

Some of the first works to focus on the analysis of foreign direct investment (FDI) highlighted the advantages enjoyed by investing companies as opposed to firms which operated exclusively in their national environment when it comes to aspects such as product differentiation (Caves, 1971), size and scale (Hirsch, 1976), or the public nature both of knowledge and of exploitable technology inside the actual firm (Horst, 1972).

However, Buckley and Casson (1976) were the earliest to apply the transaction cost theory of the firm (Coase, 1937) in the explanation of direct investment and the behavior of multinational enterprises¹. According to this approach, a firm that wishes to carry out activities abroad can choose between a variety of modalities, including foreign direct investment, exportation from the country of origin, or the formalization of contracts such as licenses or franchises². Faced with this situation, foreign

¹ Even though the later developments which incorporate the transaction cost theory lie much closer to Williamson's postulates (Anderson & Gatignon, 1986; Teece, 1986; Hennart, 1991a), focusing, for instance, on the comparison between single or joint direct investments (Kogut, 1988; Hennart, 1991b).

² Each one of these entry strategies has an associated profile regarding the degree of control involved, the resources committed, and the risk borne (Hill *et al.*, 1990).

direct investment takes place when international markets are characterized by having failures, linked to the existence of high transaction costs, such a situation being more likely when the transaction includes knowledge (Arrow, 1962).

In turn, one of the most important references for the study about foreign direct investment can be found in the eclectic or OLI paradigm (Dunning, 1977 and its subsequent developments by the same author), according to which the implementation of value-generating activities abroad by domestic firms depends on the availability of ownership advantages over third parties in the development of that activity, of internalization advantages brought by such undertakings, and of advantages related to their operation in the selected location compared to other alternatives. This approach suggests that, when MNEs adopt the decision to carry out FDI activities, the specific choice of a location for those activities depends on the goal sought by the corporation. Dunning (1993) proposes a typology of FDI activities, drawing a distinction between those which are performed seeking resources, markets, efficiency, and strategic assets, which will depend on the sort of activity that they must develop.

This search for new markets to commercialize the firm's products responds to different pressures such as the continuous escalation of certain costs required for innovation or the reduction in the lifecycles of products and processes. As regards the search for efficiency, when it comes to lower-added-value activities, MNEs tend to opt for their outsourcing and relocation to low-cost places; instead, higher-added-value activities are usually located in more advanced economies (Mudambi, 2008).

Concerning the search for strategic assets, a first aspect worthy of consideration is the fact that the greater complexity of innovative activities necessarily entails the incorporation of new knowledge from highly diverse origins. Therefore, however technologically advanced the country of origin may be, the MNE needs to open to other possible collaborators from various environments so that access can be gained to new knowledge. As a large proportion of the potentially valuable knowledge has a tacit nature, an inescapable need seems to exist to invest in different countries, as a means to pursue the physical proximity that can favor the acquisition of that knowledge, as well as its integration into the enterprise.

In addition to the transaction cost theory of the firm and the OLI approach, there are also other contributions originated from the innovation theory which help explain the international deployment carried out as a consequence of the firm's innovative approach (Casson, 1991; Pearce and Singh, 1991; Cantwell and Molero, 2003).

With regard to co-location advantages, these can also be exploited by local companies. That is why the following subsections will try: firstly, to describe how agglomeration generates advantages for innovation in co-located firms, regardless of whether they are local firms or MNE subsidiaries; secondly, to ascertain the role played by AC in the acquisition of knowledge by both types of enterprises; and thirdly, to identify the differences existing between local and foreign firms.

2.1. Advantages derived from the location in agglomerations for local firms and MNEs

One of the essential ideas within the research focused on agglomeration is that the concentration of economic activity generates different types of externalities (Anselin *et al.*, 1997; Audretsch, 2003). These external economies, also known as agglomeration economies, imply that the benefits which a firm can obtain from being located near others increase with the number of firms based on the same location (Appold, 1995; Knoblen *et al.*, 2008).

A number of works show that MNEs have a preference for areas or regions characterized by agglomeration in their location decision (Gong, 1995; Head *et al.*, 1999; Wheeler and Mody, 1992) because that type of location brings them certain advantages. Examples of these advantages would be lower costs and better chances for the availability of specific and highly-qualified labor (Makino *et al.*, 2002; Sethi *et al.*, 2003), those derived from the negotiations with local governments that provide incentives for the establishment of R&D activities in their territories (Meyer and Nguyen, 2005; Mudambi, 1998), or the access to a specific range of scientific-technological resources thanks to the concentration of innovative activity (Pelegrin and Bolance, 2008).

Nonetheless, this agglomeration may also result in negative effects on business results, since firm concentration generates congested places (Swann *et al.*, 1998) with a higher degree of competition for the various factors (land, workers...) (Glaesmeier, 1991; Pouder and StJohn, 1996; Prevezer, 1997; Flyer and Shaver, 2003; Folta *et al.*, 2006; Arikan and Schilling, 2010).

From the knowledge-based firm view (Kogut and Zander, 1992; Grant, 1996; Malmberg and Maskell, 2002), the best location for the subsidiaries of an MNE will be the one which, depending in its greater or lesser level of agglomeration, grants better chances of access to the external knowledge generated in that location. As a matter of fact, when the external knowledge which constitutes the source of competitive advantage has a tacit nature, this decision comes to acquire special relevance for the MNE (Chung and Alcacer, 2002; Nachum and Keeble, 2003).

In an attempt to clarify this controversy around the effect that the agglomeration level has on innovation, we will follow Rosenthal and Strange (2004), according to whom agglomeration is an attribute of each location which depends not only on the number but also on the industrial, geographical, and time-related variety of the co-existing firms³. These characteristics additionally fix limits regarding the knowledge that circulates between neighboring enterprises.

³ Two different regions with the same number of firms will have different levels of agglomeration according to the industrial proximity of enterprises (industrial dimension), for instance. Even if they are similar firms (belonging to the same industry and sector), agglomeration varies depending on the physical proximity between firms (geographical dimension). Finally, it is necessary to bear in mind the time dimension too, since the latter will determine if a history of agglomeration exists that has led to a specific interaction and relationship model for the firms occupying the region in question.

Along these lines, several papers suggest that the «effect caused by the level of agglomeration» largely depends on the existence, as well as on the importance acquired by the urbanization economies, specialization economies, and knowledge intensity economies that characterize each place (Knoben *et al.*, 2016; Claver-Cortés *et al.*, 2016).

Urbanization economies (Jacobs, 1969) are those resulting from the concentration of firms which develop various economic activities within a particular area or region. This concentration gives rise to a number of advantages or «fixed effects» of location (e.g. transport connections, climate, time zone, or cultural capital) which do not directly depend on the co-location of related enterprises or institutions (Swann *et al.*, 1998).

However, and most interestingly, environments like these house a plurality of technological and commercial realities, with the resulting multiplicity of knowledge types, the exchange, complementarity, and combination of which may give a boost to innovation (Frenken *et al.*, 2007). The lack of technological and competitive connection is likely to raise barriers to interaction between firms, the existence of a wide range of specialized services and agents that can act as conductors and intermediaries for these encounters acquiring special relevance. This infrastructure must recreate an atmosphere where cooperation between enterprises—from very different origins and between which no direct rivalry exists—is feasible and permits to generate new knowledge.

A first hypothesis can be posed from these ideas:

Hypothesis 1a: The existence of urbanization economies favors innovation in local firms and MNEs.

Specialization economies (Marshall, 1920; Glaeser *et al.*, 1992) are the ones which derive from the specialization of economic activity in an industry within a specific area or region. Inside that location, firms will be able to enjoy advantages such as an increased specialization of workers or supplies.

This spatial concentration of enterprises belonging to the same industry also generates externalities by the possibilities for companies to learn from one another. In this case, the mastery of a common language and knowledge base makes it possible to achieve a higher degree of interaction between firms, and as a result, a higher likelihood of generating new knowledge. Hence why the following hypothesis is formulated:

Hypothesis 1b: The existence of specialization economies favors innovation in local firms and MNEs.

Finally, knowledge intensity economies (Knoben *et al.*, 2016) stem from the location close to knowledge-producing agents and/or firms, whose coexistence creates an environment where knowledge is valued, transferred, and generated. This higher knowledge intensity is the one which defines those areas or regions which, despite lacking in industrial specialization, manage to bring together agents characterized by their orientation towards knowledge and their innovative potential, creating an atmo-

sphere that encourages the coordination of collective effort, and it is often driven by the role performed by certain local institutions (McEvily and Zaheer, 1999).

Based on the above, our third hypothesis can be stated as follows:

Hypothesis 1c: The existence of knowledge intensity economies favors innovation in local firms and MNEs.

2.2. The role played by absorptive capacity

The expertise of these subsidiaries to innovate and, ultimately, to survive, depends on their receptivity before changes in the environment, on their own skill to form part of external knowledge networks with other firms and institutions inside their own local environment, and on their ability to make the most of knowledge.

It can be stated in this respect that many firms are exposed to identical environmental conditions, but not all of them are able to turn external knowledge into results with the same level of success, because they differ in their ability to utilize these knowledge sources (Rothaermel and Hess, 2007). By way of example, using a sample of MNEs with subsidiaries in Sweden, Persson (2006) highlights the fact that nearly 60 per cent of the latter do not take advantage of local knowledge to innovate.

In fact, as firms gain access to more and more sources of potentially useful external knowledge, the possible combinations of that knowledge increase too and so does accordingly the complexity of its management. Therefore, if a firm is unable to manage and exploit such knowledge, that will most probably limit its possibilities to innovate (Henderson and Clark, 1990; Laursen and Salter, 2006), it being necessary to highlight the role of absorptive capacity —hereinafter AC— (Cohen and Levinthal, 1990). This capacity directly associated with the firm's ability to learn is a multidimensional construct which allows for knowledge acquisition, assimilation, transformation, and exploitation.

In tune with the definition offered by Cohen and Levinthal (1990), some models identify three dimensions (Szulanski, 1996; Lane and Lubatkin, 1998; Todorova and Durisin, 2007) or components of the learning process (Lane *et al.*, 2006; Lichtenhaler, 2009; Volberda *et al.*, 2010; Fernández-Mesa *et al.*, 2014) to characterize AC development level. In other words, AC will depend on the organizational capacity:

- To explore and show receptiveness before any knowledge coming from outside, locating, identifying, and assessing the one which is considered valuable.
- To transform/assimilate and manage to understand and internalize new knowledge, integrating it into the already existing knowledge, which will suffer a transformation after the combination.
- To exploit and find the way to apply new knowledge, from the existing knowledge base and the investment made in its generation and updating.

AC level will thus be determined by the development achieved in its exploratory, transformative, and exploitative dimensions.

Concerning the relationship between AC and innovation, it has become clear that AC positively affects the possibilities of innovation, understanding the latter in terms of technological innovation (Cepeda-Carrión *et al.*, 2012), process and organizational innovation (Murovec and Prodan, 2009), product innovation (George *et al.*, 2001), patent generation innovation (Sørensen and Stuart, 2000), etc. This allows us to put forward the following work hypotheses:

Hypothesis 2a: A greater development in the exploratory dimension of AC has a positive effect on innovation in local firms and MNEs.

Hypothesis 2b: A greater development in the transformative dimension of AC has a positive effect on innovation in local firms and MNEs.

Hypothesis 2c: A greater development in the exploitative dimension of AC has a positive effect on innovation in local firms and MNEs.

2.3. Differences between local and foreign firms

The position of multinational enterprises regarding knowledge management is peculiar because, unlike what happens with other types of firms, the external knowledge potentially accessible for them may come from the global environment or from the local environments of each one of its subsidiaries (Zhang and Cantwell, 2013). Nevertheless, local firms find themselves in a better position than foreign ones when it comes to accessing and exploiting local external knowledge due to their degree of integration into local networks. Without interactions and the existence of insertions in those local networks, the subsidiary will not be able to access and exploit non-formal information flows, territorial resources and, particularly, potentially useful external knowledge, normally of a tacit nature (Tallman and Chacar, 2011; Giuliani *et al.*, 2014).

Mariotti *et al.* (2010) actually found that MNEs prefer not to be located next to domestic firms because they have the impression that the possible gain of external knowledge that they might obtain is smaller than the one which those autochthonous rivals can achieve.

Consequently, referring to the possibilities offered by environments characterized by a concentration of firms, it is necessary for us to bear in mind that:

- Geographical proximity between agents becomes necessary to promote social learning processes by means of knowledge sharing and creation. This collocation does not suffice to generate the interaction between agents needed to produce that learning, though.
- The interaction which arises through the location near other firms need not always be necessarily fruitful. In this case, it may happen that external knowledge is not sought to innovate, which would mean that the role assigned by the parent company to the subsidiary does not consist in exploring and absorbing that knowledge. Veugelers and Cassiman (2004) argue

that MNE subsidiaries are not interested in the knowledge exchanges which usually take place in R&D-centered alliances. Instead, having that network of international collaborators which favors access to the most advanced knowledge and technologies seems to be more important for local firms, even though the knowledge flows coming MNEs which have established themselves next to them are not always positively taken advantage by those local firms.

In other words, inter-firm learning within a local environment needs an interaction which is not always guaranteed by the proximity of facilities. There must be a desire and a capacity to participate in local knowledge networks, domestic companies being better positioned in this respect, since they have fewer alternatives and share more features with one another. Taking these reflections into account, the hypothesis below is proposed from a clearly exploratory approach:

Hypothesis 3: Innovation in local firms is more sensitive to agglomeration (in its urbanization, specialization, and knowledge intensity dimensions) than that undertaken in MNEs.

3. Research methodology

Eight logistic regression or logit models were suggested to test the hypothesis posed, one for each type of innovation (product/service, processes, organizational practices, commercialization) in each one of the two groups of firms examined (domestic firms and MNE subsidiaries).

Logistic regression is generally used to model the behavior of a non-continuous, categorical, and specifically binomial response variable (Y^ν). In our case,

$$Y^\nu = \begin{cases} 1 & \text{There is type } -\nu \text{ innovation between 2011 and 2013} \\ 0 & \text{There is no type } -\nu \text{ innovation between 2011 and 2013} \end{cases} \quad (1)$$

ν being = product/service, processes, organizational practices, commercialization.

Each one of the logistic regression models proposed has as its aim to find out which factors contributed to determine each type of innovation (Y^ν). More precisely, the specification of the logit model to estimate would be as follows:

$$p_i = \Pr\left(Y_i^\nu = \frac{1}{x_i}\right) = \frac{1}{\left[1 + e^{\left[-B_0 - \sum_{i=1}^N B_i x_i\right]}\right]} \quad (2)$$

For simplification purposes, we can define:

$$k = \left(B_0 + \sum_{i=1}^N B_i x_i\right) \quad (3)$$

Resulting in the following expression:

$$p_i = \frac{1}{[1 + e^{-k}]} \quad (4)$$

Where

B_0 = constant of the estimated model.

B_i = coefficient of the i -th predicting variable (x_i).

x_i = i -th predicting variable, $i = 1, \dots, n$.

e = exponential function.

and p_i is the likelihood of the response variable assuming the value of 1, given the values of the x_i variables.

The specific equation which summarizes the established relationships and, therefore, the one which must be estimated within an iterative process to test the proposed hypotheses, would look like this:

$$\begin{aligned} x = & \beta_0 + \beta_1 \text{aggurb} + \beta_2 \text{aggspe} + \beta_3 \text{aggkno} + \beta_4 \text{acxpr} + \beta_5 \text{actrn} \\ & + \beta_6 \text{acxpt} + \beta_7 \text{age} + \beta_8 \text{group} + \beta_9 \text{size} + \beta_{10} \text{secthtm} + \beta_{11} \text{sectmhtm} \\ & + \beta_{12} \text{secthts} + \beta_{13} \text{regisco} + \beta_{14} \text{natisco} + \beta_{15} \text{eusco} + \beta_{16} \text{othesco} + \varepsilon \end{aligned} \quad (5)$$

The three agglomeration level indicators —AGGLURB, AGGLSPE, and AG-GLKNO— represent agglomeration in terms of urbanization, specialization, and knowledge intensity, respectively. In turn, ACXPR, ACTRN, and ACXPT respectively provide an approximation to the three dimensions of AC: exploration; transformation; and exploitation.

To these explanatory variables are added a number of control variables which stand for years of operation (AGE), membership in a business group (GROUP), size (SIZE), activity sector (SECTHTM for high technology manufacture, SECTMHTM for medium-high technology manufacture, and SECTHTS for high- or cutting-edge technology services)⁴, and geographical markets that it serves (REGISCO if it is a local or regional market, NATISCO for national markets, EUSCO for European markets, and OTHESCO for other markets).

SPSS version 23 was used as a statistical package.

3.1. Description of the population

The definition of the population under study must take into consideration that the technological dynamism or turbulence typical of each industry is a variable that can significantly influence not only the greater or lesser propensity to innovate (Patel and Pavitt, 1995; Cohen, 1995) but also other relevant variables for this study, as is the

⁴ The reference category will be: high- or cutting-edge technology services.

case of AC (Martínez-Senra *et al.*, 2013). Hence why it seems advisable to focus the analysis in sectorial terms.

As for the selection of the sector (or sectors), a literature review permits to conclude that numerous works base their search for evidence about the link between agglomeration and innovation on knowledge-intensive or high-technology industries, such as biotechnology, pharmaceutical research, nanotechnology, to quote but a few (Saxenian, 1996; Porter and Stern, 2001; Stuart and Sorenson, 2003; Cook, 2004; Owen-Smith and Powell, 2004; McCann and Folta, 2011; Varga *et al.*, 2014, amongst others).

In these types of industries, when firms focus on obtaining complex products, they need a broad skill or knowledge diversity corresponding to multiple technological disciplines, which must be permanently updated in order to respond to the ever-changing market conditions. By way of example, in certain industries, like that of biotechnology, where the knowledge base is scattered due to its actual complexity, the generation of new knowledge applicable to new products seems more likely to happen through a group of firms rather than on an individual basis (Powell *et al.*, 1996). A need arises to resort to external knowledge in this context (Chesbrough, 2003), and agglomerations are required where not only the learning of knowledge from others but also the creation of new valuable knowledge through interaction becomes more likely.

In view of all the above, a decision was made to confine the analysis to firms based in Spain and belonging to high and medium-high technology sectors which, according to the classification used by the National Statistics Institute (hereinafter, INE, for its initials in Spanish), may be both manufacturing or service sectors. Even though it is true that these sectors do not have a high representation in Spain (66,224) compared to the total number of firms (3,146,489), when it comes to employment, they account for 7.0% of the total number of employed persons, and their turnover represents more than 20% of GDP.

However, as it happens in any other sector, not all the enterprises operating in it necessarily have to show an interest in accessible external knowledge. Hence why our research exclusively focuses on firms for which it can indeed be important to complete their knowledge base with external knowledge, thus reducing the study population to those High and Medium-High Technology firms that carry out⁵ R&D (hereinafter, AM-ATID, for its initials in Spanish).

Table 1 summarizes —without drawing a distinction between sectors— how all the firms and subsidiaries of foreign companies in Spain are distributed across the different autonomous regions. According to that information, Madrid and Catalonia are the two autonomous regions with a higher business population density in absolute as well as relative terms, regarding both the total number of firms and the number of MNE subsidiaries. The third and fourth positions correspond to the Valencian Region and Andalusia if only the population of subsidiaries is considered (almost 5 out of

⁵ They have expenses in R&D.

Table 1. Distribution for the population of firms and that of subsidiaries of foreign firms in Spain by Autonomous Regions. Data corresponding to 2013

	<i>Total number of firms</i>	<i>Number of subsidiaries of foreign firms in Spain</i>	<i>Percentage over the total number of foreign subsidiaries in Spain</i>	<i>Percentage over the total number of firms in the region</i>
Andalusia	471,521	508	4.738	0.108
Aragón	88,067	219	2.043	0.249
(Principality of) Asturias	66,869	76	0.709	0.114
Balearic Islands	85,044	169	1.576	0.199
Canary Islands	129,566	187	1.744	0.144
Cantabria	37,109	42	0.392	0.113
Castile and León	162,153	157	1.464	0.097
Castile-La Mancha	124,405	108	1.007	0.087
Catalonia	580,804	3,588	33.464	0.618
Valencian Region	337,161	533	4.971	0.158
Extremadura	63,353	76	0.709	0.120
Galicia	192,998	206	1.921	0.107
Madrid	496,003	4,170	38.892	0.841
Murcia	87,146	80	0.746	0.092
Navarre	40,860	127	1.184	0.311
Basque Country	153,709	445	4.150	0.290
La Rioja	22,316	32	0.298	0.143
Ceuta	3,610			
Melilla	3,795			
Total	3,146,489	10,722		0.341

Source: Statistics for subsidiaries of foreign firms in Spain (INE).

each 100 subsidiaries of foreign companies in Spain choose one of these regions). Nevertheless, from the perspective of the weight that the population of MNE subsidiaries has in the total proportion of businesses located in each autonomous region, Navarre and the Basque Country (3 out of each one thousand firms are foreign) are the regions which comparatively attract the most foreign investment in the form of subsidiaries, after Madrid and Catalonia.

Furthermore, following a sectorial criterion, the location patterns of high and medium-high technology (manufacturing and service) firms which engage in R&D once again suggest that Catalonia, with 1,242 firms, and Madrid, with 948 firms —18.45% and 15.76%, respectively— are situated above the national average. Nonetheless, the ranking of territories varies to a large extent if the total number of firms located in each region are taken into consideration, Basque Country, Navarre, and Aragon (in this order) standing out as the regions with the highest relative representation of such firms (fourth column in Table 2).

Table 2. Distribution for the population of high and medium-high technology firms which invest in R&D in Spain by Autonomous Regions. Data corresponding to 2013

	<i>Total number of firms</i>	<i>Number of AMATID*</i>	<i>AMATID percentage over the national total</i>	<i>AMATID percentage over the regional total</i>
Andalusia	471,521	455	14.98	0.096
Aragón	88,067	200	2.79	0.227
(Principality of) Asturias	66,869	125	2.12	0.187
Balearic Islands	85,044	36	2.7	0.042
Canary Islands	129,566	56	4.11	0.043
Cantabria	37,109	61	1.17	0.164
Castile and León	162,153	185	5.15	0.114
Castile-La Mancha	124,405	97	3.95	0.078
Catalonia	580,804	1,242	18.45	0.214
Valencian Region	337,161	526	10.71	0.156
Extremadura	63,353	37	2.01	0.058
Galicia	192,998	267	6.13	0.138
Madrid	496,003	918	15.76	0.185
Murcia	87,146	126	2.76	0.145
Navarre	40,860	153	1.29	0.374
Basque Country	153,709	696	4.88	0.453
La Rioja	22,316	52	0.7	0.233
Ceuta	3,610		0.11	0.000
Melilla	3,795		0.12	0.000
Total	3,146,489	4,823		0.153

Source: Statistics for R&D (INE).

* AMATID: High and Medium-High Technology firms which carry out R&D.

The observation of these data allows us to argue that Spanish regions are not equally attractive as business locations, neither for Spanish firms nor for the MNEs which decide to carry out FDI activities in Spain, neither in the specific case of high and medium-high technology companies nor in the business fabric as a whole. In this regard, it seems interesting to reflect on whether these differences are due to some kind of reason associated with the existence of innovation networks specific to each region that attract investments.

Spain has a nationwide network of Technological Centers and Technological Innovation Support Centers (hereinafter CTCAITs, for its initials in Spanish), which are non-profit private entities created for the purpose of making a contribution to the overall benefit of society and improving the competitiveness level of firms through the generation of technological knowledge, carrying out R&D&I activities and developing their application, and providing innovation support services as well⁶. The success achieved by these Centers, closely linked to the business environment, is measured according to the competitive improvement of firms and to their contribution to the economic development of the region where they are located. It thus seems interesting, insofar as they can drive and develop the promotion of innovation, to know how they are geographically distributed across the country.

Table 3 shows the number of CTCAITs listed on the Directory of Technological Centers and Technological Innovation Support Centers located in each autonomous region, both in absolute terms and in relative terms for each 1,000 firms. According to this indicator, the first positions are occupied by Navarre and the Basque Country, whereas Catalonia and Madrid rank 14th and 16th, respectively.

3.2. Sample description

The selected sample was obtained from the PITEC (Spanish abbreviation for Technological Innovation Panel) database, elaborated on the basis of the Survey about Innovation in Firms. This database makes it possible to monitor the technological innovation activities undertaken by Spanish companies and has been prepared since 2004, thanks to the collaboration between the National Statistics Institute (INE) and the Spanish Foundation for Science and Technology. PITEC included the response of 10,074 firms in 2013, 2,096 of which belonged to high and medium-high technology sectors.

Not all the firms included in this group necessarily engage in R&D, though, this being a first requirement imposed for the survey to be representative of the population. To which must be added that this panel comprises cases of firms which perform their R&D activities in several autonomous regions. Seeking to be able to detect and

⁶ Royal Decree 2093/2008, of 19 December. Ministry of Economy, Industry, and Competitiveness (MINECO, for its Spanish abbreviation).

Table 3. Distribution of national Technological Centers and Technological Innovation Support Centers (CTCAIT) by Autonomous Regions. Data for 2013

	<i>Number of CTCAITs</i>	<i>CTCAITs per 1,000 firms in the Autonomous Region</i>
Andalusia	11	0.023
Aragón	2	0.023
(Principality of) Asturias	4	0.06
Balearic Islands	1	0.012
Canary Islands	0	0
Cantabria	2	0.054
Castile and León	7	0.043
Castile-La Mancha	2	0.016
Catalonia	8	0.014
Valencian Region	15	0.044
Extremadura	2	0.032
Galicia	7	0.036
Madrid	1	0.002
Murcia	6	0.069
Navarre	5	0.122
Basque Country	14	0.091
La Rioja	1	0.045
Ceuta		0
Melilla		0
Total	88	0.028

Source: Elaborated by the authors. INE, MINECO.

isolate a location effect on innovation, if it exists, a decision was made to select only those enterprises which develop this function in a single autonomous region. With the aim of identifying this location, and bearing in mind that it is ultimately the employees that serve as conductors of tacit knowledge, it seemed reasonable for us to conclude that this place coincides with the physical location of internal R&D employees.

Based on these markers, there are 1,610 firms which concentrate R&D implementation in a single autonomous region and consequently shape the sample utilized here. Table 4 provides a breakdown of the number of local firms and subsidiaries of MNEs whose R&D activity is centralized in each region.

Table 4. Sample distribution by Autonomous Regions

	<i>Local firms</i>	<i>MNEs</i>	<i>Total</i>
Andalusia	79	1	80
Aragón	68	2	70
(Principality of) Asturias	22	3	25
Balearic Islands	1		1
Canary Islands	8		8
Cantabria	9	6	15
Castile and León	44	6	50
Castile-La Mancha	21	3	24
Catalonia	381	95	476
Valencian Region	164	10	174
Extremadura	1	1	2
Galicia	70	8	78
Madrid	192	42	234
Murcia	29	2	31
Navarre	45	15	60
Basque Country	246	27	273
La Rioja	9		9
Ceuta	0		0
Melilla	0		0
TOTAL	1.371	239	1.610

Source: Elaborated by the authors. PITEC (2013).

In turn, Table 5 shows the distribution of the firms shaping our sample by activity sector, drawing a distinction between local firms and MNE subsidiaries.

Table 5. Sample distribution by sectors

<i>CNAE</i> ⁷ 2009	<i>High and medium-high technology sectors</i>	<i>Local firms</i>	<i>MNEs</i>	<i>TOTAL</i>
High technology manufacturing sectors		215	43	258
21	Manufacture of pharmaceutical products	67	25	92
26	Manufacture of computer, electronic, and optical products	139	15	154
30.3	Manufacture of air- and spacecraft, and related machinery	9	3	12
Medium-high technology manufacturing sectors		695	162	857
20	Chemical industry	263	52	315
27 a 29	Manufacture of electric materials and equipment; Manufacture of n.c.o.p. [Spanish initials for «not comprised in other parts»] machinery and equipment; Manufacture of motor vehicles, trailers, and semi-trailers	419	105	524
30 - 30.3	Manufacture of other transport equipment, except for: Manufacture of air- and spacecraft, and related machinery	13	5	18
High or cutting-edge services		461	34	495
58 a 63	Activities related to cinema, video and television programs, sound recording and musical edition; Activities related to radio and television programming and broadcasting; Telecommunications; Programming, consultancy, and other activities related to Computing; Information Services.	287	28	315
72	Research and development	174	6	180
TOTAL		1.371	239	1.610

Source: Elaborated by the authors. PITEC (2013).

3.3. Coding of variables

Table 6 summarizes the relevant information concerning the variables defined to perform the analysis, subsequently providing specific details about the decisions and measures adopted for their definition.

⁷ CNAE: Spanish initials for National Classification of Economics Activities.

Table 6. Variable descriptions and measures

	<i>Concept and dimensions</i>		<i>Measure</i>	<i>Information source</i>
<i>Dependent</i>	INNOVATION	INNPRD	Dichotomous variable with a value of 1 if it has innovated in product/service between 2011 and 2013, and 0 otherwise	PITEC (2013)
		INNPRC	Dichotomous variable with a value of 1 if it has innovated in processes between 2011 and 2013, and 0 otherwise	PITEC (2013)
		INNORG	Dichotomous variable with a value of 1 if it has innovated in organizational practices between 2011 and 2013, and 0 otherwise	PITEC (2013)
		INNCOM	Dichotomous variable with a value of 1 if it has innovated in commercialization between 2011 and 2013, and 0 otherwise	PITEC (2013)
<i>Independent</i>	AGGLOMERATION LEVEL	AGGURB	Dichotomous variable with a value of 1 if its located in a Park, and 0 otherwise.	PITEC (2013)
		AGGSPE	Dichotomous variable with a value of 1 if the relative importance of firms AMATID over the total of firms in the region is above the average, and 0 otherwise.	INE
		AGGKNO ^N	Dichotomous variable with a value of 1 if the number of technological centers in relation to the total number of firms is above the average, and 0 otherwise.	INE, MINECO ⁹
	ABSORPTIVE CAPACITY	ACXPR	Number of external sources ¹⁰ to which the firm assigns «high» importance as a source of information; its value may range between 0 and 10.	PITEC (2013)
		ACTRN	Percentage of employees with higher education.	PITEC (2013)
		ACXPT	Total expenditure on innovation.	PITEC (2013)
<i>Control</i>	AGE	Number of years during which a firm has been operating since its foundation.		PITEC (2013)
	GROUP	Dichotomous variable coded 0 if it is a single-unit firm, and 1 if the enterprise forms part of a business group.		PITEC (2013)
	SIZE	Dichotomous variable whose values can be 1 and 0, according to whether the firm has more than 200 employees or not.		PITEC (2013)

		<i>Concept and dimensions</i>	<i>Measure</i>	<i>Information source</i>
<i>Control</i>	SECTOR	SECTHTM	A sector-identifying dichotomous variable: 1-high-tech manufacturing; 0-otherwise.	PITEC (2013)
		SECTMHTM	A sector-identifying dichotomous variable: 1-medium-high-tech manufacturing; 0-otherwise.	PITEC (2013)
		SECTHTS	A sector-identifying dichotomous variable: 1-high-tech service; 0-otherwise.	PITEC (2013)
	SCOPE	REGISCO	Dichotomous variable whose values can be 1 and 0, according to whether the firm operates in the regional market or not.	PITEC (2013)
		NATISCO	Dichotomous variable whose values can be 1 and 0, according to whether the firm operates in the domestic market or not.	PITEC (2013)
		EUSCO	Dichotomous variable whose values can be 1 and 0, according to whether the firm operates in the European ⁴ market or not.	PITEC (2013)
		OTHESCO	Dichotomous variable whose values can be 1 and 0, according to whether the firm operates in other markets or not.	PITEC (2013)

Source: Elaborated by the authors.

NOTE: the geographical reference unit in AGGSPE and AGGKNO is the Autonomous Region.

Dependent variable

INNOVATION

One of the measures commonly utilized to estimate innovation refers to the number of patents (Henderson and Cockburn, 1994; Dutta and Weiss, 1997; Squicciarini, 2008; 2009; Vázquez-Urriago *et al.*, 2014). This indicator has some disadvantages, though. On the one hand, not all sectors are in a position to patent their innovations. For instance,

⁸ Royal Decree 2093/2008, of 19 December, regulates Technological Centers (CTs) and Technological Innovation Support Centers (CAITs) with a national scope and creates a public registry of an informative and voluntary nature which can be consulted on the Directory of technological centers and technological innovation support centers.

⁹ Equipment suppliers, customers, competitors, consultants, private laboratories or institutes, universities, public research bodies, technological centers, conferences, fairs or exhibitions, scientific journals or technical publications, professional or industrial associations.

¹⁰ The following countries are included: Albania, Germany, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Denmark, Slovakia, Slovenia, Estonia, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Montenegro, Norway, the Netherlands, Poland, Portugal, the United Kingdom, the Czech Republic, Romania, Serbia, Sweden, Switzerland, and Turkey.

only that which is susceptible of having an industrial application —expressed differently, when it is physically possible to manufacture the invention (Spanish Patent and Trade-mark Office)— can be patented in Spain. On the other hand, should it be considered that the application for a patent may result in imitators copying or absorbing the knowledge that is meant to be protected, firms can directly choose not to register these innovations.

In the light of all the above, and trying to capture a broad meaning of innovation in keeping with the recommendations made in the Oslo Manual (OCDE, 2005)¹¹, a decision was adopted to consider whether or not the firm has undertaken some type of innovation in products (goods and/or services), processes (manufacturing or production methods, logistic systems, and/or support activities for its processes), organizational practices (work organization or business procedures, responsibility distribution and decision making, and/or management of external relationships with other enterprises or public institutions) or in commercialization (product design or packaging of goods or services, techniques or channels for product promotion, methods for product positioning in the market or sales channels, or methods for the pricing of goods and services).

For this purpose, twelve dichotomous PITEC variables that assess the extent to which those types of innovation have taken place served as the basis to build four dichotomous variables which indicate whether the enterprise innovated or not in products (INNPRD), processes (INNPRC), organizational practices (INNORG), and/or commercialization (INNCOM) between 2011 and 2013 (Montoro-Sánchez *et al.*, 2012). Table 7 shows the number of local firms and MNE subsidiaries which carry out each type of innovation.

Table 7. Number of firms which carry out each type of innovation

	<i>Local firms</i>	<i>MNEs</i>	<i>Total</i>
INNPRD	974	176	1150
INNPRC	680	150	830
INNORG	665	145	810
INNCOM	591	100	691

Source: Elaborated by the authors. PITEC (2013).

Independent variables

AGGLOMERATION

The level of agglomeration will be determined by the existence of urbanization economies, specialization economies, and economies derived from knowledge intensity.

¹¹ According to the Oslo Manual, innovation is understood as the conception or implementation of significant changes in the firm's product, process, marketing, or organization for the purpose of improving its results (OCDE, 2005).

Urbanization economies are usually generated in cities or urban nuclei. The problem raised by our database lies in the fact that the specific city where the enterprise develops its R&D activity is unknown. Hence our decision to use a proxy indicator to try and test this effect, which assesses whether the firm is located in a Scientific-Technological Park (hereinafter STP) or not.

An STP contains the breeding ground typical of business agglomerations which helps generate positive externalities because firms operating in different industries lie near to one another. STPs additionally have a management body which strives to improve business results through the use of strategies such as the promotion and creation of technology-based companies, the transfer of research to commercial applications, the attraction of firms with cutting-edge technology, or the boost to strategic networks and alliances, amongst others (Siegel *et al.*, 2003; Felsenstein, 1994; Colombo and Delmastro, 2002).

Consequently, it can be concluded that these parks are locations characterized by the agglomeration of firms and other organizations in which innovation is favored through the encouragement of cooperation and placing a physical and social infrastructure at the disposal of agents that stimulates external knowledge creation, access, and acquisition (Squicciarini, 2008; 2009). Therefore, taking these arguments into account, the location in an STP can actually be said to allow for the exploitation of urbanization economies which will not be accessible for firms located outside these parks.

A dichotomous variable (AGGURB) which checks whether the firm is located in a scientific-technological park or not served to measure it.

Specialization economies arise when a geographical concentration of similar firms takes place in a specific area. Since a variety of regional features (export intensity of the business population, orientation to knowledge...) may help predict the innovative behavior of the enterprises located in those areas (Anderson and Johanson, 2008), the autonomous region was selected as our geographical unit of analysis.

This approach proves useful to verify the existence of specialization economies depending on the relative importance of the high and medium-high enterprises carrying out R&D over the total number of firms located in each autonomous region, and on whether that importance is comparatively higher or lower than the national average, with the data corresponding to 2013.

As can be seen in Table 2, the data available allow us to conclude that the regions with a higher relative specialization in these types of firms are, in alphabetical order: Aragón, Asturias, Cantabria, Catalonia, Valencian Region, Madrid, Navarre, Basque Country, and La Rioja.

From such data can be built the dichotomous variable AGGSPE, which takes the value of 1 if the autonomous region has an above-average proportion of high and medium-high technology firms that invest in R&D, and 0 otherwise¹².

¹² Based on the LQ (location quotient) approach to determine industrial specialization levels, but using the number of firms instead of employment data as a reference.

Knowledge intensity economies highlight the importance that the orientation to innovation in an area or region is likely to have for the results in terms of innovation obtained by the enterprises located in it. Expressed differently, not only is it important that public or private agents exist with resources allocated to innovation as «neighbors» but also that they have the ability to shape a network which comprises them and which can be placed at the disposal of the other agents' technological and economic development.

This is the philosophy behind the national network of Technological Centers, and the number of Technological Centers per 1,000 firms was adopted as the criterion to determine the existence of economies derived from knowledge intensity. Table 3 shows an uneven distribution between autonomous regions, and being above or below the national average will be the feature determining the existence of such economies. More precisely, above-average values would be obtained by these autonomous regions (in alphabetical order): Asturias, Cantabria, Castile and León, Valencian Region, Extremadura, Galicia, Murcia, Navarre, Basque Country, and La Rioja.

These data permit to build the dichotomous variable AGGKNO, whose value will be 1 or 0, depending on whether the autonomous region has an above-average proportion of technological centers per 1,000 enterprises or not.

Table 8 collects the number of local firms and MNE subsidiaries established in each type of agglomeration.

Table 8. Number of firms located in an agglomeration (according to the type of economies which generate it)

	<i>Local firms</i>	<i>MNEs</i>	<i>Total</i>
AGGURB	163	32	195
AGGSPE	1,126	210	1336
AGGKNO	640	77	717

Source: Elaborated by the authors. PITEC (2013).

ABSORPTIVE CAPACITY

AC is a function of the knowledge to which access can be gained and of the means used to exploit it. The greater or lesser degree of perfection achieved by this construct will thus depend on the extent to which its exploration, transformation, and exploitation capacity is developed.

In order to approach this exploratory dimension of AC, directly associated with the value that the firm attributes to a variety of knowledge sources and with its skill to establish fruitful contacts with external agents, an adaptation was made of the information coming from 10 PITEC variables which describe the importance

(high, medium, low, and irrelevant) that the enterprise allocates to each type of agent (equipment suppliers, customers, competitors, consultants, private laboratories or institutes, universities, public research bodies, technological centers, conferences, fairs or exhibitions, scientific journals or technical publications, professional or industrial associations) as a source of information. The variable ACXPR was specifically built counting the number of external sources to which the firm grants «high» importance as an information source, its possible values ranging from 0 to 10.

To this must be added that the chances to access valuable external knowledge will be limited by the stock of internal knowledge mastered by the firm, which in turn will ultimately depend on its human resources and the knowledge owned by its employees (Mangematin and Nesta, 1999). Hence, a decision was made to deal with the transforming dimension of AC using the information directly provided by PITEC and reflected in the variable ACTRN, which measures the percentage of firm staff with higher education.

Valuing and/or understanding knowledge does not suffice to exploit it successfully, though. The exploitative dimension of AC is the one which makes it possible to apply the new knowledge; the representation of this dimension was carried out by means of the variable ACXPT, which includes information about the total expenses on innovation incurred by the enterprise (Cohen and Levinthal, 1990; Murovec and Prodan, 2009) from PITEC information.

Table 9 summarizes the main descriptive statistics corresponding to the three variables related to AC.

Table 9. Descriptive statistics for AC components

		<i>Number</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Standard Deviation</i>
ACXPR	LOCAL FIRMS	1,371	0	10	1,72	1.88
	MNEs	239	0	7	1,11	1.47
ACTRN	LOCAL FIRMS	1,371	0	100	42,81	29.67
	MNEs	239	0	100	30,68	25.66
ACXPT	LOCAL FIRMS	1,371	3,278	139,293,379	1,770,720.02	8,793,334.64
	MNEs	239	17,207	277,664,312	7,716,900.89	33,572,386.18

Source: Elaborated by the authors. PITEC (2013).

CONTROL VARIABLES

The age (years of operation) of a firm may influence innovation both positively and negatively: on the one hand, having more experience is likely to permit a greater accumulation of knowledge, but it can also become an inertia generation source that will hinder adaptation as well as the introduction of novelties in products and processes. Seeking to control possible effects, it was decided to include the variable AGE, which indicates the number of years during which the firm has been operating since its foundation—obtained from PITEC—. The most important descriptive statistics corresponding to this variable can be found in Table 10.

Table 10. Descriptive statistics for the continuous control variable AGE

		<i>Number</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Standard Deviation</i>
AGE	LOCAL FIRMS	1,371	3	128	27.59	16.85
	MNEs	239	4	129	35.27	21.49

Source: Elaborated by the authors. PITEC (2013).

The need for any company to capture external knowledge or the support to this absorption also depends on its membership in a group of firms (Barge-Gil *et al.*, 2011). This effect is included with the dichotomous variable GROUP, whose values can be 1 and 0, depending on whether the firm belongs to a group or not. Nevertheless, it must be borne in mind that, while nearly 35% of local enterprises form part of a group, this percentage reaches 100% amongst subsidiaries of MNEs.

Furthermore, previous works suggest that size correlates to a significant extent with innovation. However, no consensus has been reached on the sense of causality or the sign of this relationship. The largest firms are more innovative because of their greater financial possibilities, but the smallest ones show more flexibility (Damanpour and Gopalakrishnan, 1998). The dichotomous variable SIZE, which specifies if the firm has a large size and employs over 200 workers (PITEC) was included to take account of this effect.

The expectations to make the most of innovation and the opportunities offered by the technological and competitive environment when it comes to introducing improvements in products and processes differ across sectors. Hence why, although the population was defined in a more or less homogeneous manner trying to reduce this effect, sector identification came to form part of the analysis, thus ensuring that the possible differences existing between the various competitive environments were not disregarded *a priori*. More precisely, there will be three dichotomous variables which tell us if the industry to which the firm belongs is a high-technology manufacturing sector (SECTHTM), a medium-high technology manufacturing sector (SECT-MHTM) or a high or cutting-edge technology service sector (SECTHTS). These variables were built from the information supplied by PITEC about firm activities according to CNAE09 [2009 National Classification of Economic Activities].

The greater or lesser predisposition to innovate may also be influenced by sales expectations, which in turn will depend on the breadth of the geographical markets to which the product or service can be addressed (Löfsten and Lindelöf, 2003). In this sense, sales dispersion is also likely to mean a stimulus for innovation due to the need to adapt the products both to the local demand and to the regulations of foreign markets (Vernon, 1966). For all these reasons, and following other studies such as the one carried out by Urgal *et al.* (2011), four dichotomous variables were incorporated that indicate if the enterprise operates in a local/regional market (REGISCO), in a national market (NATISCO), in a European (EUSCO), or in other different ones (OTHESCO), from PITEC information.

Table 11 shows the number of firms—the total, local firms, and MNE subsidiaries—for which the corresponding dichotomous variable takes value 1.

Table 11. Sample composition according to categorical variables

	<i>Local firms</i>	<i>MNEs</i>	<i>Total</i>
SIZE (=1)	156	121	277
SECTHTM (=1)	215	43	258
SECTMHTM (=1)	695	162	857
SECTHTS (=1)	461	34	495
REGISCO (=1)	1,317	209	1,526
NATISCO (=1)	1,313	228	1,541
EUSCO (=1)	1,083	228	1,541
OTHESCO (=1)	967	206	1,173

Source: Elaborated by the authors. PITEC (2013).

4. Results summary

Table 12 provides the results obtained in the regressions performed which, broadly speaking, suggest that the effect on innovation associated with the presence of agglomeration economies varies depending on the type of agglomeration, the type of innovation, and the type of firm (local or foreign).

The most important results according to whether the enterprise is a local one or an MNE subsidiary can be found below.

Spanish firms

Based on the agglomeration effect in the case of Spanish firms, the chances to innovate in processes (INNPRC) and in organizational practices (INNORG) increase when they are located in a park (AGGURB).

Nevertheless, innovation in commercialization (INNCOM) becomes less likely when the enterprise is established in a region which has a comparatively broader network of technological centers (AGGKNO) than the one existing in other Spanish regions. This finding *a priori* contradicts Hypothesis 1c and makes us wonder whether it is the firms committing themselves to commercial innovation that choose locations in less equipped regions in terms of «scientific-technological» knowledge, or it is the firms choosing regions more focused on the creation and dissemination of such knowledge that show less interest for innovation in commercialization. The latter is precisely what happens when the competitive conditions of the market in which a firm operates do not demand that from it.

Table 12. Result of logit estimates

	INNPRD		INNPRC		INNORG		INNCOM	
	LOCAL	MNE	LOCAL	MNE	LOCAL	MNE	LOCAL	MNE
AGGURB	0.1908	-0.9270	0.6615***	-0.7254	0.3843**	v0.9896	0.2908	0.7932
AGGSPE	0.2388	-1.0035*	0.0184	-0.3501	-0.0780	-0.5772	-0.0238	-0.3167
AGGKNO	-0.1506	-0.3203	0.0795	-0.2471	0.0492	-0.2363	-0.2472**	-0.3022
ACXPR	0.1037***	0.2121*	0.0946***	0.1805*	0.0925***	0.0341	0.1204***	0.1170
ACTRN	0.0046*	-0.0085	-0.0038	0.0022	0.0039	0.0114	0.0001	0.0185**
ACXPT	0.0000	0.0000	0.0000*	0.0000	0.0000*	0.0000	0.0000	0.0000*
AGE	-0.0007	0.0134	0.0053	0.0027	0.0068*	0.0127*	-0.0018	0.0073
GROUP	0.1694		0.2035*		0.1335		-0.0771	
SIZE	0.2235	-0.2369	0.5855***	0.2955	0.5130**	0.8564*	0.2229	-0.7621**
SECTHTM	0.3664*	-0.8659	-0.0003	0.8835	-0.1444	0.6094	0.3875**	0.1291
SECTMHTM	0.4580**	-0.4111	0.1895	1.0561*	-0.1778	0.8112	0.1148	0.2799
SECTHTS ^N	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
REGISCO	0.2195	0.2885	-0.3117	0.0879	-0.0870	0.6530	0.0894	0.1763
NATIOSCO	0.8585***	0.6367	0.2049	-0.2976	0.1355	-1.2149	0.8695***	21.7344
EUSCO	0.4238**	-0.9105	0.1479	-0.2730	0.1778	0.8880	0.1495	-0.6577
OTHESCO	0.2443	0.8311*	-0.0343	0.8762**	0.2417	-1.0961*	0.0395	0.2958
Constant	-1.4762***	1.4079	-0.5470	-0.7539	-0.9687**	-0.3200	-1.5305***	-22.3154
Maximum likelihood logarithm-2	1,568.885	252.424	1,824.490	294.612	1,826.436	283.482	1,828.677	284.967
Cox & Snell's R ²	0.057	0.093	0.054	0.084	0.052	0.143	0.033	0.154
Nagelkerke's R ²	0.082	0.136	0.072	0.115	0.069	0.194	0.044	0.207
Cases included	1,371	239	1,371	239	1,371	239	1,371	239

* $p < 0,1$; ** $p < 0,05$; *** $p < 0,01$.

Source: Elaborated by the authors. ^N Ref.: Reference category.

Furthermore, despite the lack of statistical significance, it is worth mentioning the different sign shown by the location effect in areas with a higher relative specialization in firms AMATID (AGGSPE): positive in technological innovation —product/service (INNPRD) and processes (INNPRC)— and negative in non-technological innovation —organizational practices (INNORG) and commercialization practices (INNCOM)—. It can be understood in this respect that the location in regions with more similar agents puts firms under more competitive pressure for the access to resources (e.g. lands, workers, financing...), this location being only profitable for those firms able to take more advantage of the knowledge which is circulating and which will be more easily applied to innovations of a technological nature. On the contrary, for firms involved in non-technological innovation activities, the value of potentially accessible external knowledge does not compensate for the cost overrun in the rest of factors.

From another point of view, it also becomes visible that product/service innovation (INNPRD) is not significantly conditioned by the agglomeration measures considered, unlike what happens with other internal variables. It follows from this that, when it comes to innovating in products/services, Spanish firms of this sort are essentially influenced by their internal resources and, particularly, by the knowledge owned by their workers, as will be commented upon below.

With regard to AC, although it has a different magnitude and significance in each type of innovation, it has the expected effect. The effect of the exploratory dimension (ACXPR) can be felt on all four sorts of innovation, that of the exploitative dimension (ACXPT) arises in processes (INNPRC) and organizational practices (INNORG) —even though its magnitude is almost negligible— and, finally, the effect of the transformative dimension (ACTRN) can only be seen in product/service innovations (INNPRD).

Therefore, when it comes to the level of compliance corresponding to the hypotheses proposed for our sample of Spanish enterprises, hypothesis 1a, as well as hypotheses 2a, 2b, and 2c, were confirmed.

As for control variables, it can be said that, in this sample, age (AGE) increases the likelihood of innovating in organizational practices (INNORG). This should come as no surprise, considering that firms with more years of operation are the ones which need to update those practices to a greater extent.

In turn, membership in a group (GROUP) only increases the possibilities to innovate in processes (INNPRC), whereas size (SIZE) positively affects both process innovations (INNPRC) and organizational ones (INNORG).

According to the sectorial criterion, high and medium-high technology manufactures (SECTHTM and SECTMHTM) are more likely to innovate in products/services (INNPRD) —and only high-technology ones (SECTHTM) when it comes to innovating in commercialization (INNCOM)— than service firms. Nevertheless, this result must bear in mind that the approach to innovation in services differs from that of manufactures (OECD, 2005): with a more continuous and incremental nature, it makes the identification of innovations as individual events more difficult.

Finally, in relation to the market that encourages innovation to a greater extent, serving the European market (EUSCO) increases the chances to launch new products/services (INNPRD), whereas operating in the national market (NATIOSCO) improves this type of innovation, as well as the one related to commercialization (INNCOM).

Subsidiaries of MNEs

As for the agglomeration level in the areas where MNEs subsidiaries are located, only a higher relative dimension of the business fabric AMATID (AGGSPE) has a significant effect on product/service innovation (INNPRD), though with a sign opposite to that expected. Therefore, the location in areas with more similar firms makes it less likely for the firm to innovate in products/services, or alternatively, subsidiaries innovating in products/services choose areas with a lower relative sectorial specialization.

Concerning the role of AC, the influence exerted by its exploratory dimension (ACXPR) —representative of the opening to new ideas— can be observed in technological innovations, i.e. product/service (INNPRD) and process (INNPRC), while the transformative dimension (ACTRN), measured through human factor qualification, increases the chances to innovate in commercialization (INNCOM). The third dimension (the exploitative one) (ACXPT) apparently influences innovation in commercial practices (INNCOM); the magnitude of this effect is low, though.

Consequently, empirical evidence is only obtained for hypotheses 2a and 2b in the sample of MNE subsidiaries.

When it comes to control variables, the same as in the case of local enterprises, age (AGE) and size (SIZE) positively affect the introduction of novelties of an organizational nature (INNORG), even though this time a greater size is also associated with the implementation of fewer innovations in commercialization (INNCOM), contrary to what had been predicted. It can be assumed that, in this case, a larger size has to do with commercial practices more standardized at a global level which the MNE prioritizes for the purpose of maintaining a certain level of international homogeneity.

In sectorial terms, a positive effect can only be observed in the process innovation (INNPRC) of belonging to medium-high technology manufacturing industries (SECT-MHTM) as opposed to service ones and, from the perspective of geographical market breadth, innovation in MNE subsidiaries only feels the effect of serving markets other than the European one (OTHESCO), a duality existing based on the type of innovation: unlike technological innovation (INNPRD and INNPRC), which is favored, innovation in organizational practices (INNORG) experiences the opposite effect.

To conclude this description of the results obtained, and concerning model fit and explanatory capacity, it still remains for us to highlight that, although the number of coefficients turns out to be significant in all 4 regressions, on the whole, it is higher

for Spanish firms than for MNE subsidiaries (19 and 12, respectively), goodness-of-fit statistics (Nagelkerke's R^2) are better in the case of foreign enterprises.

5. Results discussion and conclusions

The international expansion of MNEs stands out for being one of the topics which has received most attention in the research about firm management and international strategy, which has shown a strong interest in aspects such as the factors driving international processes, the selection of a target country as well as the strategy to enter that specific market, or the competitive strategy followed by firms at an international level. To which must be added that another part of the literature stresses the existence of agglomeration economies or benefits derived from the proximity of firms, special attention having to be paid to the important role that such a special atmosphere or context created thanks to the physical proximity between firms plays in knowledge generation and transfer. Despite the extensive study that researchers have made about both literature strands, the truth is that a clear «dissociation» can currently be said to exist between the literature on agglomerations and that focused on MNEs (Hervás *et al.*, 2015).

Faced with this context, the empirical evidence available about the relationship between these two sides of the business reality (innovation by MNEs and location in agglomerations), does not provide conclusive results with regard to the effect that agglomeration has on innovation, which may be positive (Mariotti *et al.*, 2014) or negative (Cook *et al.*, 2013). It could thus be argued, on the one hand, that the location in business agglomerations favors innovation and the local adaptation of these MNEs, since it permits to access external knowledge of a tacit nature linked to the regional context. On the other hand, though, an increased competition for factors as well as a higher exposure to competitive rivalry exist in such locations (Alcacer and Chung, 2014). Taking all the ideas above into account, this paper has suggested as one of its main hypotheses that the existence of agglomeration economies favors innovation processes both in domestic firms and in MNEs with subsidiaries located in these types of environments. It all bearing in mind that innovation goes beyond the purely technological aspect (product/service and processes), and also includes non-technological sorts of innovation (in commercial practices and organizational processes) which are likely to favor a higher degree of adaptation to the local context.

Furthermore, Alcacer *et al.* (2013) highlight the need to consider the specific resources and capabilities of each firm when the time comes to assess the benefits which can be obtained through the establishment of a subsidiary within a business agglomeration. It needs to be remembered in this regard that the use of external knowledge made by each firm and, ultimately, its innovative potential, depends on its absorptive capacity. For this reason, and with the support of arguments coming from the dynamic capabilities approach, the present paper has also proposed hypotheses which refer to the influence on innovation exerted by the capacity to access, assimilate, and exploit knowledge, also known as AC.

Finally, all the above considerations confirm the hypothesis according to which agglomeration does not have the same effects on innovation in local firms and in foreign ones, the former being more sensitive to those effects.

The empirical contrasts carried out from a sample of 1,610 high and medium-high technology enterprises which engage in R&D obtained from PITEC (2013), partially corroborate hypothesis 1a, but not hypotheses 1b and 1c.

Our findings reveal that the effect exerted by agglomeration economies on innovation does vary from foreign to domestic firms, and it changes depending on the type of agglomeration and innovation as well. The tests performed highlight that, in general, process and non-technological innovations are the only ones showing sensitivity to the location in a park and in areas characterized by a higher relative concentration of technological centers when it comes to Spanish firms. Instead, only the innovation undertaken by foreign firms in products and/or services is sensitive to a higher relative sectorial specialization.

Nevertheless, the signs for some of these relationships is the opposite to that expected. In the case of the negative influence that economies derived from knowledge intensity have on commercial innovation, a plausible explanation can be found in the fact that firms which choose locations with a more intensive knowledge circulation would be the ones which value the scientific-technological knowledge that they can absorb, but, by choice or due to an imposition stemming from the conditions existing in their markets, innovate to a lesser extent in commercialization.

The second case, which affects subsidiaries of MNEs, matches what was previously observed by other authors: subsidiaries located in areas more specialized in AMATID have fewer chances to innovate in products/services. By way of example, Cantwell and Mudambi (2005), using data for MNEs which had established their subsidiaries in the United Kingdom, verified that the location of subsidiaries in hyper-competitive environments characterized by a high concentration of firms which are «potential» rivals does not represent a priority for these firms which have no exclusive dependence on local external knowledge.

To this must be added that the best equipped enterprises in terms of knowledge depend to a lesser extent on the advantages that the location in agglomerations can bring them and, instead, have a greater need for protection against the exposure and imitation of rival firms. This argument would be in keeping with that of other studies according to which co-location essentially favors those firms which are less equipped with resources and knowledge, being comparatively detrimental to the ones which have a more developed internal knowledge stock (Marco-Lajara *et al.*, 2016; Melo *et al.*, 2009; Shaver and Flyer, 2000).

In any case, this divergence of results between the two samples indirectly confirms hypothesis 3, at least to a certain extent. Even though it is impossible for us to estimate the exact magnitude of this difference, the influence exerted by agglomeration economies on innovation is clearly not the same in local firms and in foreign ones.

Taking both groups of firms into account, when it comes to AC influence, even though it is true that the exploratory dimension of AC has proved to be the element showing a greater explanatory capacity in technological innovation, age and size arise as the key internal features for innovations in organizational practices. As for the transformative dimension of AC, it also increases the likelihood of innovating in products/services for Spanish enterprises, and in commercialization for foreign ones. Finally, the exploitative dimension of AC is the one that seems to be less essential for innovation in the samples examined since, despite the significance of relationships, its effects are almost negligible. It follows from all the above that hypothesis 2a, 2b, and 2c are partially confirmed.

To finish these conclusions section, beyond the possible contributions made with the present paper, it is also necessary to highlight some of the limitations faced, as well as a number of research lines for the future. Thus, by way of example, it would be especially interesting to develop the argument suggested by Alcacer *et al.* (2013), according to which, *a priori*, the location in a specific territory is not preferable *per se*. In fact, it will depend on the characteristics of the entering firm as well as on those of the other enterprises which specifically define the business agglomeration generated in each territory. In this regard, the research performed did not consider the fact that MNEs are quite likely to imitate the pattern followed by other MNEs when locating subsidiaries, often choosing to be established near other firms coming from their same country (Tan and Meyer, 2011; Chang and Park, 2005; Nachum and Wymbs, 2005; Chung and Alcacer, 2002; Shaver and Flyer, 2000; Head *et al.*, 1995).

Neither did we pay attention to the fact that the location of subsidiaries may be determined, amongst other aspects, by the role assigned to them by the MNE as far as knowledge creation and exploitation are concerned. Cantwell and Mudambi (2005) draw a distinction between two types of subsidiaries, knowledge-creating and knowledge-exploiting ones, coming to the conclusion that the role played by each subsidiary in the innovation process depends on the characteristics of the MNE, on those of the subsidiary itself, and on factors linked to location. Trying to relate this approach about the exploratory or exploitative nature of subsidiaries to the different types of innovation, the level of development reached in AC dimensions or the effect that the location in agglomerations has on it all, arises as a potential new line of research.

Finally, from a more methodological perspective, another possible line of research would refer to the limited extent to which the PITEC database has been used: a study of a transversal nature with data corresponding to 2013. An interesting line of work for future research could consist in taking full advantage of the potential offered by the whole panel, which covers the period 2004-2013, as this would permit to remove temporary effects or aspects related to endogeneity and causality from the estimates.

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From Delocalisation to Backshoring? Evidence from Italian Industrial Districts

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ABSTRACT: In recent decades, industrial districts (ID) have experienced intense delocalisation to low-cost countries, with implications for IDs' internal structure. Recent studies, however, highlight the advantages of relocating manufacturing in home countries. This paper investigates ID firms' production-location strategies and backshoring decisions. The results from a survey of 259 firms in eight Italian IDs show that firms that delocalise production do not change their strategies over time and make limited recourse to backshoring. ID production is still important to guarantee product quality and access to specialised know-how.

JEL Classification: L23; F23.

Keywords: delocalisation; backshoring; industrial districts; manufacturing, Italy.

¿De la deslocalización al *backshoring*? Evidencia de los distritos industriales italianos

RESUMEN: En las últimas décadas, los distritos industriales experimentaron una deslocalización intensa hacia países de bajo costo, con implicaciones en la estructura interna del distrito. Estudios recientes destacan las ventajas de volver a localizar la producción en el mercado nacional. Este artículo analiza las estrategias de localización de las empresas del distrito de producción y las decisiones de *backshoring*. El trabajo empírico consiste en un análisis descriptivo de 259 empresas ubicadas en 8 distritos industriales en Italia. Los resultados muestran que las empresas que deslocalizaron la producción no han cambiado sus estrategias con el tiempo, con un limitado recurso al *backshoring*. No obstante, la producción del distrito es todavía importante para garantizar la calidad del producto y el acceso a un *know-how* especializado.

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Received: 09 march 2017 / *Accepted:* 20 september 2017.

Clasificación JEL: L23; F23.

Palabras clave: deslocalización; *backshoring*; distritos industriales; producción; Italia.

1. Introduction

In the past two decades, economic activities have undergone an increasing process of internationalisation, with growing fragmentation of value chains at the global level and shifting of manufacturing processes from western countries to low-cost countries. Studies on global value chains (Cattaneo, Gereffi, & Staritz, 2010; Dedrick, Kraemer, & Linden, 2009) describe how lead firms (large multinational firms and retailers) from the global North outsource manufacturing activities to small- or large-sized suppliers in the South to benefit from cost advantages and control over the value achieved.

In this context, industrial districts (ID) have seen delocalisation of their activities (Chiarvesio & Di Maria, 2009; Cutrini, 2011; Mazzanti, Montresor, & Pini, 2011). The ID model is widely recognised as an alternative form of economic organisation to the large firm. In the ID model, agglomeration economies and the high level of specialisation of small and medium-sized firms (SME) support the location of manufacturing activities in selected, well-defined geographical areas (Becattini, Bellandi, & De Propris, 2009). Despite the positive effects of geographical and sociocultural proximity on ID firms' economic and innovation performance (Molina-Morales, 2001), many have delocalised production abroad over the years, with varying consequences for their internal structures (Camuffo & Grandinetti, 2011; Chiarvesio, Di Maria, & Micelli, 2010). Indeed, internationalisation is seen as a significant force driving the evolutionary trends of IDs (Belussi & Hervás-Oliver, 2017; De Marchi & Grandinetti, 2014). On one hand, internationalisation offers opportunities to acquire new knowledge, but on the other, it reduces internal ID cohesion due to replacement of local suppliers with international sourcing and potential losses of local competence and knowledge.

Recent studies on backshoring (Fratocchi *et al.*, 2016) stress the need for co-location of research and development (R&D) and manufacturing and for proximity with customers to manage customisation and increase the quality of interactions. This topic is especially interesting to explore in the context of ID, where local collaboration leads to innovation, but the delocalisation of production can weaken innovation capabilities. Italy has gained international recognition for the form of production linked to ID (Piore & Sabel, 1984). Starting in the early 21st century, though, Italian manufacturing (and ID) firms decided to internationalise due to saturation of the home market and potential cost-savings strategies abroad (Bucuni, Coro, & Micelli, 2014). Italian firms moved their plants, first, to Central and Eastern Europe (e.g., Romania and Bulgaria) and, second, to Far East economies (e.g. China and Taiwan). However, recent research shows that in the aftermath of

the recent economic crisis and amid the increasing economic power of developing countries such as China (resulting in higher salaries and less convenient productive conditions), Italian and European firms are starting backshoring processes to their home countries and nearshoring processes to closer countries (Belussi, 2015; Fratocchi *et al.*, 2014).

Despite a significant debate on backshoring and its opportunities at the international level, studies aimed at measuring its magnitude, particularly in European contexts, are quite scarce (Kinkel, 2014). Moreover, many existing studies are based on qualitative data (case study analysis) and secondary sources (Bailey & De Propriis, 2014; Martínez-Mora & Merino, 2014; Stentoft, Olhager, Heikkilä, & Thoms, 2016). In the context of the debate on the evolutionary trends of IDs, this paper contributes to a more comprehensive understanding of ID firms' internationalisation processes, backshoring initiatives and the reasoning driving those processes. On one hand, ID firms may decide to delocalise for efficiency reasons, while on the other hand, manufacturing processes may return due to several reasons. These backshoring decisions assign great importance to high-quality productive techniques and the recognition of market-based variables (i.e. country-of-origin effect)—factors that traditionally characterise ID production.

In the discussion on the evolutionary processes of IDs, this paper is aimed at examining the relevance of the ID context, first, to the location of manufacturing activities in comparison to foreign sites—in the context of progressive delocalisation that has interests many IDs—and, second, to the backshoring strategies implemented by ID firms. We investigate the main drivers pushing ID firms to internationalise value-chain activities. We pay particular attention to manufacturing activities in relation to firms' competitive strategies and consider the level of firm's embeddedness in the ID system. We further explore the changes in such upstream internationalisation strategies and the factors driving the eventual return to the home country.

The paper is organised as follows. The first section focuses on the theoretical discussion on firms' internationalisation processes, particularly backshoring and the link with internationalisation of IDs. The second section presents the research methodology, and the third section reports the empirical quantitative analysis and results. The discussion and final conclusions are then presented.

2. Theoretical background

2.1. Industrial districts and their evolutionary trends

An ID is defined as a group of firms embedded in a particular area where industrial specialisation and geographical proximity give rise to positive agglomeration externalities, such as knowledge spillover and labour market pooling (Becattini *et al.*, 2009; Marshall, 1920; Porter, 1996). Firms in IDs usually are small and medium-sized enterprises (SME), and by grouping together, they can benefit from the

scale economies that generally characterise large enterprises. Moreover, geographical proximity affects not only firms' division of labour and industrial specialisation but also their social and cultural relations. IDs, therefore, are seen as fertile ground to nourish economies, such the Italian one (Pyke, Becattini, & Sengenberger, 1990), and are recognised as a source of competitive advantages at the international level (Porter, 1990, 1996).

The discussion on the evolutionary ID processes is very broad (Belussi & Heras-Oliver, 2017; Boschma & Fornahl, 2011; Camuffo & Grandinetti, 2011; De Marchi & Grandinetti, 2014). The ID model introduced by Marshall (1920) and further developed by Becattini (1979, 1990) is transformed by several dynamics. One important trend is the rise of cluster-leading firms (Camuffo, 2003) and the consequent increase in the internal heterogeneity of IDs (Paniccchia, 1998): firm' strategies matter, and single firms can affect the ID governance shaping their evolution (Tomlinson & Branston, 2017). Scholars describe the transformation of IDs with the emergence of larger (lead) firms within IDs (Lazerson & Lorenzoni, 1999) and the consequent reconfiguration of local supply chains. Some IDs become more vertically integrated as hierarchisation transforms the cohesion of the local system described in the classical Marshallian ID model. Thus, the internal transformation of IDs contributes to the heterogeneity across various IDs (Markusen, 1996).

Technological innovations and the transformation of the competitive landscape can also affect the evolution of IDs. In the life-cycle framework (Belussi & Sedita, 2009; Giuliani, 2005), IDs can differ in their ability to cope with new trajectories in technology paths and the emergence of new technologies that may disrupt established industrial specialisations and economic activities (Wang, Madhok, & Xiao Li, 2014). Accordingly, some scholars exploring the factors affecting the resilience of IDs (Belussi, 2015; Suire & Vicente, 2014) focus on their ability to cope with environmental changes and adapt to external shocks. ID resilience is related to location decision externalities, the structural properties of knowledge networks (i.e. their degree of openness) and the composite technological life cycle (Suire & Vincente, 2014). More resilient IDs can decouple their trajectories from the life cycle of single products and the cycle of related technologies.

These claims are consistent with other studies that emphasise the relevance of the territory, not only industry variables, in supporting innovation in the ID model. Boix and Trullen (2010) empirically test this idea in a longitudinal analysis of Spanish local labour markets and prove that it is the ID model, not necessarily specific industry characteristics, that support innovation at the local level. Following the cluster life-cycle literature, Elola, Valdaliso, López and Aranguren (2012) show how Basque IDs evolve differently despite similar local initial conditions; however, the authors emphasise that internationalisation challenges stemming from global demands affect the maturity stage of all the four IDs under examination.

For IDs, the ability to grow and be resilient is linked to the mechanisms supporting knowledge flows internally and externally with partners. This connection

is widely explored in the IDs literature. According to a knowledge view of internal ID dynamics, they benefit from external linkages by acquiring new technological and market-based knowledge and addressing internal activities (Bathelt, Malmberg, & Maskell, 2004). This exchange can result from firms' deliberately chosen strategies but also institutional support as the role of gatekeepers may sustain ID growth and renewal (Hervas-Oliver & Albors-Garrigos, 2014; Morrison, 2008).

2.2. Internationalisation, delocalisation and backshoring in the ID context

Among the various connections with external knowledge sources (i.e. retail chains, research collaboration etc.), many studies emphasise that through internationalisation processes, ID firms can grasp external knowledge beyond their boundaries. One stream of literature explores the role of multinational enterprises (MNE) in contributing to knowledge acquisition by ID firms. While MNEs may be interested in investing at the ID level to benefit from local externalities (Cantwell & Mudambi, 2011), they can also provide new knowledge that may affect IDs' evolutionary path (Belussi, 2015). Other studies also consider the internationalisation processes of ID firms: export strategies—or more structured, market-oriented ones—can have positive impacts on ID firm performance (Belso-Martínez, 2006; D'Angelo, Majocchi, Zucchella, & Buck, 2013). However, compared to downstream internationalisation, it is specifically the delocalisation of production that affects ID evolutionary trends. ID leading firms invest to expand their value chain at the global level by transforming local sourcing decisions and changing the structure of their IDs (Corò & Grandinetti, 1999). Research from the 2000s stresses the increasing internationalisation of manufacturing activities as delocalisation processes transform local supply-chain structures (Chiarvesio & Di Maria, 2009; Rabellotti, Carabelli, & Hirsch, 2009). Not only firms producing products for final markets but also suppliers internationalise (i.e. Furlan *et al.*, 2007), helping open the local value chain globally.

On one hand, this openness is considered to be positive for IDs' knowledge acquisition, as stated. Delocalisation is part of complex sourcing strategies that also involve local suppliers (Mazzanti *et al.*, 2011). However, on the other hand, other studies suggest a more complicated picture with negative implications for the decline of IDs (Crestanello & Tattara, 2011; Pla-Barber & Puig, 2009). In the Spanish context, internationalisation is analysed, for instance, by Valdaliso, Elola, Aranguren and Lopez (2011), who focus on the information and communications technology (ICT) and electronic cluster in the Basque countries. The authors' qualitative, historical analysis provides evidence that social capital and absorptive capacity (typical aspects of IDs) drive the growth and internationalisation of the ICT cluster, although the authors cannot identify a causal connection between internationalisation and employment growth (Valdaliso *et al.*, 2011). Another study by Hervas and Boix-

Domenech (2012) comparing the Castellon and the Italian Sassuolo tiles districts shows that controlling production activities is especially important to foster innovation at the local level, supporting also firms' absorptive capacity to acquire external knowledge.

Recent studies on the delocalisation strategies of ID firms show the intertwined relationships between ID and non-ID firms (Capasso, Cusmano, and Morrison, 2013) and the link among ID firms' innovation strategies, market positioning and outsourcing strategies. According to Cutrini (2011), the Marche footwear district delocalisation invests in labour-intensive activities (delocalised in China) while retaining high value-added activities in the ID.

The debate on the delocalisation of economic activities has recently been renewed by studies that emphasise the value related to activities embedded at the domestic level or that, more generally, discuss changes in the competitive landscape that force firms to reconsider their delocalisation strategies. Backshoring can carry different connotations (Stentoft *et al.*, 2016). Following Ellram, Tate and Petersen (2013), «reshoring is generally defined as moving manufacturing back to the country of its parent company» (p. 3). Thus, in this paper, reshoring has the same meaning as the definition of backshoring offered by Fratocchi *et al.* (2016): «the geographic relocation of a functional, value creating operation from a location abroad back to the domestic country of the company» (p. 100). We also refer to practices of partial backshoring and nearshoring, in which companies decide to relocate offshored production closer to domestic markets.

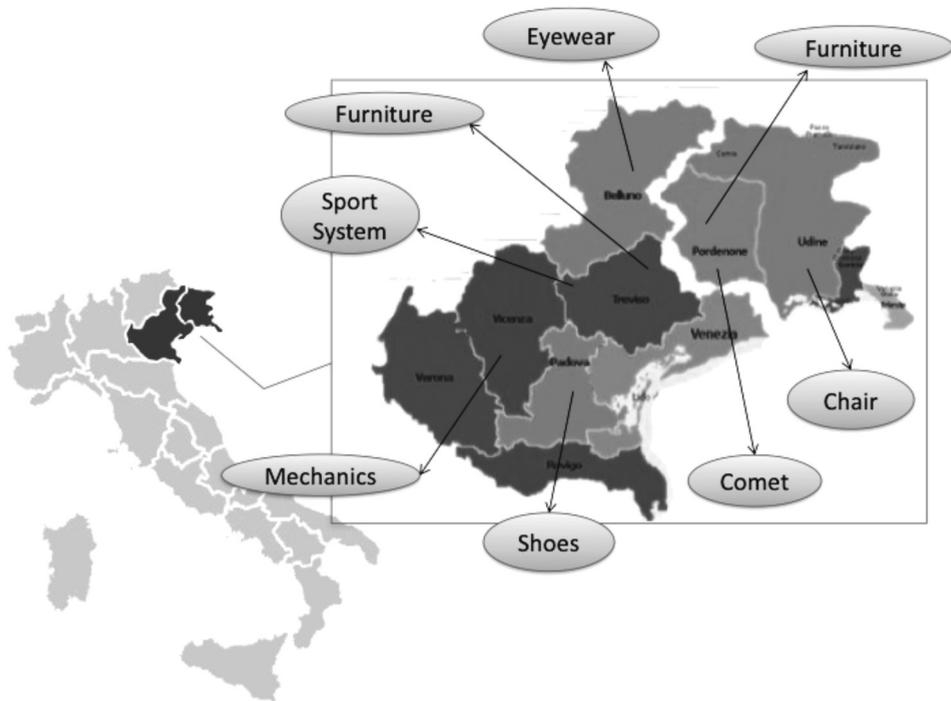
Relocation decisions can be driven by the need to modify previous offshoring strategies that turn out to be unsatisfactory for firms (Bals *et al.*, 2015). As well, backshoring can be driven by the need to co-locate R&D and production (Fratocchi *et al.*, 2014), particularly in production processes that tightly couple design and manufacturing (Pisano and Shih, 2012). Another reason might be imitation strategies, in which firms embedded in a context decide to return to their home countries in imitation of the behaviour of other firms in the same area (Lewin and Volberda, 2011). Moreover, it is important to highlight the role of customers' perceived value as a motivation to backshore. Finally, backshoring can result from policy measures that subsidise production by firms that bring back jobs to home countries (Fratocchi *et al.*, 2014).

So far, to the best of our knowledge, only a few studies (Cutrini, 2011; Martinez-Mora and Merino, 2014) explore the link between delocalisation strategies and backshoring processes within IDs. Accordingly, the goal of this paper is to understand, first, whether ID firms experiencing delocalisation consider or make backshoring decisions and, secondly, whether ID manufacturing location is relevant to firms facing the scenario of the global fragmentation of economic activities and the evolution of IDs.

3. Research design and methodology

In this paper, we investigate the internationalisation path experienced in the past decade (before 2000 up to 2015) by eight IDs two northeast Italian regions (Veneto and Friuli-Venezia Giulia) that specialise in the so-called Made-in-Italy industries (furniture, mechanics and fashion): the Treviso, Pordenone and Manzano (Udine) furniture districts, the mechanics districts in Vicenza and Pordenone (Comet), the Montebelluna sports system district and the shoe wear district in Riviera del Brenta and the eyewear district in Belluno. We choose these two regions as they can be considered highly ID-intensive regions for traditional sectors (De Propris, Menghinello, and Sugden, 2008; Grandinetti, Nassimbeni, and Sartor, 2009; Nassimbeni and Sartor, 2005). The selected IDs have relevant roles in areas of specialisation at the national and the international levels.

Figure 1. Map of the eight industrial districts under investigation



Data collection was conducted in three steps. In the initial stage, data were collected from the InfoCamere-Movimprese (the statistical department of the Chamber of Commerce that collects information about the firms in each Italian region) to measure the stock of operating firms from 2005 to 2014. The aim was to evaluate the processes of potential hierarchisation and the internal transformation of value-chain

activities at the district level. All the data were cleaned following standard procedures, and ID firms were defined according to two criteria: the municipality where the firm's ID was located and the Ateco five-digit classification (Ateco is the Italian version of the European SIC codes) of the manufacturing activities performed in each ID. Focusing on the IDs studied, we observe a persistent, though not deep, downturn in all eight and a simultaneous evolution of ID firms (from small firms to more organised, highly managerial ones).

In the second step of the analysis, we collected data for the IDs from AIDA, Bureau van Dijk's dataset on financial indices, number of employees, and other characteristics of firms. From a total of 1,657 firms, we selected firms that have a turnover higher than 1 Million euros and specialised in products for final markets or intermediated markets (components). Thus, the population considered is represented by 1,002 firms.

The last step in the sample definition was to submit a questionnaire to firms randomly chosen among the sample of 1,002 firms. The structured questionnaire was conducted during April-June 2016 through computer-assisted telephone interviews. The respondents were production managers and entrepreneurs with smaller firms or alternatively those in charge of production management within companies. In the first part of the survey, the interviewers asked about general firm information, while the second part concerned the organisation of the value chain and the production process at the geographical level (district, Italy, and abroad), as well as ownership and supply-chain relationships. The third part of the survey addressed whether firms internationalised part or all of their activities and planned or had undertaken a process of reshoring or backshoring. The respondent firms number 259, or 25.8% of the overall population, equally distributed across the three main industry groups in the eight districts (36% in furniture —Treviso, Pordenone and Manzano; 33% in mechanics— Vicenza and Pordenone; and 31% in fashion —eyewear, sports system and shoes).

4. Results

Table 1 summarises the most important firm characteristics. Most firms are SMEs (77.3% have fewer than 50 employees and an average turnover of 13.2 Ml euros), producing medium-high-quality finished goods for consumers to be maintained over time (36.8% of the respondents state that product quality is the main driver of competitive advantages, while 20.8% primarily pursue product innovation). The production model is mostly make-to-order oriented (69% of the firms). Regarding the internationalisation process, 46.4% of the total turnover derives from foreign sales, mostly in France, Germany, the United States and Austria, even though many companies name emerging markets as their first export markets. Concerning innovation, approximately 52% of the firms have in-house R&D departments, and 83.4% have developed product or process innovation (68.3%) in the past three years. About 37% of firms have in-house marketing departments and invest in branding (47.1%).

Table 1. Sample characteristics

<i>Variables under examination</i>	<i>Observed Characteristics</i>
Main activity	146 firms: finished products for consumers (56.8%).
Average turnover (2015)	13.2 ml Euro (53.6% from Italy and 46.4% from abroad).
Average total employees (2015)	49.6
Main size class (based on number of employees)*	77.3% < 49 employees.
Business group	20.8% of firms (54 firms) are part of a business group. 38.3% of firms (18 firms) are leaders of the groups to which they belong.
Primary driver of competitive advantages	Product quality: 95 (36.8%). Product innovation: 56 (21.6%).
Firms' positioning (price/quality)	1. High: 35 (13.5%). 2. Medium-high: 143 (55.2%). 3. Medium: 66 (25.5%). 4. Medium-low: 12 (4.6%). 5. Low: 3 (1.2%).
Organisation of production	1. Make to order: 178 (68.7%). 2. Assemble to order: 47 (18.1%). 3. Make to stock: 18 (6.9%). 4. Engineer to order: 16 (6.2%).
Internal functions and brand investment	Marketing department: 96 (37.1%). R&D department: 134 (52.7%). Firms with proprietary brands: 122 (47.1%).

Note: % calculated on valid answers. * Classes based on EU classification of firms.

Focusing on the value-chain organisation, our analysis shows that 84.6% of the companies outsource at least some activities in the production process. However, most of the suppliers are local: on average, 58.7% of a firm's supplier portfolio is located in the ID, 18.6% in the ID's region, 13.3% in Italy, and 9.3% abroad. Internationalisation of suppliers is not a recent phenomenon as approximately 41% of the ID firms that have international production relied on global sourcing before 2000. The activities performed abroad are both in addition to local activities (45.2%) and in replacement of local activities (35.5% performed by other suppliers and 16.1% by the company). The preferred locations of foreign suppliers are the European Union (56.5% of firms have foreign suppliers in this area), Eastern Europe (47.5%) and the Far East (40.3%).

Approximately 7% of the firms have productive Foreign Direct Investments (FDIs), mostly established since 2000. FDIs are located in Eastern Europe (50%), the Far East (31.6%), South America (21.1%), the European Union (11.1%) and the United States or Canada (10.5%). Sourcing in Italy, the EU15 and the United States

is justified by competence-seeking and reliability-based strategies, while sourcing in Eastern Europe and the Far East is based on efficiency-seeking strategies.

Based on this preliminary analysis of the internationalisation of district firms, we compare ID firms carrying out offshoring strategies—that is, having global suppliers and/or FDI— in addition to domestic production (69 firms, 26.6% of the sample) with ID firms focused on only local (and national) location of manufacturing activities (190 firms, 73.4% of the sample). Table 2 highlights the profiles of these two groups.

Table 2. Industrial district internationalisation: profile of district firms' strategies

		<i>Industrial district firms with domestic production</i>		<i>Offshoring industrial district firms</i>		<i>Whole sample</i>	
<i>Year of founding (mean)</i>		<i>1984</i>		<i>1981</i>		<i>1983</i>	
		<i>a.v.</i>	<i>%</i>	<i>a.v.</i>	<i>%</i>	<i>a.v.</i>	<i>%</i>
Turnover*	Less than 5 ml Euros***	134	70.5	32	46.4	166	64.1
	5-10 ml Euros***	29	15.3	6	8.7	35	13.5
	10-50 ml Euros***	26	13.7	23	33.3	49	18.9
	More than 50 ml Euros***	1	0,5	8	11.6	9	3.5
Industry	Furniture*	72	37.9	14	20.3	86	33.2
	Mechanics*	63	33.2	31	44.9	94	36.3
	Fashiom*	55	28.9	24	34.8	79	30.5
Sources of competitive advantages	Quality	72	37.9	23	33.3	95	36.7
	Product innovation	37	19.5	17	24.6	54	20.8
	Efficiency	20	10.5	10	14.5	30	11.6
Organisation of production	Make to order	134	70.5	44	63.8	178	68.7
	Make to stock	12	6.3	6	8.7	18	6.9
	Assemble to order	33	17.4	14	20.3	47	18.1
	Engineer to order	11	5.8	5	7.2	16	6,2
Market positioning	High/medium-high	127	66.9	51	73.9	178	68.7
	Medium	50	26.3	16	23.2	66	25.5
	Medium-low/low	13	6.9	2	2.9	15	5.8
Main market	B2B ¹	83	43.7	29	42.0	112	43.2
	B2C ²	107	56.3	40	58.0	147	56.8
Internal functions	Marketing department**	63	33.2	34	49.3	97	37.5
	Firms with proprietary brands***	80	42.1	43	62.3	123	47.5
	R&D department***	88	46.3	47	68.1	35	52.1

* Classes based on EU classification of firms. *** Sig. = 0.001 ** Sig. = 0.05

Note: a.v.: absolute value; ¹ Business-to-Business; ² Business-to-Consumer

Offshoring ID firms generally are larger than firms with ID (or national) production. This is consistent with evidence related to the higher stocks of internal resources related to marketing and R&D. Regarding industries, more firms specialised in fashion and mechanics than furniture are internationalised. However, we note that approximately 46% of smaller companies extend their production value chains across international borders. It is important to note that firms with domestic and international production have no strategy differences when considering innovation orientation and market positioning. Not only firms specialising in products for final markets but also firms operating in business-to-business markets offshore production. There are also no differences in the age of the two groups of ID firms.

Table 3 explores the outsourcing strategies of ID firms. According to our analysis, ID firms producing at the district or the national level are more vertically integrated than ID firms that offshore manufacturing activities. This result does not seem

Table 3. Outsourcing strategies of industrial district firms

		<i>Industrial district firms with domestic production</i>	<i>Offshoring industrial district firms</i>	<i>Whole sample</i>
Outsourcing strategy (mean)	% of outsourcing on firm's activities***	26.3	45.6	32.4
	N. of suppliers***	19.7	62.6	32.3
	% of outsourcing in total sales***	22.8	35.9	27.0
Suppliers' location (% on total number of suppliers) (mean)	Industrial district***	68.6	35.9	58.7
	Region	20.1	15.1	18.6
	Italy***	11.2	18.0	13.3
	Abroad	—	31.0	9.3
Relevant factors driving local (industrial district/ Italy) production (in-house and/or outsourced) (1 = low, 5 = high)	Specific competencies and knowledge	4.19	4.24	4.20
	Quality of manufacturing	4.40	4.26	4.36
	Control of innovation	3.93	3.79	3.89
	Cost reduction	3.67	3.48	3.62
Selection criteria of district suppliers (1 = low, 5 = high)	Costs	3.75	3.90	3.80
	Competencies	4.42	4.42	4.42
	Reliability	4.56	4.59	4.57
	Proximity***	4.17	3.64	4.02

*** Sig. = 0.001 ** Sig. = 0.05

to be influenced by firm size as smaller firms (less than 5 million euros) with global sourcing also outsource more frequently than local firms (45.6% vs. 27.4%). Consistent with this evidence, ID firms with domestic production have a more limited number of suppliers and a lower impact of the value outsourced on firm's total sale.

ID firms producing onshore primarily have suppliers located within the ID system (68.6%), while about 36% of the suppliers serving firms with offshoring strategies are located at the ID level. Despite this difference, the ID firms demonstrate that IDs can offer important competences. We asked the company representatives to rank on a 5-point Likert scale (1 = low, 5 = high) the importance of the factors driving the location of production activities (both those performed in-house and those outsourced) in IDs and in Italy. Both groups of firms highlight that at the domestic level—mainly in the ID—they can find specific competences and knowledge and quality manufacturing. It is also important for firms to control innovation processes (relying on co-location of innovation and production) and, finally, to make gains in efficiency.

Considering the criteria for supplier selection at the district (or national) level, we investigate whether factors such as specialised knowledge competencies, manufacturing quality, cost reduction and control over innovation are relevant when firms decide to pick local suppliers (if the companies have any district suppliers). As we can see, there are no differences in the suppliers' competencies, and the quality of their manufacturing processes ranks first for both groups of firms considered. The only difference concerns proximity, which is more relevant for ID firms producing locally than offshoring firms.

The configuration of international value-chain activities related to production seems to be quite stable as approximately 75% of the companies have not changed their international supply-chain management strategies (in contrast, more than 15% have increased the sourcing countries or externalised value-chain activities). In this context, the backshoring strategy appears to have marginal importance.

As shown in Table 4, when considering backshoring from emerging markets (given that 50 companies have production relationships with emerging markets), 13 firms (26.0%) have evaluated the possibility to backshore production to Italy, and 4 closer to Italy (8.0%), for instance, to Croatia and elsewhere in Eastern Europe. However, only 5 have actually done so. One firm implemented backshoring practices in 2000, and the other four did so more recently. Backshoring choices involve both finished products and other value-chain activities. Firms that evaluate (or carried out) backshoring practices invest abroad mostly to develop activities in substitution for local ones (10 companies). Moreover, 13 of these 17 companies implemented global sourcing before the 2008 economic crisis.

On one hand, these results are consistent with the fact that at the moment, companies do not perceive many problems in the countries where they operate (typical issues include low competencies, poor infrastructure and problems with local institutions and are rated lower than the mean of 3 on the 1-5 scale). On the other hand, among the 17 companies, the most important reason to backshore production is market driven based on the need to exploit the country-of-origin effect (Made in Italy).

Table 4. Backshoring strategies of firms offshoring to emerging economies

Backshoring practices	Closer to Italy: 4 firms (8.0%) In Italy: 13 firms (26.0%) Number of firms considered: 33 firms (65.0%)
Main motivation of backshoring (1 = low relevance, 5 = high relevance) (mean)	Fully made-in-Italy production: 4.00 Customer service: 3.65 Co-location of R&D and manufacturing: 3.35
Backshoring actions	Already in practice: 5 firms Planning to do it: 12 firms
Year of global sourcing and/or FDI (firms with backshoring practices)	Before 2000: 6 firms 2000-2007: 7 firms 2008-2014: 4 firms
Offshoring effects (global sourcing and firms with backshoring practices)	Substitution of local activities (in-house/outsourced): 10 firms In addition to local activities: 6 firms Country-specific activity: 1 firm
Year of backshoring	2000: 1 firm 2012: 2 firms 2013: 2 firms
Backshoring activities' concern	Finished products: 2 firms Semi-finished products: 1 firm Components: 1 firm Other activities: 1 firm

5. Discussion and conclusions

The empirical results lead to three main considerations. The first is related to the importance of the geography of manufacturing. ID location still matters to manufacturing activities. The manufacturing competences and skills available in the ID play an important role in the overall product quality. ID firms do delocalise but do so primarily to complement local production. Despite the higher level of outsourcing among internationalised ID firms—both in intensity and the number of suppliers involved—when these firms must choose ID suppliers, they apply the same two criteria as ID firms that invest in domestic sourcing: suppliers' competence and reliability. Moreover, ID firms producing domestically and ID firms delocalising do not have different drivers of production location at the ID (or national) level. This dynamic highlights the depth of the embeddedness of manufacturing processes within IDs' boundaries, demonstrating the relevant link with the local production system (De Propriis *et al.*, 2008; Molina-Morales, 2001). This result is of interest for policy makers in driving ad-hoc incentives for firms in IDs, as discussed in Spanish IDs by Aragón, Iturrioz, Olarte, Aranguren and Larrea (2009)2008.

The second consideration is the relative stability of the internationalisation of production in IDs. As the survey results show, the international location of manufac-

turing activities has not increased dramatically even since the 2008 economic crisis. To the contrary, the majority of international activities were carried out around 2000, at the very beginning of globalisation, with China's entry into the World Trade Organization and the introduction of the euro. Our research highlights that ID firms de-localised early in the globalisation trend, contrary to many international studies that stress the increased offshoring and global sourcing by large MNEs from advanced nations to low-cost countries and the impacts on manufacturing employment across countries (United Nations Conference on Trade and Development, 2013). FDIIs are a later phenomenon, mostly carried out from 2000 to 2007. After 15 years of intense globalisation of economics processes, ID firms have learnt how to mix and match the advantages related to the localisation of production activities. In other words, firms are more aware of what should be done locally and globally. This result is especially interesting considering that mostly SMEs are involved in these processes.

The third consideration is the magnitude of backshoring processes. Although some firms have decided or are evaluating relocating some internationalised production stages of their value chains, backshoring is still a limited phenomenon. What has been outsourced abroad does not come back easily. A possible explanation is that Italian ID firms have globalised their production chains less than U.S. corporations, reducing the probability of backshoring. Another possible explanation is that due to the complementarity of local and global production, ID firms seek to get the most out of this combination and do not have to review their choices. This seems consistent with the primary motive for backshoring: strong customer demand for made-in-Italy production. In an analysis of Spanish footwear firms mostly in the Alicante province, Martinez-Mora and Merino (2014) show that most Spanish firms reshore production to satisfy market demand for quality product and customer services; only by producing domestically can Spanish firms meet market demand and structure manufacturing processes accordingly. Thus, we can observe that the main driver of backshoring in both contexts is more related to market factors than cost effects.

This analysis enriches the theoretical debate on the internationalisation processes of ID. This original study also contributes to the literature on the impact of internationalisation on IDs and how IDs handle globalisation. The results confirm the internationalisation strategies carried out by ID firms. The analysis suggests that internationalised ID firms and onshore-producing ID firms have similar strategic profiles in market positioning and sources of competitive advantages. This outcome is consistent with earlier research on supplier selection and governance of global value chains by ID firms (Chiarvesio, Di Maria, and Micelli, 2013) that indicates a more complex relationship between the drivers of ID firms' competitiveness and supply-chain management strategies. However, other studies on the internationalisation of ID firms suggest a different scenario in which innovation-oriented firms prefer local suppliers while sourcing from emerging countries in the case of efficiency-seeking strategies (Capasso *et al.*, 2013). Additional research on this point is needed. Moreover, the survey results support the concept of the ID as a *manufacturing* system of SMEs, which goes beyond the view of a local system that reduces the manufacturing dimension of IDs in favour of other intangible activities, such as R&D and marketing.

In addition, the debate on backshoring puts under scrutiny the established production-location choices made out by MNEs but also highlights the dispute about the real value hidden in manufacturing. In this respect, our analysis of such issues through the lens of the ID model shows that backshoring is not an option for SMEs that have already implemented internationalisation strategies and is related to market-driven factors in the limited number of cases observed. At the same time, the value of manufacturing is linked to know-how and specialised competences available at the ID level where most manufacturing activities continue to be located. Surprisingly, the sample firms do not mention innovation capabilities as a major factor affecting IDs' supplier selection. From this perspective, our study provides further knowledge on the determinants of backshoring and on the factors that ultimately affect decisions concerning keeping production processes abroad.

The main limitation of this research is the lack of a connection between ID firms' internationalisation strategies and performance. Future research should consider suppliers' perspective to more thoroughly evaluate the determinants of the location of manufacturing activities and how those processes are linked to innovation issues. Furthermore, researchers could also compare ID and non-ID firms to evaluate the impact of the ID context on manufacturing location choices.

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Strategic Responses to Environmental Turbulence: A Study of Four Brazilian Exporting Clusters

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ABSTRACT: This paper investigates strategic responses to the global economic crisis that began in 2008, combined with the appreciation of the local currency and the intensification of Asian competition, of four Brazilian clusters comprised of producers and exporters of traditional manufactured products, with different levels of export intensity (footwear, furniture, wines and beachwear). The data were obtained from personal interviews with various actors (entrepreneurs, industry experts, government agents and members of local associations) and a wide range of secondary sources. The clusters present different responses depending on their degree of dependence on external markets, the possibility of redirecting production to domestic markets and level of cooperation.

JEL Classification: F23; F61; G01; L10; L66; L67; L68; M16; R12.

Keywords: cluster; internationalization; crisis; path dependence.

Respuestas estratégicas a la turbulencia ambiental: un estudio de cuatro clusters exportadores brasileños

RESUMEN: Este artículo investiga las respuestas estratégicas a la crisis económica mundial que comenzó en 2008, junto con la apreciación de la moneda local y la intensificación de la competencia asiática, de cuatro clusters brasileños formados por productores y exportadores de productos manufacturados tradicionales, con diferentes niveles de intensidad de exportación (calzado, muebles, vinos y ropa de playa). Los datos se obtuvieron a partir de entrevistas personales con diversos ac-

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Acknowledgements: The authors acknowledge the financial support of CNPq, CAPES, Faperj and the IDB to this research.

Received: 09 march 2017 / Accepted: 20 september 2017.

tores (empresarios, expertos de la industria, agentes gubernamentales y miembros de asociaciones locales) y una amplia gama de fuentes secundarias. Los clusters presentan diferentes respuestas dependiendo de su grado de dependencia de los mercados externos, la posibilidad de reorientar la producción hacia los mercados internos y el nivel de cooperación.

Clasificación JEL: F23; F61; G01; L10; L66; L67; L68; M16; R12.

Palabras clave: clúster; internalización; crisis; dependencia de la trayectoria.

1. Introduction

The existence of clusters of firms with related activities is not a new phenomenon, but their importance as a source of competitive advantage seems to have increased, or at least gained greater visibility, with the expansion of the globalization process. Scott (1996) emphasized the paradox between the spread of economic activities across national borders and the economic growth of regions within national borders. Along the same lines, Porter (1998) believed that, paradoxically, as access to goods, capital, knowledge and technology increases in any part of the world, the importance of local factors, such as knowledge and relationships, also increases. Clusters thus tend to develop competitive advantages, which in most cases are often not only national but global. As a result, the more internationalized a cluster is, the greater is its exposure to crises of global capitalism.

Although the literature has examined the issue of decline in clusters, as well as the impact of globalization on traditional manufacturing clusters, most studies have looked at these problems from the perspective of developed markets (e.g. De Marchi and Grandinetti, 2014; De Propris and Lazzeretti, 2009; Sacchetti and Tomlinson, 2009; Samarra and Belussi, 2006). Specifically, few studies have looked into how emerging markets' clusters respond to the challenges of globalization.

Therefore this paper is intended to contribute to the debate on the impacts of globalization on manufacturing clusters located in emerging markets. The analysis is particularly relevant considering the current economic context of the Brazilian economy, and the challenges that globalization poses to regional development. The paper adopts the multi-case study method of investigation, examining how four Brazilian clusters, which export manufactured products at different levels of export intensity, responded to the global crisis that began in 2008 resulting from the world economic recession, as well as the intensification of Asian competition and the appreciation of the Brazilian currency. The cases selected are particularly appropos, since the internationalization processes of the four clusters have been successful, although on different levels. The following question guided the research: *How did traditional Brazilian manufacturing clusters respond to the threats of globalization?*

2. Literature Review

Clusters transcend the mere agglomeration of related activities. They are a form of spatial organization of economic activities, which constitute areas of attraction of capital and labor (Beccatini, 1990; Markusen, 1995; Porter, 1998). It is their organicity that gives the firms in a cluster the ability to gain competitive advantages. Geographic proximity tends to encourage interactions between the various players (Brusco, 1990; Iammarino, Sanna-Randaccio and Savona, 2006; Scott and Garofoli, 2007). These interactions, which may be either internal or external to the cluster, are the mechanism by which innovation takes place. Existing social networks play a crucial role in the development of trust and cooperation among individuals and firms in a cluster, thereby facilitating the spilling over of knowledge (Audretsch and Aldridge, 2008), and, specifically, the transfer of tacit knowledge (MacKinnon, Cumbers and Chapman, 2002; Maskell and Malmberg, 1999). Cooperation is a crucial element in cluster dynamics (Tomlinson and Jackson, 2013), although competition and rivalry also play a role (Porter, 1998).

Transfers among firms can be of various kinds, and may include marketing and managerial know-how, technology, market knowledge, access to external networks and markets, etc. In addition, many clusters are located in areas that offer natural resources or have physical characteristics that are important to specific economic activities. Several actors, such as suppliers of equipment and raw materials, local and national government agencies, universities and training organizations, and research institutes contribute to a cluster's locational advantages (Porter, 1998). Focal or flagship firms may play a major role in introducing «new technologies, organizational skills, and markets» (Lazerson and Lorenzoni, 1999: p. 369). External actors, such as foreign buyers and trading companies, may support the development of international activities (Ellis, 2003). In fact, Scott and Garofoli (2007) claim that participation in global value chains can be of utmost importance to clusters located in developing countries, because they can gain access to distant markets and managerial, commercial and technological know-how. Cluster firms can thus take advantage of several types of locational economies that are often not available in dispersed locations (Polenske, 2008), and that are attractive to investors (Iammarino, Sanna-Randaccio and Savona, 2006).

Cluster life cycles have received substantial attention in the literature (Bergman, 2008; Martínez-Fernández, Capó-Vicedo and Vallet-Bellmunt, 2012). In fact, although the literature on clusters portrays mostly cases of success, clusters can finally reach a stage of stagnation (Bergman, 2008) or they can even fall into decay (Menzel and Fornahl, 2010). Trippel and Tödting (2008: p. 213) point out that scholars frequently ignore the fact that clusters «can be a blessing and a curse» for the regions where they are located. Their decline can cause general impoverishment in the region, in addition to unemployment and an exodus of part of the workforce, thus generating all types of social problems. Even so, only a limited number of studies have looked into the subject of stagnation or decline in clusters (Karlsson, 2008; Bergman, 2008; Zuchella, 2006); a couple exceptions are studies by De Propriis and Lazeretti (2009) and Ramazzotti (2010).

There are several factors that may influence a cluster's success or failure. A cluster's trajectory is shaped by its history, physical environment, industry specificities, level of cooperation, and institutional governance, among a number of other internal factors (Bergman, 2008; Gaggio, 2006). It can also be influenced by external threats such as economic cycles, technological rupture, changes in demand or in the nature of competition, and changes in government policies, etc. Isomorphic behavior (DiMaggio and Powell, 1991), that is, the tendency of firms in a cluster to copy each other, may also increase a cluster's vulnerability. Karlsson (2008: p. 13) points out that «the factors that once enabled a cluster to form and to grow may not necessarily be as important in sustaining it.» Therefore, the vitality of a cluster and its member organizations depends strongly on their ability to change.

De Marchi and Grandinetti (2014) look specifically at the impact of globalization on Italian industrial districts, focusing on the effects of immigration on the workforce, changes in the nature of entrepreneurship, and production diversification as major forces of change. The authors identify four different directions in which globalization can shape the future of Italian industrial districts: decline (caused by the unavailability of resources for implementing change), oligopolization (characterized by a limited number of larger firms that remain active by expanding internationally), hierarchization (where a small number of larger firms keep a limited number of smaller suppliers), and «glocal» reproduction (where local networks are more connected with global networks). Belussi (2015) also points out the extent to which Italian districts have responded to the challenges of globalization, particularly by increased internationalization. Both contributions show the importance of aligning with global buyers and global value chains as discussed by Humphrey and Schmitz (2002), who see these networks as mechanisms for cluster upgrading. Other authors point out the need to improve governance and cooperation within a cluster (e.g. Sacchetti and Tomlinson, 2009) in order for it to face the challenges of globalization.

Path dependence is a major risk faced by clusters, industries, and firms because it may threaten their growth and survival (Dobusch and Schüssle, 2013). Path dependence is associated with structural inflexibility regarding change, with organizations persisting in maintaining obsolete behaviors and practices that are no longer adequate for facing new challenges or exploring new opportunities (Meyer-Stamer, 1998). Path dependence has been defined as «a property of a stochastic process which obtains under two conditions (contingency and self-reinforcement) and causes lock-in in the absence of external shock» (Vergne and Durand, 2010: p. 737). Industries, clusters and firms are constantly faced with situations in which past decisions determine future outcomes, creating situations of «functional lock-in, cognitive lock-in, cultural-political lock-in or other such self-reinforcing and constraining structures and processes» (Martin, 2012: p. 185). Teece, Pisano and Shuen (1997) explored the importance of organizational history for defining long-term strategies, indicating that previous investments and the sets of routines established by organizations along their trajectories may hamper future choices. Krugman (1991) draws attention to economic

geography as a factor that contributes to a cluster's historical dependence. The spatial location of production in any industry is a constraint on future strategic alternatives. Technology also often becomes a limiting element that affects the strategic choices of industries, clusters and firms (Cohen and Levinthal, 1994; Sydow, Schreyogg and Koch, 2009). Several studies in the business literature have shown that, generally speaking, the initial success of a company by applying a certain strategy tends to lead the firm to allocate more resources to its business in order to replicate and amplify its initial success. However, the opposite may also be true, that is, initial failure may tend to lead a company away from a certain path (Noda and Collis, 2001).

On the other hand, a number of authors have challenged the idea of the irreversibility of the lock-in effect (e.g. Drahokoupil, 2012; Martin, 2010, 2012), suggesting that firms and clusters may reorient their trajectories. Garud, Kumaraswamy and Karnoe (2010: p. 760) offer the concept of path creation, in which «...“initial conditions” are not given, “contingencies” are emergent contexts for action, “self-reinforcing mechanisms” are strategically manipulated, and “lock-in” is but a temporary stabilization of paths in-the-making». That is, while path dependence impedes a cluster to adopt a new trajectory, path creation means that a cluster escapes the self-reinforcing, lock-in mechanism by following a new path. Martin (2010: p. 186) proposes an evolutionary model with several possible future trajectories for a cluster that are neither discontinuous nor radical, but «can also be consistent with ongoing forms of cumulative change, mutation and adaptation of economic states and trajectories». A cluster could thus fall into a rigid trajectory, although this may not necessarily lead to decline, or it may persist in a dynamic process of adaptation and change, either radical or incremental (Trippel and Tödtling, 2008). Incremental change could take place with small changes in the cluster's trajectory in order for it to adapt to new conditions and regain competitiveness. These changes include adoption of new management practices, entry into new markets or market niches, cost reduction programs, etc. Diversification means adding new economic activities to existing ones. Radical change involves drastic alterations in the nature of a cluster and in the strategies it has adopted.

Change processes can be triggered by the emergence of new leaders, changes in cluster governance, alliances with organizations external to the cluster, and even fortuitous events. The degree of cluster heterogeneity is also a factor in escaping the lock-in effect. The more heterogeneous the firms in a cluster, the higher the probability of some of them progressing while others stay behind and eventually fail or leave the cluster (Martin, 2010, 2012).

In summary, the review of the literature suggests that the analysis of the strategic responses adopted by clusters to escape historical dependencies —associated with the cluster trajectory and the industry itself— constitutes an important and still under-researched subject. In addition, it points out the importance of investigating the impact of globalization on shaping the trajectory of clusters and their strategic responses.

3. Methodology

The research method used is the case study and the unit of analysis is the industrial cluster. The study is longitudinal; i.e. we sought to analyze the historical trajectory of each selected cluster. This approach is considered the most appropriate for answering the research question addressed in this paper, and it is supported by an article published in the *Journal of International Business Studies*, in which Jones and Khanna (2006) advocate the use of qualitative studies to investigate historical trajectories in international businesses.

This multi-case study examines four clusters in traditional manufacturing industries: footwear (Vale dos Sinos, state of Rio Grande do Sul), furniture (São Bento do Sul, state of Santa Catarina), wine (Serra Gaúcha, state of Rio Grande do Sul) and beachwear (city of Rio de Janeiro). The clusters display different characteristics and distinct degrees of internationalization, but they have faced recent external threats to their survival.

We used primary and secondary data. The primary data were obtained by means of 39 personal interviews with various actors. Each interview varied from 50 minutes to one and half hours. All the interviews were taped and transcripts made of each of them. Of the total number of interviews, 24 were done with key firms in each cluster, and 15 with members of manufacturers' associations, private consultants and government experts.

The secondary sources included: data from government agencies related to exports and specific sectors; publications in general regarding the sectors; business magazines and newspapers; focal company sites; information available on the internet; monographs, dissertations and theses. We also collected data from local sources such as public libraries, municipalities and local associations. In addition, previous studies by Schmitz (1995, 1999, 2007) and Schmitz and Konorringa (2000) regarding the footwear cluster were used to support the findings concerning this particular cluster. Several visits were made to each cluster. The use of a variety of sources enabled triangulation to ensure the validity and reliability of the study.

The qualitative analysis was performed in two steps: descriptive and analytical. The first, descriptive, step included: (i) a preparation of reports on each cluster, with general data and historical evolution of the cluster; (ii) a detailed description of the environmental changes and threats faced by the clusters; and (iii) a detailed description of the actions taken by the clusters in response to environmental changes. The second, analytical, step consisted of: (i) an analysis of each case, including a timeline of external and internal events and their interrelation; (ii) a comparison of cluster studies; analysis within and between cases; (iii) generalizations and conclusions.

4. Results

4.1. Descriptions of the four clusters

Due to space limitations, only brief descriptions of the clusters are given. It should be noted, however, that the historical trajectory of each cluster generated an extensive

and detailed report on the main events and actors that influenced the development of the cluster. Appendix 1 summarizes the main characteristics of the four clusters.

The footwear, furniture and wine clusters are typically made up of large, medium and smaller-sized family firms. A significant number of the companies are in the hands of second or third generations because the economic activities in the regions are quite old. The origins of the three clusters are associated with the German, Austrian and Italian immigration to the South of Brazil, with the immigrants bringing the know-how of their countries of origin. The clusters are located in geographically defined regions, with a strong concentration of economic activity, which makes them play a central role in the local economy. However, due to the fact that the footwear cluster is located on the periphery of a large metropolis, it receives more external influences than the other two.

In the cases of Vale dos Sinos and São Bento do Sul, internationalization is a critical activity for the success of the clusters, but for different reasons. While São Bento do Sul specializes in furniture for exporting, the Vale dos Sinos cluster targets the demand for women's footwear in both the domestic market and the international market. In the case of São Bento do Sul, the cluster specializes in European design furniture made from pine wood, mainly to serve the German market, but also to meet the tastes of other European consumers and of American consumers. However, such products are not well-accepted in the domestic market. As for the Serra Gaúcha wine cluster, it is geared more to the domestic market, but for the past few years it has been making efforts at exportation, with still modest results.

Within this general framework, the Rio de Janeiro beachwear cluster presents completely different characteristics and serves for a counterfactual analysis. This cluster is urban, and its manufacturers' production facilities are scattered in different locations within the municipality, although the points of sale are located on the more upper class beach regions of the city. The firms are mostly in the hands of the founders, and are much smaller, less solid and less professionalized than those in the other clusters. The largest and most successful companies often rely on an entrepreneur-designer who is responsible for creating models. Although it is the second-largest beachwear exporting cluster in the country, this cluster holds an inconsequential share of the city's economy.

It should be further noted that the size of the clusters is quite varied, although rough estimates of the number of firms are available. Such estimates are very imprecise, given the variation in the number of firms due to the expansion and contraction of the clusters as the result of the economic situation at the time. Table 1 presents the competitive advantages of the clusters.

Possibly due to the strong German influence, the Vale dos Sinos and the São Bento do Sul clusters are very production-oriented, but they have a low degree of market orientation. In fact, an important, systematic criticism by the experts interviewed is the excessive focus on production, to the detriment of market issues. The dominance of focus on production is reflected in the competitive advantages of these two clusters, particularly their state-of-the-art technology. In addition, thanks to the tradition

Table 1. Competitive Advantages of the Clusters

<i>Competitive Advantage</i>	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
Local availability of quality raw materials	yes	yes	yes	no
Raw material cost advantages	yes	yes	n/a	n/a
Availability of qualified labor	yes	yes	yes	yes
State-of-the-art technology	yes	yes	n/a	n/a
Large volume production capacity	yes	yes	no	no
Own design	no	no	n/a	yes
Brand or origin identity	no	no	yes	yes

n/a = not applicable.

of the immigrants who populated the regions, they have a qualified workforce. The availability of low-cost, high-quality raw materials is also noteworthy. Interestingly, in the case of Vale dos Sinos, with the economic crisis plaguing the footwear cluster, tanned leather as well as skilled technicians have gone over to the Chinese footwear industry.

On the other hand, the Serra Gaúcha wine and the Rio de Janeiro beachwear clusters are more market-oriented, focusing on brand development both in the domestic market and in the international market. In both cases, the latter still represents a small portion of the cluster's sales. In the beachwear cluster, design is an important element of its companies' strategies since they are either fashion creators or imitators of the trends launched by leading firms. Table 2 shows the characteristics of internationalization in the four clusters examined.

The internationalization process of the Vale dos Sinos footwear cluster is the oldest, dating to the beginning of the 1970s. This process was precipitated by supply crises in the Spanish and Italian industries, which served the U.S. market. As a result, purchasing agents from American wholesalers settled in Brazil and transferred to the companies the know-how necessary for the production of footwear. This transfer of know-how played a key role in the subsequent development of the Vale dos Sinos cluster since it included everything from product specifications, raw materials and quality standards, to model designs and effective quality control at the plant. The purchasing agents completely took over marketing and design, whereas the Brazilian manufacturers were only responsible for production. By 1972, the country had become the third largest exporter of footwear in the world and the cluster led in the production and export of women's footwear. Although extremely auspicious for the cluster, it was at this early stage that one can find the roots of the problems that culminated with the recent crisis.

In turn, the São Bento do Sul furniture cluster did not benefit from a growing foreign demand, nor was it particularly sought after by buyers, except on an occasional

Table 2. Characteristics of the Internationalization Process of the Clusters

Characteristic	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
	<i>Vale dos Sinos (RS)</i>	<i>S. Bento do Sul (SC)</i>	<i>Serra Gaúcha (RS)</i>	<i>Rio de Janeiro (RJ)</i>
Boom	Dec. 1970-1980	Dec. 1990	No boom	2000-2005
External reasons for the boom	Traditional producers did not meet the demand	Traditional producers did not meet the demand	No boom	Positive image of Made in Brazil for the product category
Auxiliary factors in the expansion of exports	Foreign purchasing agents; Government incentives	Pro-active leadership within the cluster	Pro-active leadership within the cluster; Government action	Pro-active leadership in the fashion area; fashion fairs
Business orientation	Production orientation (emphasis on quality and technology)	Production orientation (emphasis on quality and technology)	Market orientation (emphasis on brand development)	Market orientation (emphasis on brand development)

basis; on the contrary, through proactive actions spearheaded by local businesspersons, it was able to open foreign markets for its products, mainly Germany and the U.S. Although it has benefited from the disorganization of production in Eastern European countries —traditional international suppliers— the key role in developing exports has fallen to local leaders.

The Serra Gaúcha wine cluster began exporting in the 1940s, having gone through periods of expansion and contraction. However, it was not until the early 2000s that several producers came together with government support to organize a cooperative export group known as Wines of Brazil. In this case, one cannot speak of an actual wine exporting boom, since the volume exported was always small; nevertheless, from then on the presence of fine Brazilian wines in foreign markets became more planned and developed. In this case, the active presence of business leaders, who also played a fundamental role in the development and professionalization of the cluster and in its presence in foreign markets, stands out.

Lastly, the Rio de Janeiro beachwear cluster benefited from the pioneering efforts of a few entrepreneurs (but who acted independently) and the favorable image of Brazil (country-of-origin effect) with regard to this type of product, which contributed to the rise of Brazilian top models on the international fashion scene and at fashion fairs organized in Brazil, in addition to the participation of Brazilian designers at international fairs. Although predominantly focused on the domestic market, beachwear designers perceived the international presence of the brand as an important element in their strategies in the domestic market.

It is worth evaluating some factors related to the structure and organicity of the clusters (Table 3). The classification derives from the authors' comparative judgment based on the literature and is valid only for comparing the four clusters. It is relative, not absolute.

Table 3. Factors Internal to the Four Clusters

<i>Factors Internal to the Clusters</i>	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
	<i>Vale dos Sinos</i>	<i>S. Bento do Sul</i>	<i>Serra Gaúcha</i>	<i>Rio de Janeiro</i>
Presence of focal companies	Medium	High	High	Low
Degree of cooperation	Low	Medium	High	Very Low
Degree of isomorphism	High	High	High	Medium

The presence of focal companies, which lead the cluster in the exploring of potential opportunities and overcoming threats, is an important element for the cohesion of the cluster's members. The presence of these companies in two of the four clusters was confirmed. In São Bento do Sul, two companies (Zipperer and Artefama) and their respective leaders played a crucial role, at different times, in determining the path to be followed by the cluster. The same was true of the Serra Gaúcha wine cluster, where business leaders from two of the region's family businesses (Vinícola Miolo and Casa Valduga) developed joint efforts to attract other companies in order to promote the international development of the cluster.

But regarding the footwear cluster, the trajectory was different. Schmitz (1995, 1999, 2007) studied the Vale dos Sinos cluster, examining the role of leading firms and export agents in its development, as well as the state's failure to support the cluster in a time of crisis. The author identified three distinct periods in terms of cooperation: the first, when the footwear industry and the cluster in particular structured their export capacity; the second, in which competition among companies led to the erosion of cooperative relations, but in which the integrative links were restored in the end; and the third, in the mid-1990s, when there was an effort to improve the competitiveness of the cluster, but which failed, at least in part, due to the particular alliances that the leading companies each formed with their international customers to the detriment of internal alliances within the cluster. In spite of this, as the global economic crisis reached the cluster in the late 2000s, cooperative efforts became more visible. Later on, several leading firms moved out of the cluster, mainly to lower-income areas of the country, where local governments offered subsidies. As they dispersed geographically, the benefits of agglomeration were lost. Schmitz and Konorringa (2000) also pointed out that, in spite of the cluster's production capabilities being considered by international buyers to be comparable to the world's best (in this case Italy), the Vale dos Sinos cluster lacked design capabilities.

Lastly, in the beachwear cluster there is no cooperation at all. In fact, there is rivalry between the entrepreneurs-designers in the select group of the cluster's leading compa-

nies. Although isomorphic behavior may be observed in all the clusters, with companies copying one another's strategies, it is in the Rio de Janeiro beachwear cluster that such behavior was less noticeable, which is an expected outcome, given the geographic dispersion and the high degree of rivalry among the entrepreneurs-designers.

4.2. The crisis, its impact on the clusters, and their strategic responses

The international crisis starting in the second half of the 2000s had negative effects on the clusters (Table 4), not only in terms of their international insertion but also in relation to their competitive position in the domestic market. The appreciation of the Brazilian currency had a strong impact on all the sectors analyzed, just as it had on all Brazilian export manufacturing sectors. In the specific case of wine, the sector's low level of tariff protection resulting from international agreements, especially in the case of Mercosur, threatened the competitiveness of Brazilian wine producers.

Table 4. Crisis-Related Aspects

	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
	<i>Vale dos Sinos (RS)</i>	<i>S. Bento do Sul (SC)</i>	<i>Serra Gaúcha (RS)</i>	<i>Rio de Janeiro (RJ)</i>
Start of the crisis	Starting in 2000	Starting in 2006	Starting in 2008	Starting in 2007-2008
External threats	Appreciation of the Brazilian currency	Appreciation of the Brazilian currency	Appreciation of the Brazilian currency	Appreciation of the Brazilian currency
	Asian competition	Asian competition	Low tariff protection	Asian Competition
	Global recession	Global recession	Global recession	Global recession
Problems internal to the cluster	Re-location of focal companies; low competitiveness; lack of own design	Low attractiveness of products in the domestic market; lack of own design.	Low competitiveness; little importance of the wine industry for the Brazilian economy	Little importance of exporting for leading companies.

4.2.1. Impacts on the clusters

The difficulties faced by the Vale dos Sinos cluster in the 2000s had already shown the first signs in the 1990s, when competition from low-cost Asian producers, especially Chinese, took on a more obvious shape. However, Brazilian companies, for the most part, had already begun to control the low-medium price footwear segment, most of which managed to resist the advance of Asian producers. Starting in the 2000s, the situation worsened, as Chinese producers upgraded their production

to reach the middle segments of the market. As the Brazilian footwear industry became less price-competitive, buyers in the U.S. reduced their commitment to Brazilian suppliers (Schmitz, 2007). In addition, Asian products invaded the Brazilian market, making damaging incursions into the position of Brazilian companies on the domestic front. The situation became even worse with the appreciation of the Brazilian currency against the dollar, leading to a drastic reduction of exports to the U.S. market. Lastly, the global recession had a further negative impact on Brazilian footwear exports. In 2009, with the adoption of protectionist measures by the Brazilian government for the footwear industry, in response to the undervaluation of the Chinese currency, the Vale dos Sinos cluster got the break it needed for reorganization. However, even then the total output of the cluster could not be absorbed by the domestic —albeit expanding— market, and exports continued to decline. Even in 2015, with the strong devaluation of the Brazilian currency, exports did not recover because the country had plunged into a recession.

The São Bento do Sul furniture cluster experienced several external threats starting in 2006, which had a negative impact on its development and the survival of its companies. These threats were very similar to those that affected the footwear cluster: appreciation of the Brazilian currency, competition from Asian products, and, starting in 2008, economic recession in the main export markets. Together, these factors produced a sharp decrease in exports. The crisis had profound impacts throughout the supply chain, drastically affecting the local economy. It is estimated that 6% of the local population left the region in 2008. In subsequent years, the number of furniture manufacturers comprising the cluster fell from 400 to around 300, with a large number of closures, bankruptcies and creditors agreements, affecting even the two focal companies: one closed its doors and the other filed for bankruptcy. The firms in the cluster were unable to transfer sales to the domestic market because their products were not well accepted in Brazil.

External threats to the Serra Gaúcha wine cluster began to manifest with the formation of the Mercosur trading bloc and the opening of the Brazilian market to imported products in the 1990s. At the time, the producers of fine Brazilian wines —concentrated in the region of Serra Gaúcha, and more specifically in the sub-region known as Vale dos Vinhedos— faced competition from foreign wines, including low quality products from Germany and quality products from Argentina, but with cost advantages, thanks in part to the preferences for Mercosur countries. With the continuous appreciation of the Brazilian currency until 2015, wine producers experienced strong competition in the domestic market for fine wines from the most varied origins. In addition, exports were also impacted by the global recession.

Lastly, once again, the Rio de Janeiro beachwear cluster is useful for a counterfactual analysis. The firms in this cluster never considered exporting (or internationalization) as a strategic part of their business. They emphasized the domestic market instead. International activities, in general, were seen by designers as a way of adding glamor to the brand, attributing it an aura of prestige. Although some leading companies managed to open stores overseas, such efforts were always individual,

by a particular company, and never entailed a concerted effort. As a result, although the recession in the developed countries had a strong negative impact on Brazilian beachwear exports (which fell by 83% between 2005 and 2011), this was offset by the concurrent expansion of the domestic market and, in particular, by the boom in the local economy (the city of Rio de Janeiro) until 2016. Given the low intensity of exports by the cluster's firms, most of them simply abandoned international markets.

4.2.2. Strategic responses by the clusters

The firms in the four clusters presented different strategic responses to external threats. Although some of these responses started years before the global economic crisis, when threats to the clusters were already manifesting, there is no doubt that they intensified with the worsening of the situation starting in the second half of the 2000s through 2015. Table 5 provides a summary of the strategic responses identified.

The strategic responses varied substantially among the clusters, according to their specificities and the degree of importance of exports in their sales. The Vale dos Sinos footwear cluster and the São Bento do Sul furniture cluster were most affected by the global economic crisis because they were export clusters, whose production could not be absorbed by the domestic market. Possibly because of their previous success over a long period of time, these clusters had a hard time changing their trajectories and finding a new path.

In the case of the Vale dos Sinos cluster, the problem was even more serious, given that one of the few adequate strategic responses would entail transferring part of the production to countries with cheap labor, such as Southeast Asian countries. Actually, the footwear companies that invested abroad did so in Argentina, with the purpose of guaranteeing that market, which had been closed to Brazilian imports due to protectionist measures, but where the cost of labor was higher than in Brazil. Several companies relocated to other regions of Brazil, but this was an independent movement, with only partial success. Until 2014, the expansion of the domestic market, combined with protectionist measures by the government, kept the manufacturers breathing, but the cluster's trajectory seems compromised when one considers the way the footwear industry has moved throughout history —always in the direction of reservoirs of cheap labor. A possible strategic response would be the upgrading of the products, which would justify a higher price, with a decrease in quantity. This strategy was followed by Italian and Spanish manufacturers, which had thus been able to survive the competition of new entrants in the past. However, the lack of proprietary design, international brands and own distribution channels abroad makes this task much more difficult for the cluster.

In the case of São Bento do Sul, attempts at solving problems also had to break with the patterns of the past in order to find new ways, not by continuing an exhausted model. However, the emphasis of the responses was on mitigating the effects of the economic crisis and reducing costs. The greatest vulnerability of the cluster is its high export in-

Table 5. Strategic Responses by the Clusters

<i>Response</i>	<i>Specific Action</i>	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
Temporary or permanent closure	Temporary closure	X	X		
	Factory closure	X	X		
	Company closure	X	X		
	Creditors Agreements	X	X		
	Bankruptcies	X	X		
Relocation	Production to other region of Brazil	X		X	
	Production abroad	X		X	
Political Actions	Lobbying	X	X	X	
	Worker Demonstrations	X	X		
Market Strategies	Greater focus on domestic market		X		X
	Search for new markets		X	X	
	Entry into market niches		X		
Product Strategies	Cheaper product lines	X	X		X
	New products	X	X		
	Product upgrading	X		X	
	Joint brands		X	X	
Sales Strategies	International operations	X	X	X	
	Participation at international fairs	X	X	X	
	Attraction of new importers			X	
	Joint communication abroad			X	
Cost reductions	Importation of inputs		X	X	X
	Negotiations with suppliers		X		
	Lean production practices	X	X		
	Reduction of working hours	X	X		
	Lay-offs	X	X		
	Joint purchases of inputs		X		

Table 5. (continue)

<i>Response</i>	<i>Specific Action</i>	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
Differentiation	Product differentiation		X	X	X
	Foreign brand licensing	X	X		
	Investments in design	X	X		X
Internationalization	Acquisitions of foreign companies			X	
	Production contracts abroad			X	
	Own stores abroad				X
Synthesis of Strategic responses		Path dependence		Path creation	No response

tensity, which makes it more sensitive to foreign demand crises. For this cluster, the only short-term solution is to reorient production to the domestic market, which requires, however, investing in raw materials, products and processes by financially depleted companies. Again, the lack of proper design, international brands and own distribution channels abroad has been an obstacle to the supply of products in external markets.

In comparison, the Serra Gaúcha wine cluster and, in particular, the producers in the Vale dos Vinhedos sub-region, adopted creative new strategies (path creation) that opened up new opportunities for the firms, mainly through internationalization. These strategies were in part cooperative and included the creation of an export consortium, overseas joint branding, and cooperative sales activities. There was also a voluntary transfer of learning between the firms in the cluster, with a view to increasing international competitiveness. At the same time, the leading firms started internationalization strategies aimed at serving the Brazilian market, considering the preference of the Brazilian consumer for imported wines. The main wineries entered into strategic agreements and alliances, ranging from production contracts and leasing of wineries abroad, to the creation of brands in joint venture with foreign producers and, more recently, the acquisition of wineries in other countries.

Lastly, faced with the collapse of Brazilian beachwear exports, most of that cluster's companies stopped exporting altogether. Only the largest companies kept at it, with recognized brands and customers already established abroad. Response strategies were individual and there was no collective effort within the cluster.

5. Final Considerations

The present study has sought to evaluate the extent to which the historical trajectory of four traditional Brazilian manufacturing clusters, mainly in terms of their in-

ternationalization, determined their responses to external threats. Although the space does not allow a broad description of the succession of events that led to the current situation of the clusters, the evidence presented is clear in indicating the existence of path dependence in two of the analyzed clusters.

We found evidence that the strategic responses of the internationalized clusters studied to demand crises are different, depending on the degree of dependence on external markets and the possibility of redirecting production to the domestic market. High homogeneity (Martin, 2010, 2012), previous international success and high dependence on external markets were behind the problems faced at the time. However, the two clusters with low and recent international insertion and limited success in internationalization presented a greater capacity to face the threats. Their strategic responses differed radically: while one cluster sought to increase its internationalization through joint export actions, production contracts, leasing of foreign properties and direct investment through joint ventures and acquisitions, the other reduced its international penetration. Interestingly, Schmitz (2007) had already pointed out that the more internationalized firms in the Vale dos Sinos footwear cluster were less capable of changing strategies and redirecting their efforts to new markets in Latin America than less internationalized firms were.

There is some evidence, therefore, that a high degree of internationalization may make change more difficult for a firm or a cluster. Also, it seems that the longer the international success of the cluster, the greater the difficulty in finding new strategic responses. This study also found that the Brazilian manufacturing clusters that reached a high degree of success in their international insertion showed a greater propensity to path dependence. This is not surprising, since the literature has already pointed out that the larger the investments made in a successful trajectory, the more difficult to escape path dependence (e.g. Teece *et al.*, 1997; Noda and Collis, 2001).

The degree of cooperation in each cluster was also quite different. In general, there was evidence that lower levels of cooperation led to the search for individual solutions for companies, suggesting that the lower the level of cooperation previously existing in the cluster, the greater the likelihood that companies will seek out individual rather than joint solutions. The importance of cooperation for a cluster's success has been extensively studied in the literature (Tomlinson and Jackson, 2013). This study shows that the choice of cooperation may become more difficult when firms face serious external threats.

These findings should be considered preliminary and tested in future quantitative studies, given the limitations of the present study regarding the number of clusters analyzed and the fact that all the clusters are located in only one emerging market, Brazil. In addition, we did only 39 personal interviews; although they included key actors in each cluster, they may not have covered some relevant aspects of the problem. However, the use of a large selection of secondary sources may have helped to reduce potential bias from the limited number of informants. The lack of local studies on the trajectories of Brazilian manufacturing clusters (as reported by Mascena, Figueiredo and Boaventura, 2013) is also a limitation and a challenge for other researchers.

The study of Brazilian industrial clusters and their internationalization process is more current than ever, considering the changes in the world economy, particularly the rise of Asian countries as strong competitors in the most diverse branches of manufacturing and the long-lasting global recession in developed countries, with repercussions in the export industries. This study specifically sought to analyze how four Brazilian industrial clusters responded to threats from the external environment and to what extent these responses revealed the existence of path dependence. We hope it contributes to the understanding of how internationalized clusters in an emerging market are impacted by and respond to globalization.

6. References

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Appendix 1. Characteristics of the Four Clusters

<i>Characteristics</i>	<i>Footwear</i>	<i>Furniture</i>	<i>Wine</i>	<i>Beachwear</i>
	<i>Vale dos Sinos (RS)</i>	<i>S. Bento do Sul (SC)</i>	<i>Serra Gaúcha (RS)</i>	<i>Rio de Janeiro(RJ)</i>
Beginning of activities in the cluster	19th Century	Beginning of the 20th Century	19th Century	1970s
Type of company	Small, medium, large family	Small, medium, large family	Small, medium, large family	Micro, small, medium Entrepreneurial
Cultural Origins in the region	Predominantly German and Italian immigration.	Predominantly German and Austrian immigration.	Predominantly Italian immigration.	Not characterized by immigration
Geographic agglomeration	High	High	High	Low
Importance of the cluster for the local economy	High More than 50% of local economic activity Nearly 50% of Brazilian footwear exports (in value)	High More than 40% of local economic activity Nearly 50% of Brazilian furniture exports (in value)	High	Insignificant
Importance of the cluster for the sector	Cluster producer and exporter	Country's largest export cluster	Country's largest fine wine cluster	Second-largest beachwear export cluster
Main focus of the cluster	Foreign market	Foreign market	Domestic market	Domestic market
Importance of internationalization for the cluster	High (average of 40% of export intensity in the 1990s)	Very High (average of 80% of production in the 1990s)	Low	Low
Estimated number of companies in the cluster	1,700-2,000	300-400	20-30	50-70

Clusters' Vital Role in Promoting International Competitive Advantage - Towards an Explanatory Model of Regional Growth

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ABSTRACT: This work responds to calls to expand the study of inter-firm relationships beyond the narrow dyadic relationship focus and sole concentration on conceptualizing collaborations as firms' strategic intent to implement mechanistic growth strategy. The objective is to map the salient features of existing clusters and how firms perceive the benefits of clusters by asking: How are the collaborative networks of private and public partnerships organized to enhance the competitiveness of all the stakeholders in a cluster? And how do these actors perceive the usefulness of clustering? The theoretical lens builds on viewing cluster initiatives as an interactive learning process and something that occurs in the interaction between actors as competitiveness is born through reshuffling resources both inside and outside of the firm, and takes into account value creation. The methodology draws on focus groups and surveys conducted in Swedish clusters. The findings show the perceived benefits of cluster initiatives to be networking, dialogue and experience exchange. The implications are that the relationships firms form in a cluster constitute critical avenues for acquiring resources and knowledge to enhance competitiveness, and bridges to other clusters in other countries. An explanatory model of clusters and regional competitiveness that emerged from our findings is presented.

JEL Classification: F20; L20; M10; O40; R10.

Keywords: clusters; networking; international competitiveness; strategic network; open innovation.

El rol fundamental de los clúster en la promoción de la ventaja competitiva internacional - hacia un modelo explicativo del crecimiento regional

RESUMEN: Este trabajo responde a las llamadas para expandir el estudio de las relaciones entre empresas más allá del foco estrecho centrado en relaciones diádicas y la concentración únicamente en conceptualizar las colaboraciones como

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Received: 09 march 2017 / Accepted: 25 september 2017.

meros intentos estratégicos de las empresas para implementar estrategias de crecimiento. El objetivo es mapear las características más sobresalientes de los clúster existentes y la forma en que las empresas perciben los beneficios de los clúster mediante las siguientes preguntas: ¿cómo son las redes colaborativas de socios privados y públicos que se organizan para mejorar la competitividad de los grupos de interés en el clúster? Y, ¿cómo perciben esos actores la utilidad del trabajo en red en el clúster (*clustering*)? El enfoque teórico se elabora sobre la visión de las iniciativas clúster como procesos de aprendizaje interactivo y como algo que ocurre en la interacción entre actores cuando la competitividad nace a través de la reorganización de recursos tanto dentro como fuera de la empresa, y tiene en cuenta la creación de valor. La metodología se basa en sesiones de grupo orientadas y encuestas pasadas a clúster suecos. Los hallazgos muestran que los principales beneficios percibidos de las iniciativas clúster son el trabajo en red, el diálogo y el intercambio de experiencia. Las implicaciones son que las relaciones que las empresas forman en un clúster constituyen medios fundamentales para adquirir recursos y conocimiento que mejora la competitividad, y que se extiende a otros clúster en otros países. Se presenta un modelo explicativo de la competitividad de los clúster y de las regiones.

Clasificación JEL: F20; L20; M10; O40; R10.

Palabras clave: clúster; trabajo en red; competitividad internacional; red estratégica; innovación abierta.

1. Introduction

In following with the scope of the call for papers for this special issue on clustering, we align the focus of this paper accordingly. Thus, the central element of clustering—the geographic agglomeration of firms and activities, informed by a multi-disciplinary and/or network perspective—constitutes the point of departure of the paper. The reason for this approach is that, in today’s globalized world, local contexts and clusters are becoming an integral source of international competitive advantage. Cluster initiatives provide a setting for companies (SMEs, MNEs, etc.) to interact effectively with each other and with other institutions, to work together and learn. The theoretical lens for this paper therefore builds on clusters (Porter, 2000), i.e. the growth of contacts within an industry that necessitates new ways of collaborating and cooperating. Because a cluster initiative is a strategic attempt to create awareness and knowledge, we use strategic network theory as a way of describing cluster initiatives that is less connected to economic geography and more connected to network theory, where the exchange of resources is in focus. Clustering is an interactive learning process, and occurs in the interaction between actors as open innovation postulates (Chesbrough, 2003; Chesbrough *et al.*, 2006).

The extant literature stresses that having a foreign market presence is imperative for most firms these days (Awuah, Osarenkhoe and Abraha, 2011). It is particularly vital for small and medium enterprises (SMEs), which are increasingly considered

an important, though neglected, research field despite SMEs being considered the engine of a country's economic growth (Sawers *et al.*, 2008; Zeng *et al.*, 2010; Sami Sultan, 2014; Resnick *et al.*, 2016). Because they represent the majority of economic structures and are the main employers of a country, SMEs attract the interest of policy-makers (Tödtling and Tripl, 2008; Solleiro and Gaona, 2012). According to Hossain and Kauranen (2016), SMEs have the ability to react and adapt faster to changing needs and the environment, and they argue that successful development of these enterprises enhances the competitiveness of a country.

Against this background, it is therefore paradoxical that «little is known about the conditions under which SMEs may be able to achieve growth when facing specific constraints. For example, it has been argued that SMEs could enter into coalitions with external organizations in order to obtain resources and information» (Hessels and Parker, 2013, p. 1). Furthermore, Costa *et al.* (2016, p. 1) argue that the current literature is «unclear about the way SMEs can access information and assimilate knowledge in a collaborative network context, to support decision-making,» going on to state that it does not clarify «how SMEs assimilate information from their networks and collaboration activities for making better decisions in terms of internationalization» (Ibid.). Thus, firms are left reeling from discontinuities created by a growing level of globalization, heightened volatility, hypercompetition, demographic changes, and the explosion of knowledge (Tödtling and Tripl, 2008; Ter Wal and Boschma, 2011). Ever-faster means of communication alter today's business climate and it is becoming more evident every day that we cannot anticipate the environment of tomorrow. This paradox highlights the importance of SMEs in the global economy, while current research discusses the shortcomings of in-depth and detailed knowledge of how SMEs interact with their surroundings.

It is evident from this scenario that the globalization process and benefits accrued from global market opportunities, and «pushing the companies to develop and adopt a proactive international approach in order to take advantage of the new situation» (Portero, Hervás-Oliver and Puig, 2012, p. 266) have given rise to two main challenges currently faced by SMEs: firstly, to transform themselves and increase their individual competitiveness (Fassoula, 2006, cited in Karaev *et al.*, 2007); and, secondly, due to their limited size, to take advantage of synergy effects created by entering into cluster initiatives, cooperative relationships with other SMEs and related partner institutions. Hence, an increased interest in regional development among policy-makers is spurred by an upsurge of interest in regional issues on the part of researchers, which is manifested in greater attention to the cluster concept and the somewhat overlapping concept of industrial districts (Johanson and Lundberg, 2011).

A perspective that has gained impact in recent years is that which is based on so-called «open innovation» (Chesbrough, 2003). Chesbrough *et al.* (2006, p. 1) define open innovation as «the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively». Open innovation requires much more interaction between different actors with different organizational cultures: large firms and SMEs (i.e. industry),

universities and research institutions (i.e. academia), as well as national and regional authorities to build the legal or incentive framework of innovation (i.e. government) (Lecler *et al.*, 2015).

Extant literature (e.g. de Vrande *et al.*, 2006) also calls for open innovation to not be studied solely from the perspectives of large, high-tech multinational enterprises (MNEs), as is most commonly done (e.g. Chesbrough, 2003). Rather, the scope of study should be broadened to capture SMEs in general, and services industries in particular. Although the flexibility of SMEs is seen as an advantage for accelerating their innovation, few SMEs succeed in managing the whole innovation process on their own, to turn their inventions into products or services. They often lack resources and capabilities (Antoldi *et al.*, 2011; Cerrato and Depperu, 2011; Coviello and McAuley, 1999; Crick and Spence, 2005) at the stages of manufacturing, distribution, promotion and research funding, which leads them to cooperate with other firms to reduce the risks, cost and time required for innovation, as well as to gain access to sales and marketing networks during the last stages of the innovation process.

Clustering and networking help SMEs to improve competitiveness (Venkataramanaiah and Parashar, 2007). However, while networking is viewed as vital for enterprises of all sizes (Ojala, 2009; Kontinen and Ojala, 2011), clusters alone cannot solve the complex problems and constraints encountered by SMEs, nor break the vicious cycle of SMEs' competitiveness (Dasanayaka and Sardana, 2010). Formulation of a firm's strategic intent is a unilateral process solely confined to a single firm (Driffield and Love, 2007). This study is a response to calls made in Osarenkhoe (2010) and Awuah *et al.* (2011), Hessels and Parker (2013) and Costa *et al.* (2016), to expand the study of inter-firm relationships beyond the narrow dyadic relationship focus and sole concentration on conceptualizing collaborations as firms' strategic intent to implement mechanistic growth strategy.

This paper highlights the importance of interaction within and between society's stakeholders and how different forms of cluster initiatives can contribute to long-term value creation that strengthens companies' competitiveness at the domestic level as well as in international contexts. More succinctly, mapping of the salient features of existing clusters and unveiling firms' perceptions of benefits accrued from regional clusters is the first step in a cluster development process. To accomplish this overarching objective, the following research question is formulated: How are the collaborative networks of private and public partnerships organized to enhance the competitiveness of all of the stakeholders in a cluster? And how do these actors' perceive the usefulness of clustering?

Following this section, the paper proceeds with a presentation of the theoretical underpinnings, consisting of a review of literature that views markets as organized behaviour systems, manifesting network structures and clusters, made up of components with varying characteristics, that interact with each other in a systemic way. After that, comes the methodology section, and thereafter a presentation and discussion of the case study. We then present an explanatory model of cluster and regional

competitiveness that emerged from our findings, and close with concluding remarks and a discussion of the implications of the study.

2. Theoretical underpinnings

The transformation from industrial society to information and service society, accompanied by great economic, political and social globalization, constitutes an important platform for ideas of new regionalism. It has thus become a central tenet of regional growth policy to create new kinds of arrangements, to mobilize local and regional actors and interest in horizontal network constellations, and to utilize information and knowledge assets by means of partnerships (Lovering, 1999; Hudson, 2005; Hessels and Parker, 2013).

2.1. Strategizing in networks

We define networking broadly as all of the actions of a company or an individual in business relationships and networks (Ford, Gadde, Håkansson and Snehota, 2003). Like any network setting, clusters are embedded in a historical, sociocultural, economic and political context that shapes the norms, values and expectations that in turn influence the structures and processes of the cluster and its members. Sizable efficiency gains can thus be achieved by the actors in strategic collaborative networks of exchange relationships (Auwah, Abraha and Osarenkhoe, 2011; Ojala, 2009; Kontinen and Ojala, 2011) through their activity links, resource ties and bonds to other actors in the network.

Kalinic and Forza (2012) discuss how SMEs use strategic focus rather than the gradual approach of building experience. They further argue that the internationalization of SMEs takes place in the absence of sufficient experience or specific market knowledge. In contradiction to previous research, SMEs can in many cases attain rapid internationalization (Osarenkhoe, 2009). Building on this, Hessels and Parker (2013) highlight the importance of inter-firm collaboration strategies. Collaboration, in particular when it unfolds in the context of networks, is an important facilitator in the internationalization of SMEs (Johanson and Lundberg, 2011; Ter Wal and Boschma, 2011; Kontinen and Ojala, 2011). Taking part in collaborative networks can benefit SMEs in internationalization processes (Hessels and Parker, 2013) by providing decision-makers with additional channels of information and knowledge, introducing partners, and influencing decisions on foreign market selection and entry mode. On the opposite side of the spectrum, Pla-Barber and Puig (2009) provide insight into the impact of industrial districts on the international activities of firms. Their paper shows how location influences the timing and levels of imports and exports, and how these influences have been diluted in recent years as the home-textile industry becomes more involved in the global arena. Thus, this challenges «some key arguments exploring the advantages of the district in the international activities

of firms by questioning the capacity of the district to prevent international sourcing, and its vulnerability to the threats created by the growing integration of the world economy» (*ibid.*, p. 435).

However, in the past 20 years there has been a shift in the economic policies pursued in many countries, with increased interest in networks in the micro-economic business environment (Zeng *et al.*, 2010). The focus is no longer on specific companies or on the market in general; instead, specific relationships and networks between companies in a region are the object of policy-makers' priorities (Ciravegna *et al.*, 2014). As a result, vast resources are now being poured into projects and programs to support the development of relationships between various companies in a specific region and aimed at achieving growth. It is therefore not surprising that, in recent years, various research disciplines have shown increasing interest in the collaboration between various stakeholders.

2.2. Innovation through clustering

Few innovations arise from a single, isolated source (Håkansson and Snehota, 1990). Most are created through complex, interactive, iterative and cumulative learning processes in which a variety of actors (individuals as well as organizations) are involved in different ways (Curran *et al.*, 1993; Dasanayaka and Sardana, 2010). The embryo of an innovation is not always spawned by a development department and passed on to other units. In many cases, the development department is instead integrated in all parts of the chain. Thus, the innovation process can also be considered a socially embedded process where the user perspective is often in focus (von Hippel, 2001).

It is important to study how innovation generates value for the parties involved (Håkansson and Waluszewski, 2002, 2007; Van de Ven *et al.*, 1999; Van de Ven, 1999). One definition of innovation suggests that innovation is born out of reshuffling resources both inside and outside of the firm. Thus, it is virtually impossible for a single company to reprocess and accommodate all the skills it needs within the organization. Instead, organizations rely on various forms of cooperation with external actors, companies and other organizations.

De Vrande *et al.* (2006) discuss how SMEs pursue open innovation primarily for market-related reasons such as satisfying customer demands, or keeping up with competitors. Their most important challenges relate to organizational and cultural issues as a consequence of dealing with more external contacts. Clusters can therefore provide a common platform that help SMEs to overcome these barriers. The value of a firm's presence in a specific cluster of firms with similar or complementary skills and expertise has been widely analysed in the literature (Porter, 1990; 1998; Martin and Sunley, 2011). According to Porter (1990), national clusters are formed by firms and industries linked through vertical (buyer/supplier) and/or horizontal (common customers, technology, etc.) relationships with the main players located in a single

nation or state. Porter (1998) later modified this definition to encompass institutions (formal organizations).

It has long been recognized that related firms and industries tend to locate in geographical proximity to one another but concentrate to a location only if agglomeration brings benefits greater than the cost of locating to that area (Martin and Sunley, 2011; Menzel and Fornahl, 2010). Geographical benefits relate to a certain geographical location (e.g. specialized labour, infrastructure, etc.), whereas agglomeration economies describe how these and other factors are created by increasing the number of firms (Martin and Sunley, 2011; Menzel and Fornahl, 2010).

Consequently, geographical proximity is seen as a vehicle that enhances the dissemination of knowledge and the development of institutions, which in turn may enhance cluster effectiveness. Geographical proximity creates competitive advantages for SMEs that cooperate closely and compete, since a host of linkages between cluster members results in a whole greater than the sum of its parts (Porter, 1998). Competitors within a cluster benefit from agglomeration effects in ways that yield cost advantages and access to resources not available to competitors not located in the cluster (Valdaliso *et al.*, 2011; Maskel, 2001). The geographic concentration of clusters contributes to developing additional economic benefits and technological externalities (Niu *et al.*, 2012). Technological externalities are defined as those consequences of activity which directly influence the production function in ways other than through the market (Ter Wal and Boschma, 2011; Martin and Sunley, 2011). Geographical proximity also strengthens communication and intensifies the exchange of knowledge between cluster members (Gomes and Hurmelinna-Laukkanen, 2013).

Karaev *et al.* (2007) addressed the effects of clusters on competitiveness, concluding that belonging to a cluster has a strong positive effect on SME policy in industrialized countries. This invariably reinforces the notion that geographical clustering of economic activity can have an impact on a firm's creativity and competitiveness in a number of different ways (Sami Sultan, 2014; Zaheer and Manrakhan, 2001; Malecki, 2012). It is expected that firms in a cluster can benefit from productivity improvements due to reduced transaction costs, access to labour, benefits associated with collective intelligence, technology spillover, and increased competitive pressure. Against this background and in line with cluster theory, local contexts and clusters, where companies interact effectively, become an important source of international competitive advantage.

One way of conceptualizing clusters is to view them as complex adaptive systems (Martin and Sunley, 2011), consisting of various stakeholders (large firms and SMEs, universities and research institutions, national and regional authorities, etc.) with varying characteristics, that interact with each other in a systemic way (Menzel and Fornahl, 2010, cf. Valdaliso *et al.*, 2016). Firms in cluster settings are heterogeneous in nature and therefore endowed with different organizational cultures, knowledge and capabilities (Ter Wal and Boschma, 2011). Hence, clusters «do not develop evenly and as a whole» (Menzel and Fornahl, 2010, p. 224; Valdaliso *et al.*, 2016, p. 68). Social capital in particular, however, is widely understood as condu-

cive to the promotion of intellectual capital, collective learning and the creation and transfer of knowledge both inside and outside the firm's and cluster's borders (Kuah, 2002; Maskell, 2001; Malecki, 2012; Valdaliso *et al.*, 2011). Nahapiet and Ghoshal (1998, p. 243) define social capital as «the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit,» which they categorize into structural-, relational- and cognitive dimensions. The three dimensions are all interrelated and affect firms.

According to Birkinshaw and Hood (2000, p. 12), «it is not just cluster membership but the specific characteristics of the cluster in question that impacts the likely subsidiary role». Ceglie (2003), on the other hand, argues that geographical concentrations of SMEs that operate in the same sector are not sufficient for producing «external economies». Trust-building and constructive dialogue (Niu *et al.*, 2011; Malecki and Fornahl, 2012) between cluster actors, information exchange, identification of common strategic objectives, and agreeing on a joint development strategy and its systematic and coherent implementation, are of paramount importance for building an efficient cluster.

2.3. Reflections on the theoretical underpinnings

For SMEs in a cluster initiative strategic network or industrial district settings, the decision to internationalize their business operations in markets with varying magnitudes of physical and psychological distance is an example of an innovative business practice. Inter-organizational collaboration offers lasting and well-structured relationships, resource flow and other interactions between specific organizations seeking to meet common —as well as individual targets. Cluster-based strategies can improve the competitiveness of SMEs and a cluster approach may be used by SMEs as a tool to meet their challenges with respect to globalization and trade liberalization. A company's strategic partnerships with other companies and organizations create synergies for the parties involved, which increases the potential for positive regional development.

3. Methodology

This current study adopted both qualitative and quantitative methods, with the main focus on the former (Yin, 2002). The data collection process took place from 2013 and 2015, with the first phase beginning in conjunction with workshops with representatives of clusters from five regions in Sweden.

Ten 2-hour focus-group discussions were conducted with process leaders of cluster initiatives, regional and local networks, with six members in each group. A moderator encouraged a free flow of viewpoints on the main theme for discussion (David and Sutton, 2004) that probed: How are the collaborative networks of pri-

vate and public partnerships organized to enhance the competitiveness of all of the stakeholders in a cluster? In following with requirements for conducting focus group interviews, the groups were observed from behind a one-way mirror. The researchers could see in but the participants could not see out. The discussions were videotaped and later transcribed.

The second part of the data collection process used a questionnaire with semi-structured and open-ended questions aimed at unveiling how firms in the clusters and networks perceive the benefits or gains of cluster collaborations. Fifty-three companies and other actors in the Aluminium Works-, Energy Agency-, Furniture Works- and Heavy-Duty Vehicles cluster initiatives were surveyed, through a combined e-mail and telephone questionnaire, with a response rate of 81%. The survey covered: how benefits accrued in conjunction with strategic collaborations in the region were manifested in different ways; advanced dialogue and consensus between companies and other significant actors; the potential to pool resources between companies, e.g. at production peaks; collaboration with schools and the education system to ensure workforce supply; the potential for shared marketing and profiling; the potential to establish collaboration with universities, other academia and research institutions; and the level of satisfaction with forms of work used by the clusters.

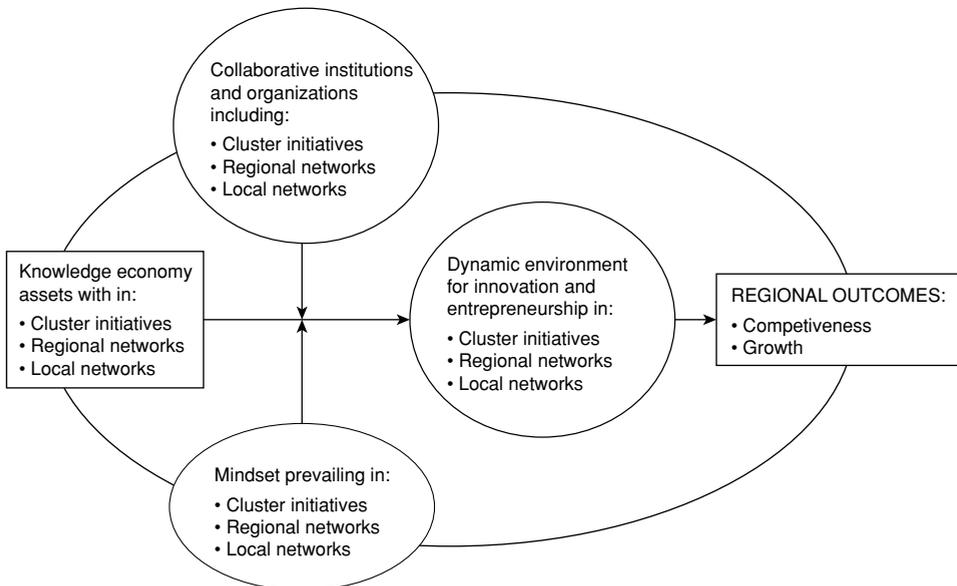
The analysis consisted of three steps: data reduction, data display, and drawing conclusions (Miles and Huberman, 1994). The main themes—in our case the *focus*, *objectives*, *activities and organization of the clusters and networks*, and *perceptions of cluster members*—were extracted to provide succinct insight on the salient features of the cluster initiatives, and regional and local networks in the region studied. The conclusion-drawing and verification focused on reflecting and understanding the data chosen to present.

4. Presentation of the case study on clustering and networking

According to our respondents, clusters and networks are collaborative arrangements that together contribute to strengthening and reinforcing fertile conditions for SMEs and for regional competitiveness and growth. In comparison to their Swedish peers, firms in Kronoberg County have fewer bankruptcies (2.6 per 1000). In recent years, the region has held a top position in terms of its capability for running fast-growing companies, with approximately 300 «gazelle» companies per million employees. Gazelle companies are vital for growth, as they are the ones creating most of the new jobs. Kronoberg County's share of exports is also very high. In 2010, it had the country's highest export figures per capita. When looking at the different forms of internationalization, a regional pattern emerges. The numbers of import and export companies in most counties in Sweden are relatively similar, with import businesses making up the largest share. In Kronoberg County, export companies make up the larger share.

Figure 1 shows that in knowledge economy, organizations collaborate to compete. Knowledge economy assets are turned into results when a dynamic environment for innovation and entrepreneurship is in place. To turn assets into outcomes for people and place in the knowledge economy, the process of innovation requires collaboration across boundaries, both geographical and functional. Oftentimes, collaborative organizations and institutions reflect regional mindset (values and attitudes). For example, it is essential for a region to have a mindset that encourages people and regions to be innovative and entrepreneurial. The presence of collaborative institutions and organizations, such as cluster organizations, networks, research-industry consortia and entrepreneurial support networks, greatly facilitates this environment. These alliances, networks and other relationship-building mechanisms create connections and linkages vital to economic development in a technology-driven world.

Figure 1. Analytical framework depicting three collaborative initiatives as continuums



Cluster initiatives: organized interaction between companies, administrations, and educational institutions around a common business category with the purpose of strengthening growth and competitiveness; **Regional networks:** interaction between actors at a regional level having an interest in collaborating around a common matter; **Local networks:** interaction between actors at a municipal level having a mutual interest in collaboration.

4.1. Mapping of the salient features of strategic collaboration platform

4.1.1. Cluster Initiatives

A cluster initiative is an organized development process associated with a common area of business activities. The purpose of such initiatives is to fortify

the growth and competitiveness of a cluster. Bilateral development processes run solely with authorities or other companies are not considered cluster initiatives, since they do not constitute collaboration that intersects industry, administration and academia.

Table 1 lists five cluster initiatives in Kronoberg County linked to established sectors in the county—in traditional manufacturing industry as well as in new areas of growth, including: *Aluminium Works*—comprising regional and national companies in the aluminium industry; *Bioenergy Cluster Småland*—providing marketing support for companies and organizations in bioenergy; *Glassworks*—a collaboration in the marketing and selling of experiences and activities involving glass manufacturing in the region; *Furniture Works*—involving design—and furniture companies in Småland, and aimed at developing a strong trade region; and *Heavy-Duty Vehicles*—comprised of industry manufacturers and their subcontractors, and aimed at facilitating collaboration between the companies. The table shows selected financial data for the five initiatives (in SEK thousands).

Table 1. Cluster initiatives in Kronoberg Country

<i>Cluster initiative</i>	<i>No. firms</i>	<i>No. employees</i>	<i>Sales volume</i>	<i>Turnover/employee</i>	<i>Gross profit</i>
Aluminium Works	48	4,214	11,292,808	2,680	798,314
Bioenergy Cluster Småland	12	1,264	4,924,379	3,896	10,975
Glassworks	8	695	624,852	899	11,749
Furniture Works	25	445	846,578	1,902	78,336
Heavy-Duty Vehicles	15	7,936	28,085,183	3,539	880,338
TOTAL	108	14,554	45,773,800	3,145	1,779,712

The main purpose of the cluster initiatives identified in this study is to stimulate economic growth in various business sectors and, through collaboration, reinforce the competitiveness of the firms and the cluster. According to the respondents, cluster initiative activities include common marketing, business profiling, and lobbying. The cluster initiatives encompass over 150 companies, the municipalities in the region, and over 20 other collaborative partners, like universities and university colleges. Together, the companies employ over 21,000 in and outside the region (based on data on 114 of the companies). Cluster initiative recruitment is conducted from a branch perspective rather than geographic. Members range from one-man enterprises to large global corporations, and their operations involve trade as well as manufacturing and services in both local/regional and international markets. Most of the cluster initiatives receive financial support from the region, and several participate in national programs and cluster development ventures.

4.1.2. Regional networks

Regional networks are not necessarily geographically based; nor do they necessarily represent a specific cluster. The following regional networks were identified in this study and include initiatives that focus on mobilizing individuals and actors in their work on region-related future issues, as well as initiatives to support branch development: *Centre of Information Logistics (CIL)*—promotes education in information logistics, based on the needs and priorities of the business sector; *Delta Garden*—aimed at strengthening the competitiveness of companies by developing new forms of communication and dialogue based on interaction and a participatory perspective; *Destination Småland*—promotes tourism and the hospitality industry in the region through collaboration between the region, municipalities and companies in the visitor industry; *GodaHus, Energy Efficient Buildings in the Southeast*—aimed at developing work related to energy efficient buildings in the region through collaboration between public actors, universities, and companies; and the *Governor's Ambassador Network*—a relatively new network that mobilizes actors and resources for future development in Kronoberg. The task of the regional networks is to support development of the region's business sector, collaborate on education for the business sector, and to strengthen the attractiveness and competitiveness of the region. The work entails generating strategies for joint efforts, coordination of projects, and municipal education.

4.1.3. Local networks in the municipalities

The focus here is primarily on interactions between actors at the municipal level with a mutual interest in collaboration. There are business networks in all of the county's municipalities, and municipalities often have more than one. In Ljungby, for example, five business networks were identified, three of which are presented below. In other municipalities, there are also more networks than those presented below. Several of the networks have a long history, and were initiated and are operated by the local companies. *Lagan Products*, for example, dates back to the 1960s, while other networks, like *Vi företagare* in Tingsryd and *Growing Älmhult*, have been active since the end of 1990s. IKEA is a member of the Growing Älmhult network.

The local networks primarily focus on support and development of the local business sector. Promoting the attractiveness of the municipality, as well as its companies and industry, is however also important. Interaction between companies, and between companies and the municipality, forms the core of network activity. The 15 local networks encompassed in this study have more than 700 members in total.

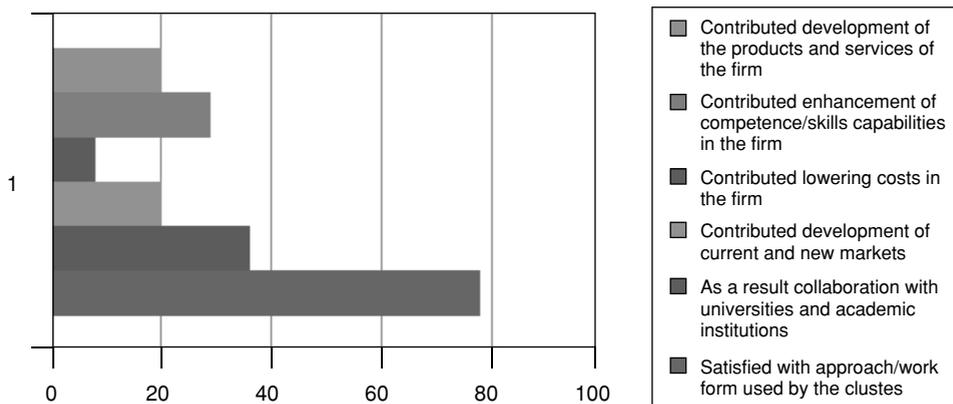
The local networks arrange breakfast meetings, common marketing, participation in trade fairs, initiatives to ensure continued access to an educated workforce, and collaboration with the municipality involving practical work experience for students. The networks have developed substantial collaborations with their municipalities, with well-established forms for continuous dialogue with municipal government.

4.2. Collaborations in clusters

A viewpoint commonly expressed by all respondents, which is also in line with extant literature (Osarenkhoe, 2010; Sami Sultan, 2014), is that collaboration in itself holds no value. Hence, it is crucial to substantiate any benefits derived from collaboration. In the end, a collaboration is not viable unless everyone feels they have gained. The benefits must be palpable to all of the actors involved. There is consensus among the actors surveyed in this study that benefits are what motivate them and other actors to collaborate and to contribute to jointly created preconditions for growth, both local and regional. Benefits accrued from clustering and networking were extracted from extant literature (Martin and Sunley, 2011; Menze and Fornahl, 2010; Osarenkhoe, 2010; Antoldi *et al.*, 2011; Cerrato and Depperu, 2011) and operationalized and, as noted above, can be manifested in different ways: advanced dialogue and consensus between partners; the potential to pool resources; access to an educated workforce; the potential for shared marketing and profiling; the potential for collaborations with universities and research institutions; and satisfaction with the work methods used.

Table 2 presents the perceptions of the cluster initiative actors in our study on the usefulness of clusters and networking.

Table 2. Firms' views on the benefits of clusters and networking



In a nutshell, *networking*, *dialogue*, and *experience exchange* were recurring themes in how the respondents expressed the benefits of collaborations in a cluster initiative setting. As one respondent put it:

Seminars and dialogue groups offer a good exchange of experiences, and increase the competence of the participating co-workers. Collaboration with the university provides an opportunity for specific, needs-based skills development activities and special education. In certain R&D areas, collaboration opens the way for external co-creation and financial resources. The largest benefits for my company are the recurring meetings and information exchange. This information is more concise and more relevant than the general reviews of the market situation available in various countries (like conferences, seminars, workshops, etc.).

Other benefits of cluster collaboration are the strengthening and development of the role of the business sector and that the cluster can function as a lobbyist in common matters. Collaboration in the cluster is also viewed as a way to market the region and make it visible, and as a means of increasing its attractiveness, which might help to entice new companies and entrepreneurs to the branch and the region. The respondents expressed their view on this as follows:

The cluster initiative is a means to market the region. Many more are attracted when companies come together. It increases sales volumes, and visibility, and thereby also the possibility of attracting more people to the branch [...] But it's still up to each company how to utilize that resource.

Another respondent described the different aspects of the benefit to firms, and what collaborating in clusters can entail:

Running joint projects, product- as well as knowledge-related, where staff from different companies and actors in the cluster participate, offers considerable added value for everyone, since the shared knowledge base in the projects grows considerably larger and, in particular, wider. We are also running projects and activities that individual actors wouldn't be able to carry out on their own. Having other actors from society present in the cluster is also very valuable.

The respondents' descriptions of the benefits of cluster collaboration convey a multifaceted picture of the needs and underlying rationale that motivate their firms to allocate time to collaborations. This picture is important in comprehending the dynamics of cluster collaborations and how a number of questions and aspects are involved in how the various actors perceive collaboration benefits. This may include issues with no direct or immediately foreseeable impact on a company's revenue or economic viability.

5. Discussion of the findings

Soft and hard benefits accrued from collaborations in clusters and networks

The foremost benefit of collaboration in clusters is «soft»: experience exchange, networking, and dialogue between companies and other actors. The companies are largely pleased with the forms of work in the cluster initiative. The most notable finding is that only 8% of the respondent companies agree that collaborating in clusters has led to reduced costs, e.g. through joint purchases or increased productivity. This contradicts earlier findings (Porter, 2000; Curran *et al.*, 1993; Martin and Sunley, 2011; Menzel and Fornahl, 2010; Karaev *et al.*, 2007; Venkataramanaiah and Parashar, 2007), that geographical proximity brings so-called agglomeration effects in terms of higher specialization, innovation and knowledge transfer, leading to a reduction of costs and improved competitiveness of industrial sectors, regions and nations.

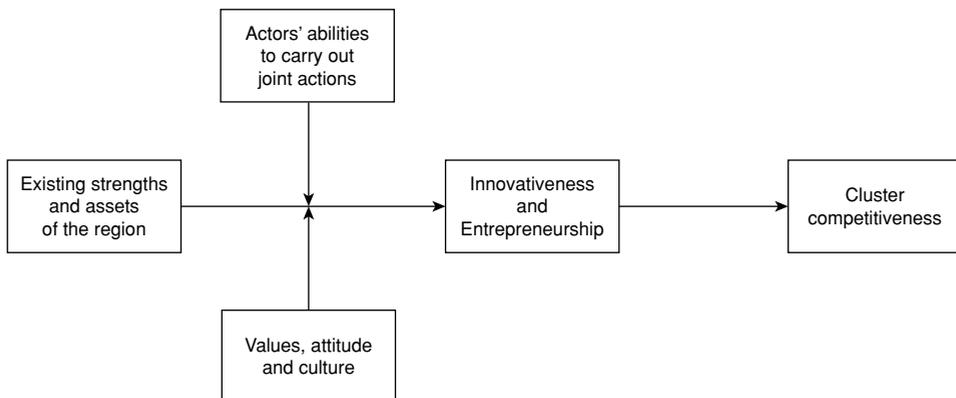
The above-mentioned anomaly is in contrast to the basic assumption of the open innovation model (von Hippel, 2001; Chesbrough, 2003), that much of the knowl-

edge useful for developing new products and services lies outside the boundaries of the company. This is particularly important for SMEs as they often lack the resources and capabilities (Antoldi *et al.*, 2011; Cerrato and Depperu, 2011) to manage the entire innovation process on their own, to turn their inventions into products or services. We therefore suggest clusters as a tool to alleviate these challenges, as there is mounting evidence that clustering and networking help SMEs to improve competitiveness (Venkataramanaiah and Parashar, 2007).

However, firms' perceptions of the benefits accrued from regional clusters, illustrate the complexity of the underlying motives for their participation in clusters. A number of different aspects of long-term sustainable growth of the companies and of the region are involved.

The analytical scheme presented earlier in Figure 1 is further refined and aggregated to an explanatory model of clusters and regional innovativeness. Figure 2 depicts an explanatory model of cluster and regional growth. A model (Figure 2) that emanated during the discussion of our findings below. Successful competitive regions base their growth and development on established areas of strength; they do not seek to develop completely new activities, but rather build on tradition, history, and competence in the region. But acting in the same way as always does not necessarily lead to success. Rather, it is the ability of renewing and developing existing assets in a region that creates the preconditions for competitiveness and growth in companies and regions.

Figure 2. Towards an Explanatory Model of Cluster and Regional Growth



However, innovation capability and entrepreneurship at an individual level do not sufficiently explain why certain regions are more successful than others in terms of creating the necessary conditions for growth. In prosperous regions, there is a contexture, a regional innovative environment founded on a consensus, and a capability for interaction between actors from different sectors of society. This has to do with cultures and values, and attitudes towards change and development, along with a framework for interaction. A region's leadership decisively affects its ability to

cultivate common values and joint actions. A regional leadership capable of creating a common consensus and establishing different forms of interaction, where different actors in the region move in the same direction, is imperative for building an innovative environment that promotes competitiveness and growth.

It can be deduced from the figure that interaction can be viewed as a four-phase process. The process starts with dialogue (to mobilize actors and resources) (Håkansson and Waluszewski, 2002; Van de Ven *et al.*, 1999) and formation of a common strategic idea, and continues with collaboration (the forming of common action plans for implementation) followed by joint action (implementation of the commitments and activities within the developed common frame and strategy). Partnership may also be regarded as a process over time, where the actors gradually acquire a shared view, with a simultaneous maturing of confidence and trust between the actors, that facilitates joint commitments and inputs (Ciravegna *et al.*, 2014; Johanson and Lundberg, 2011; Ter Wal and Boschma, 2011; Zeng *et al.*, 2010; Kontinen and Ojala 2011). The process calls for developing social capital that connects actors. This is particularly important when the environment is made up of actors with different organizational cultures (i.e. SMEs, MNEs, academia, government) (Lecler *et al.*, 2015).

6. Concluding remarks and implications

Mapping the salient features of existing clusters and networks and unveiling firms' perceptions of the benefits of regional clustering is the first step in a cluster development process. We mentioned earlier in the paper that our aim was to highlight the importance of interaction within and between society's stakeholders and how clusters and networking can contribute to long-term value creation that strengthens the competitiveness of companies at both the domestic level as well as in international contexts. On their own, SMEs are seldom able to develop the competencies, technology coverage, marketing skills, etc. required to meet all of the demands from the environment (Antoldi *et al.*, 2011; Cerrato and Depperu, 2011). However, these functions may well be developed by the companies through collaborating with others (Carbonara, 2002; Osarenkhoe, 2010). This enables them to acquire strategically crucial knowledge that can be converted into new products and services, thereby unleashing the dynamic potential of small enterprises and contributing, in the end, to economic growth.

The findings of this study that led the identification of «soft» and «hard» benefits accrued from collaborations in clusters invariably strengthens our understanding of the prerequisites for regional growth and competitiveness. In addition, we have identified the impact of soft factors such as regional leadership and governance, and interaction and joint action capabilities, emphasizing the importance of consensus and social capital. A model based on these critical factors, unveiling the factors relevant to cluster development and regional growth and how they interact with each other, has been presented.

Lessons learned from the preceding sections aptly depict that innovation capacity in companies, clusters and regions is an increasingly important factor in the development of competitiveness and growth. In order to establish long-term competitiveness, continuous development of new products, services and production processes is crucial. Innovation capacity is, along with entrepreneurship, decisive for sustainable development of companies and regions. In other words, efforts to stimulate growth and competitiveness among companies and regions are increasingly being focused on developing and renewing the resources available in a region. Achieving this requires strategic collaboration between various actors from various settings —businesses, private and public organizations, and academic institutions— thus epitomizing the notion that innovation entails new ways of configuring the resources of many actors, where the goal is to generate value for all of the parties involved. This places high demands on both the internal coordination of existing supplier chains as well as the ability to work together across industry and institutional boundaries.

The dynamic between short-term goals and long-term goals cannot be overemphasized in this case study. The most notable finding is that only 8% of the companies surveyed agree that collaborating in clusters has led to lower costs, e.g. through joint purchases or increased productivity, a far cry from other findings in extant literature. Short-term goals are important in order to create a driving force in the process and, in turn, the conditions necessary for more strategic, long-term efforts (e.g. establishment in culturally distant markets). Succeeding in processes of this kind demands perseverance and trust between the actors (Niu *et al.*, 2011; Malecki and Fornahl, 2012). Achieving tangible results from a cluster initiative often takes years. This time factor, puts the perseverance and trust of stakeholders to the test.

Further research is needed on how SME clusters can be significantly upgraded to enhance cluster productivity, competitiveness and participation in international markets. Such analysis can help diagnose a region's economic strengths and challenges and identify realistic ways to shape the region's economic future. Future research directions in clustering should also examine the constraints with respect to innovative capacity.

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Intra-Cluster Cooperation Enhancing SMEs' Competitiveness - The Role of Cluster Organisations in Poland

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ABSTRACT: The determinants of SMEs' competitiveness and, in particular, the constraints faced by SMEs, as well as the implications of the barriers for a firm's growth have been investigated by a great number of researchers. Despite the popularity of the studies focused on SMEs competitiveness this topic is not losing its relevance, since SMEs are backbone of national economies. The issue is of even greater importance for post-transition economies. In this paper, we argue that intra-cluster cooperation, which should epitomise the genuine and fully fledged cluster, provides cluster firms, in particular SMEs, with advantages and thus can assist SMEs in upgrading their competitiveness. Special role play in this respect also dedicated cluster organisations. The conceptual part of the paper is accompanied by empirical considerations. Best practices from selected Polish clusters dominated by micro, small and medium enterprises are presented-

JEL Classification: O30; D85, R10.

Keywords: cluster; cooperation; competitiveness; cluster organisation; SME; Poland.

La cooperación intraclúster mejora la competitividad de las PYME: el papel de las organizaciones de clusters en Polonia

RESUMEN: Los factores determinantes de la competitividad de las PYME y, en particular, las limitaciones que deben afrontar, así como la implicación de barreras para el crecimiento de cualquier empresa, han sido investigados por un gran número de expertos. A pesar de la popularidad de los estudios centrados en la com-

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Received: 30 may 2017 / Accepted: 20 July 2017.

petitividad de las PYME, este continúa siendo un tema de especial relevancia, ya que las PYME son la columna vertebral de las economías nacionales. La cuestión cobra mayor importancia en el caso de las economías posteriores a la transición. En este estudio sostenemos que la cooperación dentro del clúster, que ha de ser el epítome del clúster genuino y plenamente desarrollado, ofrece a las empresas del grupo, y en particular a las PYME, una serie de ventajas que pueden ayudarlas a ser más competitivas. En dicho contexto las organizaciones de clusters juegan un papel destacado. La parte conceptual del estudio vendrá acompañada de consideraciones empíricas. Asimismo, presentaremos las mejores prácticas de una selección de clusters polacos dominados por las microempresas, las pequeñas empresas y las medianas empresas.

Clasificación JEL: O30; D85, R10.

Palabras clave: clúster; cooperación; competitividad; organización de clusters; PYME; Polonia.

1. Introduction

The focus of this study is the intra-cluster cooperation. The literature provides a huge number of definitions of clusters. The roots of this phenomenon go back to the works of Alfred Marshall (1920) and his theory of industrial districts. In his theory, Marshall highlighted the significance of agglomerations and resulting externalities from localized cooperation among entities within industrial districts. Nowadays, the most popular approach to business clusters is associated with Michael Porter who defined clusters as geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions (e.g., universities, standard agencies, trade associations) in a particular field that compete but also cooperate (Porter, 2000, pp. 15-34). Enright (1996, p. 191) explained that «A regional cluster is an individual cluster in which member firms are in close proximity to each other». Van den Berg, Braun and van Winden associated clusters with «local or regional dimension of networks» (2001, p. 187).

In general, what determines a cluster is the focus on a core industry with high level of specialization, existence of a large pool of firms that constitutes the critical mass; operation of R&D and business-support institutions in spatial proximity engaged in vivid interactions based simultaneously on competition and cooperation among the three types of entities (Markusen, 1996; He and Fallah, 2011, Ketels and Memedovic, 2008).

Bearing in mind the Marshallian approach to industrial district and further the Porterian concept of a cluster based to some extent on the previous one, we can state that clusters are founded on two critical dimensions —the spatial one and the relational one, thus they can be regarded as spatially embedded networks. The entities from the three different sectors - business, R&D and administrative sectors are inter-related and the relationships are horizontal or vertical in nature. The relationships in

cluster's network are the basis for information exchange and offer access to resources and capabilities of other cluster entities (Gulati, 1999). The spatial dimension enables firms to easier share information and thus to learn from possible mistakes of other entities. Thus, clustering supports small and medium enterprises to overcome the growth constraints and compete in international markets, which means that clusters are conducive to cope with the issue of the liability of smallness (Aldrich and Auster, 1986; Kale and Arditi, 1998). Cluster SMEs can namely capitalize on different inter-firm collaborations within clusters, in order to enhance the growth in the face of various constraints deriving from the size liability (Hessels and Parker, 2013).

In this paper, we seek to unpack this positive impact in more details by distinguishing the main channels of influence. Therefore, the goal of our study is to unearth the foundations of cluster's facilitating role in enhancing SMEs competitiveness by drawing on a sample of Polish clusters. We argue that intra-cluster cooperation helps alleviating and overcoming the problems of various nature resulting from the «liability of smallness». It provides framework for developing innovations and improving efficiency, hence, it generates concrete advantages. To achieve the research goal, we conduct the literature review and put forward the framework organising our research considerations and we use the case study method drawing on Polish clusters. The rest of this article is structured as follows. First, we present the literature background briefly introducing the concept of intra-cluster cooperation —its nature and related advantages. Based on these considerations conceptual framework of the study is developed. Next, using the case study approach the key research issue is discussed on the cases of a few Polish truly operating clusters, whose growth has been fostered by cluster initiatives and cluster organisations. Finally, the paper provides some concluding remarks, summing up the conducted study.

2. Literature review

2.1. The nature of intra-cluster cooperation

The creation of value and «relational advantage» through inter-organizational relationships arising from collaboration, and the capacity to capture the «relational advantage» has been investigated by many researchers (Saxenian, 1991; Child and Faulkner, 1998; Dyer and Singh, 1998; Barringer and Harrison, 2000). In times of innovation-driven economic growth, when risks and costs of innovation substantially increased, SMEs need to focus much on the research capability and on the ways to reinforce their knowledge and research intensity (Hagedoorn and Schakenraad, 1992; Dodgson, 1993; Coombs *et al.*, 1996).

One of the distinguishing feature of a cluster is co-operative relationships among its entities, which in case of cluster firms are to be accompanied by competitive relations. According to Anderson and Narus (1990) cooperation can be defined as the complementary actions taken by firms in interdependent relationships to achieve mutual outcomes. Morgan and Hunt (1994) underline that to be an effective competitor

in the global economy firms need more cooperation and networking. However, within cluster the cooperation can take place not only among firms, but among them and R&D institutions, business-support organizations and local or regional government. Thus, the scope of potential co-operative constellations is diversified and rich.

Co-operation, which is one of a few characteristic features of a cluster creates the relational proximity among cluster entities and the relational proximity is supported by the spatial proximity. Clusters are conducive to cooperation since partners involved are sufficiently physically close to allow frequent interaction and effective exchange of information (Maskell, 2001). This proximity fosters the interaction in both formal and informal settings (Birley, 1985). Since clusters are founded on social networks, which function within a particular geographical space, they create a specific culture and often even the language and vocabulary used by local specialists can be specific to a region where a cluster operates (Saxenian, 1994). These factors facilitate the intra-cluster collaboration (McKelvey *et al.*, 2002). The intra-cluster co-operation emerges from the focus of cluster firms and institutions on a common goal that to be achieved calls for collaboration. Co-operation is accelerated by the mutual trust, which is a kind of side-effect of co-operation on the one hand, and on the other hand it is a pre-requisite for cooperation. Schmitz and Nadvi (1999, p. 1503) state that trust enables the competing firms to cooperate which results in joint actions. This kind of actions generate collective efficiencies that emerge from complementary specializations of cluster actors and from better coordination (Pouder and St. John, 1996; Pyke and Sengenberger, 1990).

Intra-cluster cooperation develops over time, but only if there is a trust among cluster actors. Emergence of trust-based relations is within clusters on the hand easier since their actors operate in spatial proximity and can better monitor their behaviour, on the other hand however, it is more difficult since cluster firms are engaged in vivid, sometimes devastating rivalry for local markets (Florida and Kennedy, 1990) and it can create distrust (Zand, 1972). To increase the level of mutual trust among cluster actors, in particular, firms functioning of business associations, governmental and multilateral agencies, and in particular cluster organizations can be established (e.g., Altenburg and Meyer-Stamer, 1999; Schmitz and Nadvi, 1999). They are the result of implementation of cluster initiatives which according to - Sölvell, Lindquist and Ketels (2013, p. 1) «are organized efforts to increase the growth and competitiveness of clusters within a region, involving cluster firms, government and/or the research community». Cluster organizations are a formalized platform for cooperation and their activities help to reduce information asymmetry as well as limit opportunistic behaviour. A cluster organisation is a tangible manifestation of cooperation between cluster entities, though, it usually does not include all the cluster actors.

2.2. Advantages of intra-cluster cooperation

Intra-cluster cooperation and its intensity is crucial from the perspective of cluster actors, especially cluster firms trying to take advantage from their involvement in

clusters (e.g. Humphrey and Schmitz, 1996; Porter, 1998). Intra-cluster cooperation is more probable, when more cluster firms can supplement their confronting interactions with trust and collaboration. The replacement of pure rivalry in some areas with collaboration means, that linkages among actors emerge. Swann and Prevezer (1996) argue that clusters focused on industries, where multiple linkages can be created are characterized by stronger growth, which is associated with development of cluster-specific advantages.

Cluster-specific advantages can contribute to the competitive advantage of cluster entities, in particular, the cluster firms. Bearing in mind that competitive advantage enables a particular firm to perform better in comparison to rivals, generally we can argue, that the advantage may be efficiency- or innovation-driven. The efficiency driven advantage goes in line with the attempts to decrease the costs of operation and the innovation-driven advantage is related to differentiation from competitors. This approach is consistent with the simple and traditional perception of the competitive strategy characteristic for Porter. Cooperation that coexists next to competition within clusters leads often to differentiation and innovation in products and services.

Efficiency-driven advantages are related to opportunities to reduce costs of operations. The chance to decrease the cost of operations results from a set of factors, i.e. better access to specific information; easier and broader supply of labour force and access to capital resources; complementing one another activities by cluster entities and great opportunities for economies of scale. This kind of advantages contribute to the productivity, which can be leveraged outside the formal boundaries of individual firms.

Tether (2002) underlined, that cooperating firms are often involved in higher level innovative activities. Cooperation in R&D contributes positively to innovation (e.g. Faems *et al.*, 2005; Cincera *et al.*, 2004; Belderbos *et al.*, 2004) and linkages in this area may be a source of competitive advantage (Lambooy, 2004). Thus, cooperation is conducive to innovation processes (Fritsch and Lukas, 1999; Fritsch, 2003; Kaufmann and Wagner, 2005; Medda *et al.*, 2006). Innovation-driven benefits emerge very much from cooperation since it creates opportunities to share knowledge and exploit knowledge spill-overs (Lundvall and Johnson, 1994, p. 26). Innovations, which arise from operations within clusters represent often the result of interactive model of innovation processes (Johannessen, 2009), which means that innovation is the outcome of interactions between people, organisations and the environment. Innovation emerges from the relationships between entities with different knowledge resources rather than from knowledge resources alone.

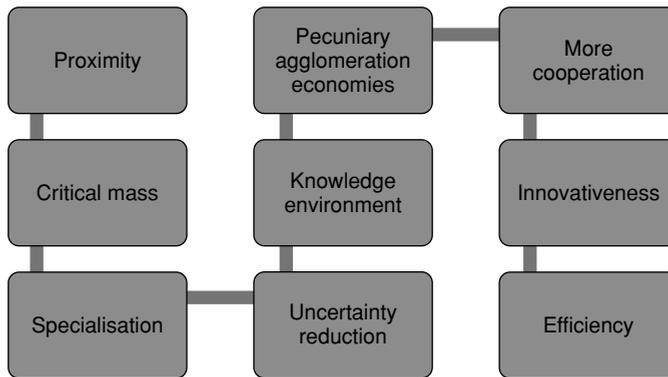
Cooperation, which manifests itself in networking is the way to exchange the tacit and codified knowledge. In case of tacit knowledge, the geographical proximity is particularly important (Cooke and Wills, 1999; Hilpert, 2006; Dosi, 1988; Leonard and Sensiper, 1998). Thus, the aspect of cluster proximity positively impacts the knowledge, in particular, the tacit knowledge exchange and further the innovation activities. Geographical and cultural proximity facilitates cooperation which makes innovation efforts less risky, allows the innovating entities to get access to critical

innovation inputs and it increases the level of trust among cluster firms (Sternberg, 1999; Arndt and Sternberg, 2000; Sapsed *et al.*, 2005; Koschatzky, 1998; Amara *et al.*, 2005). Thus, we can assume that within truly operating clusters, that grow gradually over time, a kind of self-reinforcing mechanism works that develops the pool of multiple cluster-benefits.

3. Conceptual framework linking intra-cluster cooperation with competitiveness gains for SMEs

As briefly discussed in the previous part, clusters are seen as attractive locations providing conducive environment for business, in particular for SMEs. Given the breadth and comprehensiveness of cluster definition, and, in the light of numerous possible advantages provided by clusters, in this paper we propose to look at the cluster role for SMEs competitiveness in a systemic and more focused way. We put forward some framework enabling the analysis, which refers to the cluster’s features on the one hand, and innovativeness and efficiency as crucial determinates of competitiveness on the other hand (Scheme 1).

Scheme 1. Basic components linking clusters with intra-cluster cooperation and expected advantages

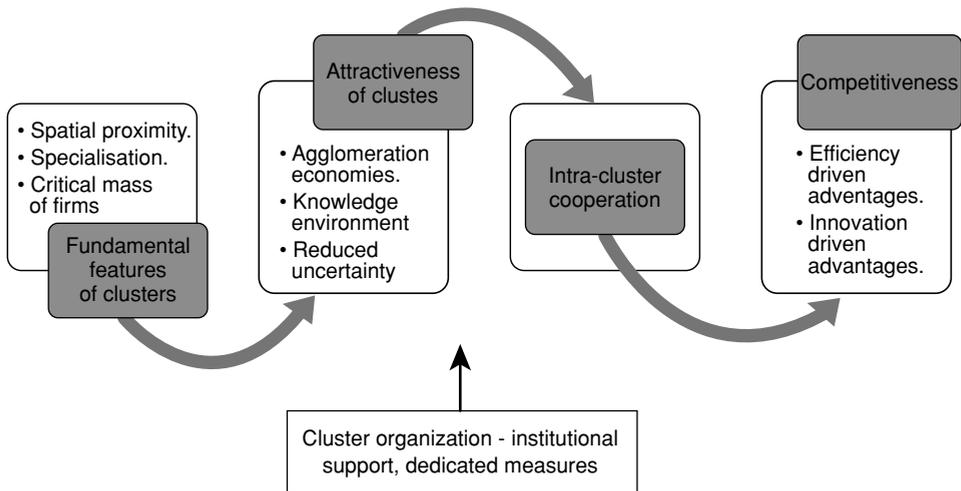


Source: Authors’ own proposal based on the literature review.

The chain of our reasoning is following. The proximity and critical mass of entities being specialized in given field/industry, in other words, all this what constitutes the backbone of cluster, enables achieving three main advantages (Götz, 2009), which are: pecuniary agglomeration economies, conducive knowledge environment and reduced uncertainty. These components work towards more cooperation among firms. They facilitate closer interactions among small and medium companies inhabiting given cluster. More cooperation in turn enables reaching advantages, otherwise impossible to achieve due to size/smallness liability, which are

enjoyed usually by larger firms —such as more expertise, better negotiating power, economies of scale, more innovations due to shared activities, etc. Clusters, hence, by its very nature and thanks to the idiosyncratic features (specialization, critical mass, proximity) offer conducive environment facilitating cooperation, which in turn enables reaching advantages of innovativeness and efficiency. However, enhanced innovativeness and efficiency can be achieved also directly thanks to the distinguished sources. Namely, knowledge spillovers and environment conducive for knowledge creation certainly contribute to the innovativeness advantages. Pecuniary agglomeration economies and critical mass of specialised entities seem to create the foundations for efficiency advantages. The lower level of uncertainty as provided by mature clusters with well-developed supporting entities such as cluster organisations in turn seem to affect both types of advantages. Improved trust relations, mutual understanding, shared values, and norms all what make up the third component of cluster attractiveness positively impact both —firms' efficiency as well as innovativeness (Scheme 2).

Scheme 2. Clusters as attractive locations facilitating inter-firm cooperation and providing competitive advantages



Source: Authors' proposal based on literature review.

We suggest as one of the possible channels of cluster influence on firms' competitiveness the enhanced inter-firm/intra-cluster cooperation which is a central component. It translates into efficiency —and innovation-driven advantages, which consequently determine firms', in particular, SMEs' competitiveness. This intra-cluster cooperation is in turn possible thanks to the idiosyncratic features constituting the backbone of clusters and making these places attractive locations. As the case of Polish clusters demonstrates, special role in additionally reinforcing these interdependencies can play cluster organisations.

The efficiency —and innovation-driven advantages impact the competitiveness of cluster firms that being more competitive in terms of costs of operations and/or innovation are better equipped to internationalize. Thus, cluster can accelerate firms' internationalisation via the efficiency and innovation-gains and additionally via the activities of cluster organizations. The locally generated advantages for cluster firms in terms of efficiency and innovativeness may trigger the internationalisation. The competitive advantage in the domestic market is a pre-requisite for internationalisation, which is presented in the Uppsala model of internationalisation (Johanson and Vahlne, 1977, 2009). The relationships with other cluster firms partially co-create the advantages for cluster firms. In case any of the related firms has internationalized, the relationships may work as a springboard for a particular firm internationalisation. The springboard mechanism was exposed in the network approach to internationalisation (Johanson and Mattson, 1988).

When cluster firms are developing their cooperation exploiting the cluster organisation, this entity may become a platform for foreign expansion. Cluster organizations are a pro-internationalisation entities since they may establish relations with other cluster organisations and it is assumed to result in creating ties between enterprises or research and development institutions, which are part of the organisations. The pro-internationalization activities of a cluster organisation manifest themselves in the initiation of international cooperation as well as their acting as an intermediary in contacts with foreign partners. Intra-cluster cooperation which may be formalized as a cluster organization supports companies in gaining access to foreign markets through identifying potential business partners as well as organising foreign business trips and trade missions. It generates additional efficiency-gains since cluster firms can promote their products without incurring large costs, and the cluster brand which a cluster organisation uses contributes to the perception of cluster firms. A cluster organisation provides often firms with information about foreign markets obtained through market research, as well as represents cluster firms in business negotiations with larger and sometimes stronger business partners.

Summing up, we can conclude that the efficiency-advantages and innovation-advantages accelerate the creation of competitive advantage of cluster firms which is of high importance, if not a necessity, for the firms which are eager to expand abroad and plan becoming international in nature. The advantage may be discounted *via* expansion of cluster firms in the domestic, as well as in foreign markets which means their active outward internationalisation.

4. Methodology of the empirical study

In our study, we apply the case study method since this method may be used to generate or develop a theory on the basis of empirical data. The case study research method may be defined as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clear; and in which multiple sources of evidence are used (Yin 1984,

p. 23). Martínez-Fernández (*et al.*, 2012) underline that this method of qualitative research represents approximately 7% of the studies on industrial clusters.

Case studies help to understand some complex issues. They can be single or multiple. In our research, we follow the multiple-case study, which may be adopted with real-life events that show numerous sources of evidence through replication rather than sampling logic (Zainal, 2007). Yin (1994) explains that generalisation of results from case studies stems on theory rather than on populations. Multiple-case studies enhance and support the previous results. Multivariate cases can be explained by a problem-solving theory among others (Yin and Moore, 1987). The products of the problem-solving theory are the results of ideas and discoveries from external sources (Zainal, 2007, p. 3).

According to Yin (1984) there are two key types of case studies —exploratory and explanatory. If we want to understand the context, the settings of a phenomenon, we apply the first type (Dyer and Wilkins, 1991; Guba and Lincoln, 1994; Langley, 1999). Applying this method, we try to answer the broad research question if the intra-cluster cooperation is a mediating force in the impact of clusters on cluster firms' competitiveness. Conducting the research presented in the paper, we attempt to extend the knowledge on the role of clusters in the upgrading of cluster firms competitiveness, we attempt to present the mechanism how clusters may support firms' efforts to be more competitive. The study is to add some new findings and arguments to what is already known from the previous research focused on the broad topic of cooperation within clusters and to bridge the Porterian concept of competitive advantage of firms with the concept of clusters.

The data sources are secondary and primary in nature. The secondary sources are the latest reports on clusters in Poland, in particular, the reports of Polish Agency for Enterprise Development (PARP, 2012; 2014), information available on the Internet and articles in the business press. The primary data is the expertise of one of the authors, who is an entrepreneur involved in one of the clusters in Poland and simultaneously a cluster manager representing a particular cluster organization.

Our unit of analysis is the cluster which is supported by a cluster initiative formalized as cluster organization. The key characteristics of our sample clusters represented by cluster organizations are presented in Table 1.

Next part discusses the findings of our study with reference to the distinguished two types of advantages.

5. Findings

5.1. Efficiency-driven advantages

Cluster firms may enjoy efficiency-advantages thanks to cooperation within a cluster and the advantages may be even greater, when the cooperation is facilitated and further formalized by a cluster organization. Cluster organizations develop ser-

Table 1. Cluster organisations in investigated sample

<i>The name</i>	<i>Core industry</i>	<i>Year of the establishment of COs and its legal form</i>	<i>Number of firms</i>	<i>No. of R&D organisations</i>	<i>No. of BSO</i>	<i>Other types of organisations</i>	<i>Foreign markets served by cluster firms and the cluster organisation</i>
Leszno Printing and Advertising Cluster	Printing	2006, association	39	3	2	2	Germany, France, Spain, Portugal, Slovakia, Czech Republic, Lithuania
Gdański Construction Cluster	Construction	2007	52	5	No data	4	No data
Bydgoszcz Industrial Cluster	Polymers	2006 association	56	4	5	3	Germany, Russia, Slovenia, Czech Republic, Denmark, Sweden, Portugal, France, Spain, China, the Netherlands, Lithuania, Romania, USA, Ukraine
Wielkopolski ICT Cluster	IT	2008 association	63	3	7	1	USA, Germany, France, Italy, Belgium, The Netherlands, Spain, Portugal, Austria, Czech Republic, Slovakia, Romania, Sweden, Denmark, Finland, Lithuania, Latvia, China, Georgia
Life Science Cluster	Life science	2006 cooperation - agreement	52	11	7	6	Germany, USA, UK, France, Russia
Aviation Valley	Aviation	2003 association	85	4	4	1	France Canada, USA, Denmark, Spain, Germany, Turkey, Hungary, UK, Italy
Eco-Energetic Cluster EEI - Energy, Ecology, Innovation	Renewable energy		10	8	3	3	Germany
West Pomeranian Chemical Cluster „Green chemistry»	Chemistry	2007 association	74	5	2	30	USA, Sweden, Denmark, Finland, Belgium, Czech Republic, France, Spain, UK, Lithuania, Latvia, China, Georgia
Kom-cast Cluster	Metallurgy	Cooperation - agreement	46	9	11	53	Russia, Kazakhstan, USA, Latin America
West Pomeranian ICT Cluster	IT	2009 foundation	119	13	4	2	Norway, Sweden, UK, Belgium, Finland, France, Spain, the Netherlands, Germany, USA, Italy

Source: authors' own expertise and web-sites of the cluster organisations.

vices aiming to support the cluster firms. The services are offered for remuneration, but the positive thing is that the cost of a service is often included in the membership fee paid by the cluster firms. Thus, the money is kept in a way within a cluster since it contributes to the cluster organization, which works as a platform of cooperation. The value-adding support stemming from the operations of a cluster organisation is visible among several clusters in Poland.

One of the supported clusters is the Life Science Cluster in Krakow, in Poland (<http://lifescience.pl/en/>). The core industry of the cluster is research and development related to biotechnology, pharmacy, medicine, cosmetology and environmental protection. The cluster embraces firms and research institutes functioning in the above-mentioned sectors. Part of the entities formally joined the cluster organization and formalized their cooperation. Cluster firms may use tools for internet communication and marketing and participate in conferences, trainings, workshops and seminars organized by the cluster organization. These events are dedicated to cluster entities and often offered at lower price. In the Life Science Cluster, firms can choose a particular package of services: standard, silver and gold. The price of each package of services depends on the scope of the package and on the size of the cluster firm. Thus, cluster entities are supported in their operations and simultaneously an income for the cluster organization is generated, which further is used to support other needs of cluster entities. Additionally, to make the communication more efficient cluster entities use a Podio platform, which is an online platform for companies and other organizations to conduct their operations. Cluster entities take advantage of Intranet. It accelerates the exchange of information among cluster's members and contributes to the exchange of codified knowledge. Despite it, the Intranet function supports cluster firms in daily activities since it includes: an events calendar, project management module, meeting notes. It allows to update information on possible sources of financing downloading the information directly from the websites of proper institutions, like e.g. the National Science Centre, the National Centre for Research and Development.

Specific cluster platforms to improve the internal communication with the use of IT tools are quite popular among ICT clusters focused on software, multimedia, telecommunication networks and IT outsourcing to enable seamless flow of information (data, documents). In the Polish reality there are a few concentrations of IT firms and related businesses, that decided to formalize their cooperation in the form of a cluster organization and exploit this mode of cooperation to generate efficiency gains for their members, e.g. the West Pomeranian ICT Cluster (www.klaster.it), Wielkopolska ICT Cluster (www.wklaster.pl/en). That all stimulates vivid cooperation within the cluster.

Attempts to increase the efficiency of communication is characteristic for a cluster concentrated around the casting industry, embracing foundries in Poland and is located in the three regions of Eastern Poland, i.e. the Podkarpackie region, the Lubelskie region, and the Świętokrzyskie region (<http://www.kom-cast.pl/en/about-us/>). This cluster grows on the foundation of the interwar traditions of the Central

Industrial District in Poland. Firms that decided to formalize their cooperation developed the Virtual Scientific and Technical Information Centre. It is a portal which gives access to current information on business trends in the industry presented in domestic and foreign journals and on results of R&D conducted by scientific centres. The Virtual Scientific and Technical Information Centre possess the Foundry Tech software enabling execution of engineering calculations. Cluster firms are offered economic consulting services (trade, marketing, intellectual and industrial property protection) and professional, industrial experts' consulting that contributes to the development management process. These benefits —free of charge consulting— are of greater importance for SMEs that lack resources. The free flow of data and knowledge among cluster entities improves on the one hand efficiency of casting technical documentation design, but has the potential to improve innovativeness since it supports the update of technical knowledge.

Offering specific services to cluster firms is sometimes accompanied by joint procurement actions. The mechanism of these actions leads to the decline of costs borne by cluster entities. Joint procurement is used by several Polish clusters and in particular it is popular in clusters focused on construction industry, like the West Pomeranian Construction Cluster, which develops different purchasing groups for fuel, energy, phone subscription. Efficiency-driven advantages are characteristic for concentration of printing and advertising firms located in a few districts of Wielkopolska region. The cluster entities have developed an interesting and efficient mode of networking, which got the name of creative homelessness (Jankowska, 2012). The meetings of cluster entities, that decided to formalize their cooperation take place each time in the premises of a cluster entity. It gives the chance to learn more about this particular entity, supports the creation of trust which is crucial in clusters and doesn't call for any extra financial support to maintain the premises dedicated to networking.

The brief review of selected cases of cluster organisations demonstrates, that Polish clusters indeed allow their member firms to increase efficiency by reducing the costs of certain business activities - transaction costs, decreasing the procedural and administrative burden, facilitating exchange of information, or increasing the bargaining power and improving the negotiating position, when it comes to joint purchases, etc.

5.2. Innovation-driven advantages

Cooperation within a cluster is to create for cluster firms the efficiency gain, but innovation-driven benefits as well. Clusters working with or without the formal representation of a cluster organization are conducive to pro-innovation business and science cooperation. To upgrade the innovativeness of firms it is important to know their innovation needs and weaknesses in terms of innovative input. Thus, cluster organizations conduct often innovation audits to diagnose the innovativeness level of cluster firms and further to start discussions with potential supporters, especially from the R&D sector. The innovation audits allow to define the training needs of clus-

ter firms, which on the one hand contributes to the level of expertise of the business sector and, on the other hand creates potential customers for the services of R&D institutions. Such activities are visible in different clusters. It works well in the spatial concentration of firms operating in the tool, processing sector and the chemical sector in the Kujawsko-Pomorskie region. There are located firms involved in modern processing tools and detailed elements made of plastics (<http://www.klaster.bydgoszcz.pl/index.php5?lang=en>).

The innovation audits allow to identify the gaps within the innovation inputs thus often the needs of firms and to define the hierarchy of the needs related to the innovation input. This kind of practises were implemented in the Leszno Printing and Advertising Cluster, too. In this case the R&D partner —the Research and Development Centre for the Graphic Arts participated in many working meetings coordinated by the cluster organization dedicated to the Leszno Printing and Advertising Cluster and provided expertise relating not only to the printing industry, but also in terms of market analyses, support programs for knowledge transfer, joint development of R&D projects, as well as assistance in obtaining public funding for the implementation of these projects (Główka, Jankowska, 2014). The established cooperation led to the development of three joint projects and applying for funding from the Polish Agency for Enterprise Development within the programme ‘Innovation voucher’ programme in 2008. Despite the fact, that these three projects were rejected, cooperation flourished. The entrepreneurs and the researchers improved the projects together and later two of them were successfully re-submitted. In 2009 both received funding from the Agency.

The joint projects between business and R&D are easier to develop and to realize within clusters since in this cooperation a cluster organization as an intermediary is involved. In the chemical cluster in West Pomerania, that embraces firms exporting chemical products to Western European markets, Asia or America four projects under international initiative CORNET (Collective Research Networking), aiming at combining science and business: SubWex (subcritical water as a «green» solvent used for extraction of plants), SmartFlowerPack (development and implementation of intelligent packaging system based on biomaterial designed for packing flowers - B2B solution), FreshCoat (functional use of edible coatings to extend the shelf life of fresh foods), ExtruMIBI (preparation and application of thermostable natural antimicrobial agents) are implemented. The cluster firms cooperate with the Centre of Bioimmobilisation and Innovative Packaging Materials (CBIMO) of West Pomeranian University of Technology in Szczecin.

Great advantages in the field of innovativeness are characteristic for the aviation cluster operating in the South East of Poland (<http://www.dolinalotnicza.pl/en/>). The concentration of companies from the aviation industry, research institutes and educational and training entities is famous for its innovative solutions and products. Ninety of the aviation firms developed the association - Association of the Aviation Industry Entrepreneurs «Aviation Valley». It started to cooperate with other associations of aviation companies, that represent the Polish Aeronautical Technology

Platform. Together they initiated and signed an agreement with the National Centre for Research and Development concerning the establishment of a sector programme for aeronautics INNOLOT at a national level. This programme financed by the National Centre for Research and Development in Poland aimed at intensification of the growth of R&D in strategic sectors of Polish economy, in aviation among others. The key results of the cooperation are to increase the share of end-products in Polish aviation industry and upgrade the Technology Readiness Level developed by research institutions. The cooperation resembles the approach of the European JTI Clean Sky (<http://www.cleansky.eu/>) and it is not to be limited just to the aviation cluster firms in the South East of Poland, but to all firms in Poland involved in the aviation industry, among which there are a lot of small and medium enterprises.

Advantages contributing to innovativeness of cluster firms arise often from the opportunities to develop knowledge and competences in the cluster. This kind of benefits are visible in each cluster, but in the Polish landscape there are a few clusters relatively more famous for that. In the Lower Silesia region operate many Polish and foreign enterprises, research organizations and business-support institutions focusing on the renewable energy (<http://en.klaster-eei.pl/content/offer>). The firms are often employing biomass technologies such as biogas plants or local heat plants using biomass. Since this region needs very much to shift towards green energy the companies expect growth and to respond to the challenge they need skilled workers and professionals. Within the cluster there operates the School Complex and Educational Centres in Bielawa, where into the curriculum the technician in the «Renewable energy systems» was introduced. It was the first school in Central-Eastern Europe, which decided to educate technicians in this field. Cluster firms and their association participated in the reviewing of the curriculum and assisted in implementing it. A relatively big success was the inclusion of this profession in the Ministry of Education profession list. The school cooperates with the Wrocław University of Technology, that has access to a specific laboratory owned by the school. This laboratory is used in the research and development at the University and in teaching focused on renewable energy issues. This kind of cooperation is crucial from the perspective of the human resources development. The lack of professionals is sometimes an obstacle in the growth of a cluster. It is the case of the cluster of firms focused tool and processing sector and the chemical sector mentioned at the beginning of this section. It is located in the North West of Poland. To cope with this challenge firms lobbied to open a class on-demand in one of the vocational and technical schools dedicated to tool making and processing industry. The benefits are mutual for the education sector and for firms. Students have great opportunities to get an internship in cluster companies and they receive a scholarship, which presently is financed by the Municipal Office of Bydgoszcz and is to be financed by the cluster entities in the future. To motivate young people to learn and work hard an award for the best student was established. Cluster firms cooperate with the Continual Education Centre. Thanks to the efforts of cluster firms the centre was equipped with injection pumps. Thanks to that unemployed people can be trained as injection pump setters and later to get a job in the cluster firms. Another co-operative initiative was the development of a class profile

«Cooling and Air-Conditioning», which seems to be an innovative direction in the region and even in Poland.

Similar approach to cope with the lack of human resources for the core industry firms in the cluster was implemented in the Aviation Valley in southern Poland. The cluster organisation representing the whole Aviation Valley community cooperates with the Marshal Office of the Podkarpackie Region within a project «Modernisation of the vocational training offer in relationship to the regional labour market». Five key firms from the cluster declared their willingness and readiness to conduct a series of training and coaching for the teachers and apprenticeships for the students from technical high schools. The pro-educational cooperation within the region is accompanied by study visits of cluster firms in other modern aviation companies in foreign markets. The study visits are quite popular in the case of other clusters too. Thanks to the cooperation focused on the education issue the products and services offered by the clusters are of better quality and more innovative.

Short review of selected Polish clusters offers evidence of the beneficial role played by cluster organisations in generating innovation conducive environment. This happens in various ways, by providing matchmaking forum, facilitating joint application for external research and development grants, coordinating the cooperation with high schools and universities and, last but not least, by simply being a neutral broker supervising the strategic activities in the area of science and knowledge exchange.

6. Conclusions

Sometimes clusters are perceived as a localised network of firms, embracing often small and medium enterprises that benefit from joint actions. These actions result in the development of capabilities, allows upgrading of skills and involves establishing public private partnerships.

Clusters thanks to their idiosyncratic features provide numerous advantages which can address the likely liability of smallness suffered by SMEs. This can happen via the intra-cluster cooperation which being a peculiar functional glue channels in a way the cluster externalities directly to small companies. Hence, it bridges the cluster positive effects with member's needs. This cooperation can be additionally facilitated by activities of dedicated cluster organisations. These can further reinforce the beneficial linkages, enhance more collaboration exchange of knowledge or other forms of cooperation and if necessary alleviate any conflicts, harmful processes distorting the intra-cluster relations such as abuse of domain position etc.

The aim of the paper was to highlight the mediating role of intra-cluster cooperation for the competitiveness of cluster firms. The study shows the positive impact of intra-cluster cooperation on the strategic capability and competitive strategies of cluster firms. First, we put forward the framework comprising the critical components linking cluster features with strategic advantages. This scheme derives from literature review and seeks to structure the exploration of possible cluster role in im-

proving the SMEs competitiveness. Second, we study selected pool of Polish clusters trying to assess their contribution to the identified advantages.

Presented cases of Polish clusters allow us to argue that these hubs with strong support of dedicated cluster organisations indeed facilitate cooperation enabling reaching crucial advantages. Based on these cases we can also find that, the investigated intra-cluster cooperation:

- depends to high degree on the commitment of cluster organisation's managers,
- needs some top-down assistance - ministry initiatives can often trigger the development of such collaboration not only assist it later on,
- exists even when lacking clear cluster branding and identification i.e. when there are only genuine bottom up and spontaneous interactions,
- can expand the boundaries of one cluster and stretch to other clusters.

The interactions among locally concentrated entities which manifest themselves very much within the cluster create an environment of greater productivity and subsequently provide context which is conducive to firm's international competitiveness.

In this paper, we touch upon the cluster role in reducing the SMEs size liability. We argue that the features of cluster as spatially concentrated pool of competing and cooperating entities enables achieving certain advantages. Benefiting from them is possible thanks to the intra-cluster collaboration. This cooperation is facilitated by—and in return simultaneously as a circular causation, it leads to reduced uncertainty, conducive knowledge environment and agglomeration economies. This further results in generating concrete advantages for SMEs' innovativeness and efficiency advantages.

We are fully aware of certain limitations of our study. The conceptual approach adopted here is obviously one of many other possible ways of framing the discussion on clusters' broadly understood attractiveness and clusters' contribution to competitiveness improvement. Seeing clusters as facilitators of cooperation alleviating the size liability and providing innovativeness and efficiency advantages is just one of the possible attitudes to studying this topic. The sample of investigated Polish clusters can be also further broadened. It may perhaps if possible draw on other countries cases. Future investigations may also better explore the issue of internalisation of cluster firms being an outcome of improved competitiveness due to innovativeness and efficiency advantages generated in cluster.

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