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Social capital, cooperation and innovation in the energy sector clusters

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Abstract:

This paper analyses the relationship between the location of companies in specialized environments, social capital, cooperation, and firms' performance in terms of innovation. After calculating the degree to which the Spanish energy sector is agglomerated at the provincial level, the research hypotheses are tested using the PLS-SEM technique. The results show a positive and significant relationship between industrial agglomeration in territorial clusters and the firms' innovative performance, besides the mediating effect of social capital and cooperation in this relationship. It is concluded that business location in specialized environments is of strategic importance for companies, especially in terms of innovation.

Keywords: Agglomeration, cluster, innovation, social capital, cooperation.

JEL classification: R12, R30, D83, O31.

INTRODUCTION

The importance of innovation has increased in recent years, having established itself as an essential element for the survival and competitiveness of organizations (Lee *et al.,* 2019; Lin *et al.,* 2020). For its part, industrial agglomeration in territorial clusters has been shown to be an element that drives the creation of environments that are competitive yet highly cooperative, which can influence the innovative performance of its members both directly and indirectly. Several researchers have tried to establish, from different perspectives, different relationships between membership of such environments, social capital, cooperation, and innovative performance, although they have not reached a consensus, disagreeing in their conclusions about how these variables are related to each other (Huggins *et al.,* 2012; Geldes *et al.,* 2017; García-Villaverde *et al.,* 2020; Claver-Cortés *et al.,* 2020**).**

However, at present, the dynamics of technological development, the instability of demand and high levels of competition act as major impediments and reduce the success rates of companies when undertaking innovation projects (Hansen, 2022; Isaksen *et al.,* 2022). Therefore, it is necessary to determine the tools available to companies to boost their innovative performance. In this regard, the literature establishes various conclusions in relation to the factors that seem to allow companies to achieve this objective. Among them, it is worth highlighting tools that promote specialization, social capital and cooperation in the business environment (Huggins *et al.,* 2012; Lis *et al.,* 2021). A good example of these are industrial clusters. This context can serve as a breeding ground for the development of social capital in companies, which is considered by García-Villaverde *et al.* (2020) as a strategic resource that connects organizations with the agents of their environment and allows them to react to market dynamism.

Since the introduction of this concept by Nahapiet and Ghoshal (1998), numerous studies have analyzed its role in the innovative performance of firms. A wide range of researchers on social capital have highlighted the access to new valuable knowledge as one of the most important outputs of its development, being a key resource for the development of innovations, value creation and competitiveness (García-Villaverde *et al.,* 2018; Kobeissi *et al.,* 2023), although, in accordance with Pucci *et al.,* (2020), there is still some ambiguity in this regard. In fact, this author establishes that findings in literature on the effect of social capital on innovation performance are quite diverse, encouraging different degrees of relational proximity to be analyzed. In this respect, this paper not only consider social capital but cooperation as an indicator of existing relational ties.

In recent years, demand requirements have increased in relation to the complexity of innovations, which has forced companies to look for new potentially valuable partners in their environment to cooperate in this area, to improve their innovative performance (Marco-Lajara *et al.,* 2019). Accordingly, the analysis of industrial agglomeration spillovers has been found to be a key factor when determining other fundamental elements for business innovation, such as networking and interorganizational cooperation (Hardeman *et al.,* 2015; Davids and Frenken, 2018).

This research work provides current evidence, both theoretical and empirical, about the effects of industrial agglomeration of territorial clusters (hereinafter "IATC") on networking, cooperation among firms and performance in terms of innovation, broadening previous research in this area by analyzing the variable social capital in this context (Marco-Lajara *et al.,* 2022a). The research is structured as follows. First, a concise and solid review of the literature is carried out, on the basis of which four hypotheses are raised. Next, is explained the methodology utilized and, subsequently, the results corresponding to the two phases of analysis are presented. Lastly, the obtained results are discussed, and conclusions are developed, highlighting the need to continue deepening the analysis of the effects derived from the dynamics of proximity and cooperation in innovation, through the establishment of valuable relational networks of positive reciprocity.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT.

INDUSTRIAL AGGLOMERATION, GEOGRAPHIC SPECIALIZATION, SOCIAL CAPITAL, AND INNOVATIVE PERFORMANCE.

The study of IATC is a topic that attracts the attention of numerous researchers, especially in relation to its impact on the innovative performance of firms (Nestle *et al.,* 2019; Howell, 2020; Song *et al.,* 2022; Yu *et al.,* 2023). It should be noted that research on this field extends beyond specific industries, having been conducted both in traditional and knowledge-intensive industries (Belso-Martínez *et al.,* 2019; Troisi *et al.,* 2021).

In this type of environment, a series of localization economies are generated that influence the way in which companies operate and relate to each other (Hervás-Oliver *et al.,* 2018). One of the main factors to highlight is the high degree of specialization reached by many of its members, favored by the existence of skilled labor and access to specialized resources and services (Delgado *et al.,* 2010; Flores and Castellanos, 2021). In this line, according to Resbeut *et al.* (2019), belonging to a cluster promotes specialization of knowledge and procedures, both for businesses engaged in the main sector and for those that carry out activities that are complementary to it. Thus, firms located in a cluster tend to have high levels of specialization and complementarity (De Propris and Driffield, 2006; Albors-Garrigos and Hervás-Oliver, 2019). In addition, these contexts are characterized by the existence of knowledge spillovers that favor the dissemination of specialized knowledge generated by cluster members (Caragliu and Nijkamp, 2016). This allows companies to increase the chances of success in the development of innovations (Martínez-Pérez *et al.,* 2016; García-Villaverde *et al.,* 2017).

However, even though agglomeration economies generate certain positive externalities for their members, there is no consensus when it comes to establishing the influence of geographical proximity, by itself, on the development of innovations by firms (Boschma, 2005; Lazzeretti and Capone, 2016). In this regard, Geldes *et al.* (2015) find that geographical proximity is a prerequisite for the generation of positive externalities that lead to superior innovation performance. Drawing upon the aforementioned information, we hereby propose the subsequent hypothesis:

H1: The degree of agglomeration of a territorial cluster has a significant influence on the innovative performance of its member firms.

The origins of social capital date back to the beginning of the 20th century (Hanifan, 1916). Its popularity among the academic community has progressively increased over time, especially in recent decades, in the field of social sciences (Bocigas *et al.,* 2010; Lin, 2017). Specifically, the first works on social capital in the field of Strategic Business Management date back to the late 1980s (Bourdieu, 1986; Coleman, 1988). Putnam (1995, p.67) defines social capital as *"characteristics of social organization, such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit"*.

Social capital provides access to a set of new resources that are valuable for firms, particularly knowledge which, integrated in a given relational network and shared by the nodes that compose it, is susceptible to being used for innovation purposes by its members (Nahapiet and Ghoshal, 1998; Lefebvre *et al.,* 2016). Several authors highlight trust, shared values and objectives, and common cultural characteristics as the main drivers of social capital (Doh and Acs, 2010; Huggins and Thompson, 2015). In this line, the geographical proximity of companies specialized in the different activities of a given industry could favor the generation and development of these factors (Malecki 2012; Chen *et al.,* 2014ab).

Social capital developed by companies, encompassing its fundamental facets of structural, relational and cognitive dimensions, improves the flow of information and the exchange of knowledge among organizations within a network of relationships which, in turn, enhances their innovative capabilities and contributes to the overall improvement of business performance (Kim and Shim, 2018; Al-Omoush *et al.,* 2022). Thus, although in the context of a cluster there is a high flow of specialized knowledge, its effective acquisition and use for the development of innovations will depend on the social capital that companies have (Kim and Shim, 2018; Marco-Lajara *et al.,* 2022b).

Despite this, there seems to be no consensus among researchers in determining whether IATC, social capital and the innovative performance of organizations are related each other (Uzzi, 1997; Molina-Morales and Martinez-Fernandez, 2009; Pucci *et al.,* 2020). Grounded on the aforementioned content, we propose the subsequent hypothesis:

H2: The social capital of firms mediates the relationship between the degree of agglomeration of territorial clusters and innovative performance.

INTERORGANIZATIONAL COOPERATION AS A DRIVER OF INNOVATION IN SPECIALIZED ENVIRONMENTS.

Increasingly, the innovative performance of companies depends on the availability of external resources and capabilities (D'Ambrosio *et al.,* 2017). Because of this, innovation is nowadays considered as a collective process, which allows to pool a wide set of resources and capabilities and, consequently, increases the chances of success of the innovative process (Cassi *et al.,* 2015; Geldes *et al.,* 2017).

Organizations acquire knowledge both from internal and external sources (Díaz-Díaz and De Saá Pérez, 2014). According to García-Peñalvo *et al.* (2012), socialization plays a pivotal role in facilitating the dissemination and amalgamation of knowledge, particularly the tacit one, via informal learning mechanisms. Companies, especially SMEs, are unable to generate all the necessary knowledge on their own (Marco-Lajara *et al.,* 2019). Geographical proximity is a condition that can favor collaboration and interorganizational learning (Boschma, 2005). According to Delgado, *et al.* (2014), the knowledge base of the cluster and its internal dissemination, allow the generation of new opportunities for innovation and entrepreneurship. In this vein, Pekkarinen and Harmaakorpi (2006) stated that the most significant competitive advantage that can be cultivated by companies within a cluster lies in the knowledge generated through collective learning processes.

Productive specialization is a fundamental externality of clusters (Delgado *et al.,* 2010), so that in this environments there are greater possibilities of generating innovation ecosystems, to the extent that most of their members are specialized in various stages of the value system of their main industry, or in carrying out complementary activities. Collaboration between companies and a diversity of stakeholders is crucial for value creation, both from a business and a social point of view (Kohtamäki *et al.,* 2013). This is especially so because enables firms to pool resources that are complementary, favor the generation of synergies to drive innovation (Caragliu and Nijkamp, 2016; Gillett *et al.,* 2019). In addition, this allows companies to avoid duplication when developing new knowledge and innovations and, consequently, reduce costs and risks (Wang *et al.,* 2017).

Meanwhile, Xu *et al.,* (2019) determine that the ability to integrate the different phases of the value system through external linkages influences businesses performance in terms of innovation within a cluster. Building upon the aforementioned analysis, the subsequent hypothesis is proposed:

H3: Interorganizational cooperation mediates the relationship between the degree of agglomeration of territorial clusters and innovative performance.

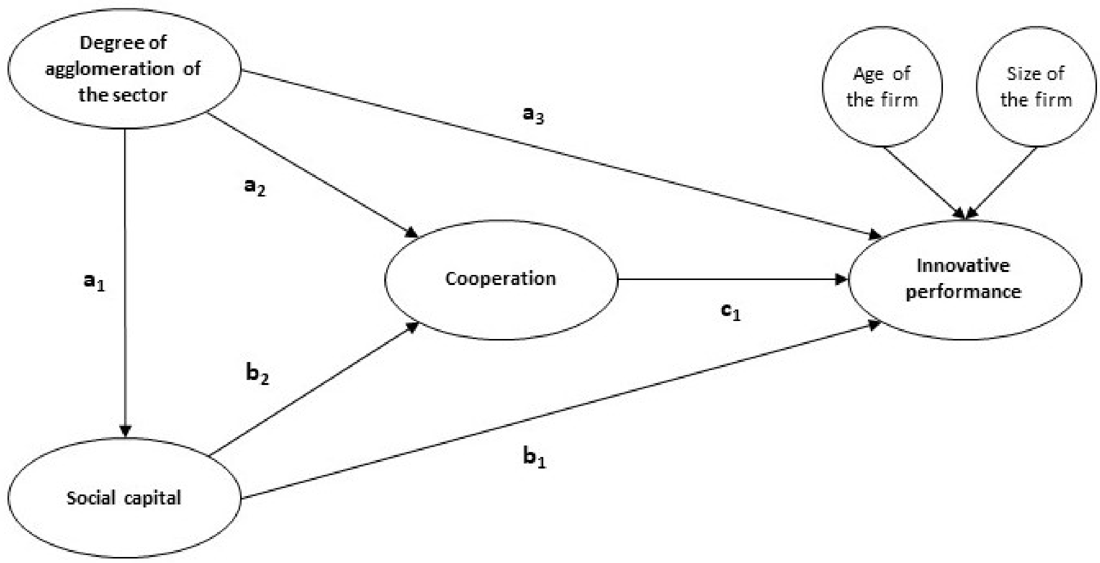
The cooperative-competitive context generated in clusters drives the generation and development of relational networks, through which a large amount of information and knowledge is disseminated (Parra-Requena *et al.,* 2010; Braun, 2015). Thus, the proximity resulting from the membership of firms in a cluster enhances the generation of connections between its members (Juhász and Lengyel, 2018). Social capital is deeply rooted in the social ties of individuals and organizations (Zhong, 2014), and through its exploitation, both tangible and intangible benefits are sought (Chung and Cheng, 2016). According to Capaldo (2007), the existence of strong ties among several members of a given social network, a factor associated with structural social capital, allows firms to improve their innovative performance. This is because, over time and with continued interaction, strong ties increase reputation and trust, which are linked to relational social capital, to the extent that relationships maintain a positive reciprocity (Gulati, 1995).

Generally, innovation development necessitates the interaction and collaboration among various specialized actors that possesses valuable information, knowledge, and resources, with the aim of promoting specific objectives (Pyburn and Woodhill, 2014). However, even though numerous studies determine that IATC favors networking, cooperation and innovative performance of companies, there are some researchers who disagree (Kukalis, 2010; Letaifa and Rabeau, 2013). Within a given relational network, the existence of shared norms, values, beliefs and objectives among members, aspects related to cognitive social capital, can boost their possibilities of accessing new sources of knowledge (Wang and Chen, 2016), in addition to favoring the establishment of positive reciprocal relationships, characterized by a high degree of fairness, equity and cordiality (Eugenio *et al.,* 2013). According to Parra-Requena *et al.* (2010), this may favor the creation and development of fruitful relational networks, in which new knowledge flows with fewer restrictions. Moreover, has the potential to foster collaboration among firms, thus enhancing their innovative performance by allowing them to pool valuable resources and enabling the attainment of shared objectives (Geldes *et al.,* 2017).

Thus, companies manage to boost the creation of new knowledge through interaction and cooperation, sharing and combining existing resources in the context of a given social network (Ansari *et al.,* 2012). In this line, social capital facilitates interaction and effective sharing of information, knowledge, and other valuable resources to favor common interests, which can boost cooperation and the innovative performance of participating entities (Martinez-Perez *et al.,* 2016; Garcia-Villaverde *et al.,* 2017; Geldes *et al.,* 2017). Based on the above, the following hypothesis is put forward:

H4: There is a double mediation of social capital and interorganizational cooperation in the relationship between the degree of agglomeration of territorial clusters and innovative performance.

Figure 1. Theoretical model and hypotheses



Source: Own elaboration.
Note: H1 = a_3; H2 = a_1 x b_1; H3 = a $_2$x c_1; H4 = a_1 x b_2 x c_1

RESEARCH METHODOLOGY

POPULATION AND SAMPLE

Firms' population is comprised of businesses located in Spain, whose main activity is included in code 35 of the national classification of economic activities (CNAE 2009), corresponding to the supply of electricity, gas, steam, and air conditioning. The SABI database was used to determine the number of active companies[1]. In this way, 13,339 active companies were detected, which make up the population under study. It is worth mentioning that this sector is of great importance for the country, both in economic and strategic terms.

In relation to its strategic significance, this sector has an essential impact on the level of affluence and social welfare, is essential for the proper functioning of today's society, and conditions the growth possibilities of the industry. Moreover, with respect to its economic relevance, this sector generated in 2019 the 13,8% of the Gross Value Added of the industry, and the 9,4% of the industry production, ranking second and third, respectively, in relation to the main industries and sectors of activity in Spain. Also presented the highest level of productivity per employee, which amounted to 466.500 euros.[2]

In addition to their strategic and economic importance, these sectors present certain unique particularities. The sector that makes up 98.4% of the population is the electricity supply sector. This is a capital-intensive sector that remained under a monopoly regime in Spain until 1998. The liberalization process started with Law 54/1997, of November 27, 1997, on the Electricity Sector and, currently, it is regulated by Law 24/2013, of December 26, 2013, on the Electricity Sector. Currently, the activities of high voltage energy transmission, which is carried out by a single company (Red Eléctrica de España "REE"), and distribution to consumption points, which is carried out under an oligopoly regime, are regulated.

On the other hand, energy generation and commercialization activities are liberalized (these are the companies that have been analyzed in this paper). In the case of the gas supply sector, the situation is similar. Since

[1] Iberian balance sheet analysis system.

[2] Figures for the year 2019, extracted from the MINECO report 2021 (Ministry of Industry, Commerce and Tourism. Government of Spain.). www.mincotur.gob.es

1998, the sector has been deregulated, mainly through the application of Directives 98/30/EC, 2003/55/EC and 2009/73/EC. Currently, supply and marketing activities are liberalized, while processing, transport and distribution activities remain regulated.

Table 1. Distribution of firms in the population and the sample.

Coefficient	Agglomeration of the region in relation to the national average	Companies in the population (%)	Companies in the sample (%)
Number of employees	Regions with greater agglomeration	66.09%	57.87%
	Regions with lesser agglomeration	33.91%	42.13%
Number of companies	Regions with greater agglomeration	66.62%	56.85%
	Regions with lesser agglomeration	33.38%	43.15%

Source: Own elaboration.

The sample is made up of 197 companies located in different regions of Spain. As observed in Table 1, in both cases, the population under study and the sample analyzed present similar characteristics in terms of their distribution.

Regarding to the sample, two different methodologies were used to determine whether, according to the proposed model, the minimum size required for PLS estimation was exceeded. First, the "minimum R-squared" method, developed by Hair *et al.* (2016) as an alternative to the rule of ten cases per predictor by Barclay *et al.* (1995), was used. The minimum sample sizes given for given R^2 values and number of predictors can be seen in the Table 2. In the proposed model, the minimum observed R^2 value is 0.376, and the maximum number of predictors is 3. Based on the above and taking as minimum sample values those determined for a minimum R^2 value of 0.25, the minimum sample size required is 59 samples.

Table 2. Minimum sample size as a function of the R^2 value.

Maximum number of arrows pointing to a single construct	Minimum R-squared value in the model			
	0,1	0,25	0,5	0,75
2	110	52	33	26
3	124	59	38	30
4	137	65	42	33
5	147	70	45	36
6	157	75	48	39
7	166	80	51	41
8	174	84	54	44
9	181	88	57	46
10	189	91	59	48

Source: Own elaboration.

Secondly, the G*power tool, version 3.1, was used. In this second test, with a confidence interval of 95%, the minimum sample required is 119. Increasing the confidence interval to 99%, the minimum sample required is 161. In both tests and confidence intervals, the sample obtained (197) exceeds the minimum sample size required to make estimates using the PLS-SEM tool.

DATA COLLECTION AND MEASUREMENT OF VARIABLES.

To determine the coefficient of agglomeration at provincial level, secondary data were analyzed. The province was selected as the territorial unit of analysis because each province has certain characteristic features that differentiate it, to a greater or lesser extent, from the rest.

This study also worked with primary data. To obtain it, a questionnaire was designed with the "Qualtrics" software, and it was distributed using "Microsoft Outlook". The distribution was carried out from September to December 2020, a period in which several mailings were made until a sufficient sample size was reached.

The questionnaire was addressed to the general manager, as this person has a broad knowledge of the organization, both at corporate, competitive, and functional levels, so that he/she can make a holistic interpretation of the company's situation. In order to improve the quality of the responses obtained, and thus reduce the bias of the common method, the survey items were written in a simple and easily understandable way. In addition, the recipients were informed of the objective of the research work, and it was explicitly specified that the information reflected in the questionnaire would remain completely anonymous.

After analyzing the responses received, any questionnaires that presented any types of irregularity (single value in numerous items, missing values, or existence of patterns) were eliminated, which left a total of 197 valid units. To determine the minimum required sample size, the minimum R-squared method was used, which establishes that, for R^2 values greater than 0.5, and a maximum of 5 predictors per construct in the nomogram, the sample size must be at least 45 units (Hair *et al.,* 2016). Based on this method, the sample size far exceeds the minimum required. In the development of the questionnaire, the following validated scales were used:

DAS. This independent variable reflects the degree of agglomeration of the sector at provincial level in Spain. For its calculation, the distribution of employment and companies in the electricity, gas, steam and air conditioning supply sector in the national territory was analyzed, taking as units of analysis the provinces of Spain. The corresponding indicators were obtained from the calculation of the following coefficients (Kim, 1995; Boix and Galletto, 2005; 2006; Díez-Vial, 2011; Marco-Lajara *et al.,* 2016):

$$Coefficient\ of\ agglomeration\ (employees) = \frac{\frac{Number\ of\ sector\ employees\ at\ regional\ level}{Total\ number\ of\ employees\ at\ regional\ level}}{\frac{Number\ of sector\ employees\ at\ national\ level}{Total\ number\ of\ employees\ at\ national\ level}}$$

$$Coefficient\ of\ agglomeration\ (companies) = \frac{\frac{Number\ of sector\ companies\ at\ regional\ level}{Total\ number\ of\ companies\ at\ regional\ level}}{\frac{Number\ of\ sector\ companies\ at\ national\ level}{Total\ number\ of\ companies\ at\ national\ level}}$$

The interpretation of these coefficients pertains to the level of concentration of employees and/or companies in the sector in each of the provinces analyzed. Regions exhibiting values surpassing 1 indicate a higher degree of agglomeration in comparison to the national average. Furthermore, the magnitude of the coefficient corresponds to the intensity of agglomeration within the respective region.

Social capital. A mediating variable based on the three dimensions defined by Nahapiet and Ghoshal (1998): Structural, relational, and cognitive. The measurement scale is, as in the previous cases, Likert-type, and 7-point. It consists of 18 items and was developed based on the work of Parra-Requena *et al.* (2013).

Cooperation. A Likert-type scale comprising 6 items and employing a 7-point rating system was utilized to assess this mediating variable, on the basis of Laursen and Salter (2006), Belussi and Sedita (2009); Molina and Martinez, (2009); Claver-Cortés *et al.* (2015) and Belussi and Hervas-Oliver (2018). Refers to the degree of collaboration shown by companies with key stakeholders in their operating environment, including suppliers, rival firms, customers, technology centers, universities, and other relevant organizations.

Innovative performance. To gauge this dependent variable, a Likert-scale survey was employed, comprising 13 items and employing a 7-point response format. Were utilized validated measurement scales, with separate sets of 1, 3, 4, and 5 items to assess the management, marketing, process, and product innovative performance, respectively. These scales were obtained from Prajogo and Ahmed (2006) and Škerlavaj *et al.* (2010).

Age (control variable). This variable was measured in terms of the period elapsed between the date of incorporation of the companies and the year 2019. The data were grouped into 5 age brackets, assigning values from 1 to 5, as follows: 1 (10 years or fewer); 2 (11 to 20 years); 3 (21 to 30 years); 4 (31 to 40 years); and 5 (over 40 years).

Size (control variable). Size was measured based on the number of employees of the sampled companies in the financial year 2019, classifying them into 4 groups. They were assigned a value from 1 to 4, as follows: 1 (micro enterprise - 10 employees or fewer); 2 (small enterprise - from 11 to 49 employees); 3 (medium enterprise - from 50 to 249 employees); 4 (large enterprise - 250 employees or more).

ANALYSIS TECHNIQUE

The analysis consists of two phases. In the first one, an analysis was carried out of the population distribution of companies and employees in the sector. To do this, two coefficients were calculated, based on the number of companies (Kim, 1995; Díez-Vial, 2011) and employees (Boix and Galletto, 2005; 2006; Marco-Lajara *et al.,* 2016). In the second phase of the analysis, a theoretical model was developed, in which is assessed the relationship between the analyzed variables. This model was tested by means of the PLS-SEM technique, using the Smart PLS tool, version 3.3.3.

This technique has been chosen due to different reasons, among which, it is worth highlighting the following. It allows understanding the existing correlation patterns between the established variables, by estimating coefficients that maximize the explained variance of the endogenous constructs of the model (Kline, 2015). It is especially useful in social science research, since it is a field of study in which there are many variables that cannot be observed directly, which makes it particularly suitable for studies in the area of strategic business management (Hair *et al.,* 2012; Roldán and Cepeda, 2019; Marco-Lajara *et al.,* 2022a).

For the estimation of complex models with many latent variables measured by multiple indicators, or various structural relationships, it is an efficient tool which facilitates the modeling (Hair *et al.,* 2013). This technique offers superior robustness and flexibility compared to conventional methods, being used in lots of publications in first quartile journals, which validates its use (Martínez-Ávila and Fierro-Moreno, 2018).

To analyze models that have multidimensional constructs by means of the PLS technique, two stages of analysis must be carried out (LOC Model/HOC Model). This model has two latent variables, social capital, and innovative performance. The use of this methodology was considered appropriate because it finds the correlation patterns between the variables established, while maximizing the explanation of the variance with the established model (Kline, 2015).

According to Roldán and Cepeda (2019), the structural equation models "SEM" (Structural Equation Models) are particularly useful in social science research, because it is a field of study in which there are a large number of variables that cannot be observed directly

EVALUATION OF THE GLOBAL MODEL

Prior to the analysis of the measurement and structural models, Hair *et al.* (2016) recommends assessing the global model fit. According to Henseler *et al.* (2016), this assessment can be carried out in PLS by using the "Standardized Root Mean Square Residual" fit criterion (hereinafter SRMR).

While Hu and Bentler (1998) established a maximum value of 0.08 to guarantee the global model fit. The evaluation of the global model results in an SRMR value of 0.054 for the saturated model, and 0.056 for the estimated model. It is confirmed that the model has an adequate global fit.

EVALUATION OF THE MEASUREMENT MODEL

A research model can contain both reflective and formative variables, although the decision on the measurement model should be based primarily on the nature of the latent variable (Henseler, 2017). In addition, the purpose of the research should be considered. The evaluation of a research model using PLS-SEM should be conducted in two phases, with the first phase corresponding to the measurement model and the second phase to the structural model (Hair *et al.,* 2019a). The measurement model of the present research is mostly reflective in nature, although one of the variables (DAS) is formative in nature. According to Hair *et al.* (2019a), different criteria should be followed to assess measurement models, since vary based on the formative or reflective nature of the construct being examined. The systematic process followed in each case is shown in Table 3.

Table 3. Systematic evaluation process of the measurement models.

EVALUATION CRITERIA OF THE MEASUREMENT MODELS			
Phase A: Reflective measurement models.		**Phase B: Formative measurement models.**	
Internal consistency	Cronbach's Alpha	**Convergent validity**	Redundancy analysis
	Composite reliability		
	Dijkstra-henseler's rho		
Convergent validity	Reliability of the indicator	**Collinearity between indicators**	Variance Inflation Factor (VIF).
	Average variance extracted		
Discriminant validity	Cross loads	**Magnitude and significance of indicator weights**	Weights and external loads

Source: Own elaboration based on Hair *et al.* (2019a).

In relation to the evaluation of the formative measurement model, in accordance with Sarstedt *et al.* (2013), a single item was used that represents the essence of the latent variable that the formative indicators seek to measure. A path coefficient value > 0.8 and R^2> 0.5 are considered adequate, and VIF values < 3, and external weights and loadings should be checked to be significantly different from zero (Hair *et al.,* 2019a). In Table 4, the results derived from the evaluation of the formative measurement models are presented.

Table 4. Summary of formative measurement model

EVALUATION OF THE FORMATIVE MEASUREMENT MODEL			
Convergent Validity	Path coefficient	0.916	
	R^2-value	0.839	
Discriminant validity	Agglomeration	Employment	Companies
	VIF	1.192	1.192
Significance and relevance of indicators	External Weights	0.552	0.641
	External loads	0.810	0.863

Source: Own elaboration.

In relation to the evaluation of the reflective measurement models, the results are showed in Table 5.

We first evaluate the internal consistency, observing values of Cronbach's alpha, Dijkstra-Henseler's rho and composite reliability > 0.7. After that, when evaluating convergent validity, we obtained values for external loadings > 0.708 and average variance extracted (AVE) > 0.50. Finally, following the same method with the discriminant validity of the latent variables of the model, it was verified, by means of the Fornell-Larcker analysis, that the square root of the average variance extracted from each construct is higher than the correlations that it maintains with the rest of the constructs of the model. In addition, the Heterotrait-Monotrait (HTMT) ratio was used, and we found HTMT values < 0.85. According to Hair *et al.* (2019a), these levels represent an adequate fit of the reflective measurement models evaluated, which translates into all reflective constructs of the model being reliable and valid.

Table 5. Summary of reflective measurement models[3]

INTERNAL CONSISTENCY AND CONVERGENT VALIDITY				
	Cronbach's Alpha	**rho_A**	**Composite reliability**	**Average variance extracted (AVE)**
Cooperation	0.885	0.885	0.913	0.638
Innovative performance	0.847	0.849	0.897	0.686
Social capital	0.868	0.876	0.919	0.791
EXTERNAL LOADS	**Cooperation**	**I.P.**	**Social capital**	
Cooperation customers	0.859			
Cooperation competitors	0.786			
Cooperation tech.cent.	0.715			
Cooperation others	0.755			
Cooperation suppliers	0.828			
Cooperation universities	0.840			
C.S.C.			0.877	
S.S.C.			0.875	
R.S.C.			0.916	
I.M.P.		0.812		
I.K.P.		0.786		
I.C.P.		0.856		
I.D.P.		0.855		
VIF	**Cooperation**	**I.P.**		
Age		1.007		
Cooperation		2.279		
D.A.S.	1.604	2.344		
Size		1.051		
Social capital	1.604	1.779		
DISCRIMINANT VALIDITY				
FORNELL-LARCKER	**Cooperation**	**D.A.S.**	**I.P.**	**Social capital**
Cooperation	0.799			
D.A.S.	0.718	Formative		
I.P.	0.646	0.662	0.828	
Social capital	0.601	0.614	0.675	0.889
HTMT	**Cooperation**	**D.A.S.**	**I.P.**	**Social capital**
Cooperation				
D.A.S.	0.718	Formative		
I.P.	0.646	0.662		
Social capital	0.601	0.614	0.675	

Source: Own elaboration.

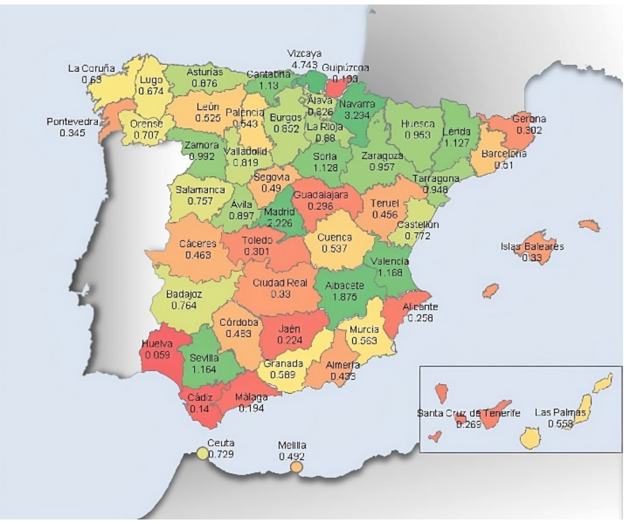
[3] Note: D.A.S.: Degree of agglomeration of the sector; I.P.: Innovative performance; C.S.C.: Cognitive social capital; S.S.C.: Structural social capital; R.S.C.: Relational social capital; I.M.P.: Innovative managerial performance; I.K.P.: Innovative marketing performance; I.C.P.: Innovative process performance; I.D.P.: Innovative product performance.

In the following section, the outcomes of this research are presented.

RESULTS

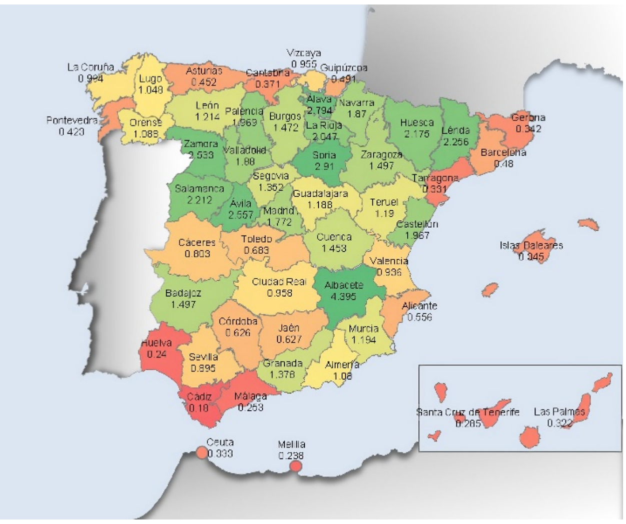
The results can be classified in two sections. On the one hand, Figures 2 and 3 show the distribution of the sector according to the agglomeration coefficient of employment and companies in the sector at the provincial level. To ease the visualization and understanding of the distribution of the sector in Spain, Figures 2 and 3 have been prepared, which reveal the employment and companies' agglomeration coefficients, respectively. In addition, color ranging from bright red to dark green has been set, which refers to low and high levels of agglomeration, respectively, with respect to the national average. The other colors indicate, gradually, intermediate levels.

Figure 2. Agglomeration coefficient of employment at provincial level



Source: Marco-Lajara *et al.* (2022a).

Figure 3. Agglomeration coefficient of firms at provincial level



Source: Marco-Lajara *et al.* (2022a).

Secondly, the hypotheses proposed have been tested. Table 6 shows the direct effects identified. After analyzing the data, hypothesis 1 was accepted, providing empirical evidence about the existence of a positive and significant relationship between the IATC and the innovative performance of firms, on which there was no consensus in the literature (Boschma, 2005; Lazzeretti and Capone, 2016).

Furthermore, Table 7 shows the indirect effects raised, which establish the existence of a mediating effect of social capital and cooperation in the previous relationship. This allows the acceptance of the hypotheses 2, 3, and 4. Below the data is presented in more detail.

EVALUATION OF THE STRUCTURAL MODEL

Regarding to the second section, the structural model is assessed, following the systematic process established by Hair *et al.* (2019a), as follows. Firstly, an Algorithm Partial Least Squares analysis is conducted to evaluate the level of collinearity among the constructs, with the aim of ensuring that the Variance Inflation Factor value remains below the threshold of three (Hair *et al.,* 2019c).

In the second step, by running the *bootstrapping* process in full mode, 5000 random subsamples and a 95% confidence interval, the *path* coefficients of the established relationships are determined, which take values between 0 and 1, and indicates the degree to which a change in the source variable of a relationship influences the value of the target variable.

Subsequently, the coefficients of determination R^2 are tested to determine the predictive capacity of the model for each variable. In this vein, R^2 values of 0.25, 0.50 and 0.75 can be considered as mild, medium, or high, respectively (Hair *et al.,* 2019a).

Then, f^2-effects' size is studied to test the impact of the exogenous constructs on the R^2 value of the endogenous variables with which they are related to, whose value is classified as small, medium, or large if it takes values close to 0.02, 0.15 and 0.35 respectively (Hair *et al.,* 2019a).

Finally, the *blindfolding* process is run to analyze the cross-validation redundancy index Q^2, which indicates the predictive relevance of the model with respect to each endogenous construct. Values of Q^2 greater than zero, 0.25, and 0.50 indicate small, moderate, and large predictive relevance, respectively (Hair *et al.,* 2019b). In performing the latter analysis, the omission distance (D) was set according to the restriction that the sample size divided by this value cannot result in an integer. Thus, the D value selected was 7 [Sample size=197].

DIRECT EFFECTS

Table 6 shows the results derived from the evaluation of the structural model. As can be seen, all the relationships established in the model are positive and statistically significant. Based on this data, hypothesis 1 is accepted.

Table 6. Summary of direct effects[4]

Structural path	Coefficient (β)	Standard deviation	p-values	95% CI	Results
Coop -> I.P.	0.234**	0.081	0.004	[0.084-0.401]**	
D.A.S. -> Coop	0.560**	0.055	0.000	[0.448-0.668]**	H1 supported
D.A.S. -> I.P.	0.255**	0.070	0.000	[0.112-0.388]**	
D.A.S. -> S.C.	0.614**	0.034	0.000	[0.547-0.681]**	
S.C. -> Coop	0.258**	0.069	0.000	[0.123-0.396]**	
S.C. -> I.P.	0.351**	0.066	0.000	[0.220-0.477]**	

Source: Own elaboration.

INDIRECT EFFECTS

In relation to the analysis of indirect effects, Table 7 shows the results obtained. Thus, the mediating effect of the social capital variable on the D.A.S. - I.P. relationship is positive and significant (β= 0.215, p-value = 0.000).

The mediating effect of the cooperation variable in the relationship between the D.A.S. and I.P. constructs is also positive and significant (β = 0.131, p-value = 0.000). Finally, a double positive and significant mediation of the social capital and cooperation variables in the relationship between D.A.S. and I.P. is detected. Based on the above, Hypotheses 2, 3 and 4 are accepted.

Table 7. Summary of indirect effects[4]

Total effect of D.A.S. on I.P.		Direct effect of D.A.S. on I.P.		Indirect effect of D.A.S. on I.P.			Results
Coef. (β)	**T value**	**Coef. (β)**	**T value**	**Point estimated**		**C.I. 95%.**	
0.638**	**17.316**	**0.255****	**3.630**	**Total**	**0,383**		
				H2 = a_1 x b_1	0.215**	[0.133-0.305]	Supported
				H3 = a_2 x c_1	0.131**	[0.046-0.236]	Supported
				H4 = a_1 x b_2 x c_1	0.037*	[0.009-0.080]	Supported

Source: Own elaboration.

CONCLUSIONS AND DISCUSSION

Based on the results, it is established that there is a positive and significant direct relationship between DAS and innovative performance (Hypothesis 1). This result adds to that of other works with similar findings (Geldes *et al.,* 2015; Martínez-Pérez *et al.,* 2016; García-Villaverde *et al.,* 2017; Zeng *et al.,* 2019). However, this paper provides a novel approach, in that it does not simply consider membership or not of a cluster but takes into consideration the degree of agglomeration (Marco *et al.,* 2019; Claver-Cortés *et al.,* 2020; Huang and Zheng, 2021).

After analyzing the results corresponding to the proposed mediation relationships, it is corroborated that there is empirical evidence of the effect of each of the mediating variables in the relationship between DAS and the innovative performance of companies. Firstly, social capital is shown to be the main mediating variable in this relationship (Hypothesis 2), as it presents the most powerful mediation values. Thus, empirical evidence is obtained that DAS favors firms' social capital, and this in turn contributes to improving their innovative performance (Ganguly *et al.,* 2019; García-Villaverde *et al.,* 2021). The results also find that cooperation has a positive and significant effect of mediation in the DAS and innovative performance relationship (Hypothesis 3). Although these connections have been analyzed in previous studies (Geldes *et al.,* 2017; Weber and Heidenreich, 2018), the approach applied in this research provides new information on the role that cooperation can play in this kind of

[4] Source: Own elaboration. Note: I.P.: Innovative performance; D.A.S.: Degree of agglomeration of the sector; Coop: Cooperation; S.C.: Social capital; **Statistically significant at 1% - *Statistically significant at 5%.

contexts. Finally, empirical evidence is obtained on the positive and significant relationship between the social capital of firms and the degree to which they cooperate with agents in their environment. This has allowed us to evaluate the joint effect of these variables on the relationship between DAS and the innovative performance of firms. Thus, it is determined that there is a double mediation effect of social capital and cooperation in this relationship (Hypothesis 4). The academic literature is scarce in relation to the analysis of this subject from the applied perspective, which adds more value to the study.

The study of the effects of business location in clusters on performance in various areas related to the exercise of business activity has been approached from a wide variety of perspectives. An example could be the work of Hervas-Oliver and Albors (2009), which studies companies in the ceramic cluster of the Castellón province and highlights the importance of internal resources in the effective exploitation of the external resources existing in the clusters and, especially, of the absorptive capacity for the development of innovations. McCann and Folta (2009) focus their study on biotechnology clusters located in the United States, analyzing whether the positive externalities existing in specialized regions unequally benefit the companies located in them, concluding that the companies that benefit most from agglomeration are those that are younger and have a greater knowledge base.

In this regard, although it is clear that internal factors influence the effective exploitation of environmental opportunities, this work contributes to the existing literature by providing a different approach, focusing on the analysis of the innovative performance of firms based on the specialization of the territories, as well as on the existing links between specialized agents (social capital and cooperation). The novelty of this work lies in the fact that it considers the degree of agglomeration of regions instead of the membership or not of a cluster. D.A.S. coefficient has been established at the provincial level, based on the number of employees and companies in the sector in relation to the total, to determine the degree of specialization of each of the regions. Furthermore, according to Hervás-Oliver *et al.* (2021) collaboration is a fundamental activity for the development of innovations by companies. Thus, once its importance has been demonstrated, the question arises as to what factors favor the effective establishment of cooperation agreements. In this line, this paper has analyzed the role of the social capital of firms and their degree of cooperation with agents in the environment, in order to determine the mediating role of the generation and development of social networks and cooperation in the relationship established between the degree of specialization of the territories and the innovative performance of firms.

In line with Pucci *et al.* (2021), albeit from a different perspective, this paper analyzes social capital in conjunction with its effective exploitation, that is, the establishment of cooperation agreements with agents in the environment, to try to distinguish, to some extent, the degree of proximity of firms when assessing its effect on innovative performance. Companies should choose their partners carefully since this decision could impact on the joint outcomes achieved through cooperation (Prashant and Harbir, 2009). It is noteworthy to acknowledge that industrial agglomeration arises from the coexistence of specialized entities in close geographical proximity, leading to the presence of potentially valuable actors with whom cooperation agreements can be established (Resbeut *et al.,* 2019). In addition, chances for increasing the firms' innovative performance are higher when different actors collaborate themselves in different aspects, particularly when carrying out processes of collaborative innovation (Lazzarotti *et al.,* 2017).

Based on the above, it is possible to conclude that industrial agglomeration generates certain positive externalities that enhance the innovative performance of the firms located in the region. However, in line with Grashof (2021), and as has been argued in this paper, the effective exploitation of positive externalities derived from agglomeration depends, to a large extent, on two relational variables, such as social capital and the degree of cooperation.

This work has both theoretical and practical implications. From a theoretical point of view, it establishes the importance of broadening the field of vision, not only analyzing the effects of belonging or not to a given cluster, but also delving deeper into its characteristics, with its degree of specialization being one of the most important factors to be analyzed. In addition, it is necessary to consider the degree of connectivity between the agents that make up a cluster, since the effective transfer of knowledge will depend on this. In this respect, the social capital of companies is postulated as a measure of the capacity of companies to relate to agents in their environment, and cooperation as a measure of their capacity to establish mutually beneficial agreements in an effective manner.

From a practical perspective, these results highlight the importance of agglomeration in the innovative performance of companies, especially SMEs, not only for its direct effects, but also for its implications for the degree of interaction and cooperation of companies with agents in their environment. Governments should be aware of the importance of promoting business specialization to improve the innovative performance of companies. In this regard, they should be aware that the existence of solid links between specialized agents favors the generation of expectations of positive reciprocity and, thus, the establishment of effective cooperation agreements. Companies and other entities linked to the economic environment, for their part, must be aware of the impact that localization can have on their competitiveness, as well as the fact that the advantages of establishing relational links and cooperation agreements with agents in the environment far outweigh the risks. In this way, it is necessary to bury the traditional perspective that is maintained in many businesses, in which the fear of cooperation due to the risk of intrusiveness and opportunistic behavior prevails. By locating in specialized environments and establishing positive reciprocity agreements, companies significantly increase the valuable resources and capabilities at their disposal and thus the chances of achieving their objectives and improving their competitive position in the markets.

The sector under study is currently undergoing a transformation process, through which it is trying to improve sustainability by reducing the environmental impact of its production processes and improving their efficiency. Moreover, this transition towards a sustainable energy model, free of fossil fuels, implies an unprecedented increase in the requirements of electrical energy supply, especially due to the incorporation of electric cars into the mass market, which poses many challenges for companies in terms of innovation. The current environment, in addition to presenting high levels of complexity and dynamism, seems to present a general trend towards business concentration, resulting in the creation of large multinational corporations, with great power and ability to compete in the markets. To face these giants, SMEs have as their main tool their flexibility and capacity to react to changes. In addition, the option of localization in specialized environments and the investment of time and resources in the construction and development of their social capital can allow them to strengthen their relative weaknesses. According to Skala and Rydvalova (2021), the establishment of strategic cooperation agreements is presented as a more flexible alternative to traditional vertical integrations and more reliable and effective than the usual market relationships. Thus, cooperation would allow firms to develop and implement a greater number of relevant innovations through access to a wide range of resources, in addition to valuable capabilities, without reducing their flexibility.

This research is not only focused on the investigation of recognized clusters but aims to discover the real effect of agglomeration on business performance in terms of innovation. Thus, it provides empirical evidence on the relevance of regional agglomeration for the innovative performance of companies, not only considering the number of companies, but also the volume of employment in each and every one of the regions that make up the Spanish territory. In addition, it has been considered key to determine to what extent this relationship is mediated by the degree of connectivity of the specialized agents located in the region. Thus, this paper approaches the study of agglomeration from a particular and specific perspective, from which it seeks to demonstrate the importance of location and interaction in achieving superior performance in terms of innovation.

In short, in an increasingly connected world, companies must have the ability to recognize the opportunities that exist in their environment and take advantage of them to achieve their objectives. In this regard, business localization in specialized environments and the construction of social capital stand as very useful tools to promote cooperation and innovative performance of companies, which are established as key elements to meet the challenges and requirements of the current environment and, consequently, ensure the survival and development of companies over time.

This paper provides new evidence that points to the importance of the environment in the innovative performance of businesses, besides highlighting the relevance of establishing valuable relational networks and cooperation agreements in the effective exploitation of the externalities that arise as a result of businesses location in specialized environments.

This research work has a few limitations. Firstly, by focusing on the degree of business agglomeration, it has not taken into account the existence of organizations that offer complementary products and services, such as companies specializing in the construction of electrical installations or power line repair services, among many others. Along these lines, the study has not included an analysis of the different types of institutions in each region, to evaluate their possible effect on the innovative performance of companies. In addition, there are papers that analyze, in isolation, the effect of business location in specialized regions (e.g., agglomeration) on different aspects linked to business innovation, such as the exploration and exploitation of product innovations (Ozer and Zhang, 2015), the development of radical-type innovations (García-Villaverde, 2017; Hervás-Oliver, 2018; 2022). Finally, the sample refers to a cross-section so that it is not possible to control for unobserved variability which can cast doubt on the real interpretation of the key parameter as an impact or effect, or just as a relationship. Further research can include the study of complementary sectors, as well as the effect of institutional thickness on the development and/or exploitation of innovations by companies. In addition, it could be interesting to individually study the effect of IATC on each of the dimensions of social capital established by Nahapiet and Ghoshal (1998), as well as its relationship with the innovative performance of firms both in general terms and in isolation on the different types of innovation.

REFERENCES

Albors-Garrigos, J, and Hervas-Oliver, J. L. (2019). Disruptive innovation in traditional clusters: the case of the kerajet ceramic tile cluster in Spain. *Applied Sciences, 9*(24), 5513.

Al-Omoush, K. S., Ribeiro-Navarrete, S., Lassala, C., & Skare, M. (2022). Networking and knowledge creation: Social capital and collaborative innovation in responding to the COVID-19 crisis. *Journal of Innovation & Knowledge, 7*(2), 100181.

Ansari, S, Munir, K, and Gregg, T. (2012). Impact at the 'bottom of the pyramid': The role of social capital in capability development and community empowerment. *Journal of Management Studies, 49*(4), 813-842.

Belso-Martínez, J. A., Tomás-Miquel, J. V., Expósito-Langa, M., and Mateu-García, R. (2019). Delving into the technical textile phenomenon: networking strategies and innovation in mature clusters. *The Journal of The Textile Institute, 111*(2), 260-272.

Belussi, F., and Sedita, S. R. (2009). Life cycle vs. multiple path dependency in industrial districts. *European Planning Studies, 17*(4), 505-528.

Belussi, F., and Hervas-Oliver, J. L. (Eds.). (2018). *Agglomeration and firm performance.* Berlin, DE: Springer.

Bocigas, P. B, López, J. E. N. and Sáez, P. L. (2010). The mediating effect of social capital on firm profits: a theoretical approach. *Cuadernos de estudios empresariales*, *20*(1), 11-34.

Boix, R. and Galleto, V. (2005) *Local Work Systems and Marshallian Industrial Districts in Spain. Working Paper No. 05.14.* Departament d'Economia Aplicada, Universitat Autònoma de Barcelona, Barcelona.

Boix, R. and Galletto, V. (2006). *The new map of industrial districts in Spain and its comparison with Italy and the United Kingdom (No. 06.04).* Working Paper. Department of Applied Economics at Universitat Autonoma of Barcelona.

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional studies, 39*(1), 61-74.

Bourdieu, P. (1986) The forms of capital. *In Granovetter, M, and Swedberg, R. (Eds.) The Sociology of Economic Life, 3rd edition, (pp.78-92).* New York, NY: Westview Press.

Braun, C. (2015). *A qualitative analysis of the networks of tourism SMEs in Germany: managing business networks for knowledge transfer* (Doctoral dissertation). Nottingham, UK: University of Nottingham.

Capaldo, A. (2007). Network structure and innovation: The leveraging of a dual network as a distinctive relational capability. *Strategic management journal*, *28*(6), 585-608.

Caragliu, A, and Nijkamp, P. (2016). Space and knowledge spillovers in European regions: the impact of different forms of proximity on spatial knowledge diffusion. *Journal of Economic Geography, 16(*3), 749-774.

Cassi, L, Morrison, A, and Rabellotti, R. (2015). Proximity and scientific collaboration: Evidence from the global wine industry. *Tijdschrift voor economische en sociale geografie, 106*(2), 205-219.

Chen, C. J, Hsiao, Y. C, and Chu, M. A. (2014a). Transfer mechanisms and knowledge transfer: The cooperative competency perspective. *Journal of Business Research*, *67*(12), 2531-2541.

Chen, Y. H, Lin, T. P, and Yen, D. C. (2014b). How to facilitate inter-organizational knowledge sharing: The impact of trust. *Information and management, 51(*5), 568-578.

Chung, H. M, and Cheng, L. H. (2019). Coopetition and Firm Survival in a Cluster: Insights from the Population Ecology on the Yacht Industry in an Emerging Economy, 1957-2010, *Management and Organization Review, 15*(4), 837-856.

Claver-Cortés, E, Marco-Lajara, B, and Manresa-Marhuenda, E. (2015). Location in science-technology parks, dynamic capabilities and business innovation. Industrial Economics, 397, 59-71.

Claver-Cortés, E, Marco-Lajara, B, and Manresa-Marhuenda, E. (2020). Innovation in foreign enterprises: the influence exerted by location and absorptive capacity. *Technology Analysis and Strategic Management, 32*(8), 936-954.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American journal of sociology*, *94*(1), S95-S120,

D'Ambrosio, A, Gabriele, R, Schiavone, F, and Villasalero, M. (2017). The role of openness in explaining innovation performance in a regional context. *The Journal of Technology Transfer, 42*(2), 389-408.

Davids, M, and Frenken, K. (2018). Proximity, knowledge base and the innovation process: Towards an integrated framework. *Regional Studies, 52*(1), 23-34.

Delgado, M, Porter, M. E, and Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, *10*(4), 495-518.

Delgado, M, Porter, M. E, and Stern, S. (2014). Clusters, convergence, and economic performance, *Research Policy*, *43*(10), 1785-1799.

De Groot, H. L, Poot, J, and Smit, M. J. (2016). Which agglomeration externalities matter most and why? *Journal of Economic Surveys, 30*(4), 756-782.

De Propris, L, and Driffield, N. (2006). The importance of clusters for spillovers from foreign direct investment and technology sourcing. *Cambridge Journal of Economics, 30*(2), 277-291.

Díaz-Díaz, N. L, and de Saá Pérez, P. (2014). The interaction between external and internal knowledge sources: an open innovation view. *Journal of Knowledge Management*, *18*(2), 430-446.

Díez-Vial, I. (2011). Geographical cluster and performance: The case of Iberian ham. *Food Policy, 36*(4), 517-525.

Doh, S, and Acs, Z. J. (2010). Innovation and social capital: a cross-country investigation. *Industry and Innovation*, *17*(3), 241-262.

Eugenio, A. M. F, Felip, M. R. A, Fuertes, I. F, and Personat, G. S. (2013). The contributions of social support to social capital: proposal of an integrated and convergent model. *CIRIEC-Spain, Journal of Public, Social and Cooperative Economics*, (77), 155-188.

Flores, M. A. S, and Castellanos, F. A. S. (2021). Proximity effects and labour specialization transitions in Mexico: a spatial Markov chain analysis. *Regional Studies, 55*(4), 575-589.

Ganguly, A, Talukdar, A, and Chatterjee, D. (2019). Evaluating the role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in determining innovation capability of an organization. *Journal of Knowledge Management*, *23*(3), 1105-1135.

García-Villaverde, P. M, Elche, D, Martinez-Perez, A, and Ruiz-Ortega, M. J. (2017). Determinants of radical innovation in clustered firms of the hospitality and tourism industry. *International Journal of Hospitality Management, 61*(1), 45-58.

García-Villaverde, P. M, Parra-Requena, G, and Molina-Morales, F. X. (2018). Structural social capital and knowledge acquisition: implications of cluster membership. *Entrepreneurship and Regional Development, 30*(5-6), 530-561.

García-Villaverde, P. M, Elche, D, and Martinez-Perez, A. (2020). Understanding pioneering orientation in tourism clusters: Market dynamism and social capital. *Tourism Management, 76*(1), 103966.

García-Villaverde, P. M, Ruiz-Ortega, M. J, Hurtado-Palomino, A, De La Gala-Velásquez, B, and Zirena-Bejarano, P. P. (2021). Social capital and innovativeness in firms in cultural tourism destinations: Divergent contingent factors. *Journal of Destination Marketing and Management, 19*, 100529.

Geldes, C, Felzensztein, C, Turkina, E, and Durand, A. (2015). How does proximity affect interfirm marketing cooperation? A study of an agribusiness cluster. *Journal of Business Research, 68*(2), 263-272.

Geldes, C, Heredia, J, Felzensztein, C, and Mora, M. (2017). Proximity as determinant of business cooperation for technological and non-technological innovations: a study of an agribusiness cluster. *Journal of Business and Industrial Marketing, 32*(1), 167-178.

Gillett, A, Loader, K, Doherty, B, and Scott, J. M. (2019). An examination of tensions in a hybrid collaboration: A longitudinal study of an empty homes project. *Journal of Business Ethics, 157*(4), 949-967.

Grashof, N. (2021). Putting the watering can away–towards a targeted (problem-oriented) cluster policy framework. *Research Policy, 50*(9), 104335.

Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of management journal*, *38*(1), 85-112.

Hair, J. F, Babin B.J, Anderson R.E, and Black W.C. (2019c). *Multivariate data analysis.* 8th edition. Hampshire, UK: Cengage Learning, EMEA.

Hair, J. F, Hult, G. T. M, Ringle, C, and Sarstedt, M. (2016*). A primer on partial least squares structural equation modeling (PLS-SEM).* California, USA: Sage Publications.

Hair, J. F, Hult, G. T. M, Ringle, C. M, Sarstedt, M, Castillo Apraiz, J, Cepeda Carrión, G, and Roldán, J. L. (2019a). *Manual de partial least squares structural equation modeling (pls-sem).* Barcelona, ES: OmniaScience Scholar.

Hair, J. F., Ringle, C. M., and Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning, 46*(1-2), 1-12.

Hair, J. F, Risher, J. J, Sarstedt, M, and Ringle, C. M. (2019b). When to use and how to report the results of PLS-SEM. *European business review, 31*(1), 2-24.

Hair, J. F., Sarstedt, M., Pieper, T. M., and Ringle, C. M. (2012). The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long range planning*, *45*(5-6), 320-340.

Hanifan, L. J. (1916). The rural school community center. *The Annals of the American Academy of Political and Social Science*, *67*(1), 130-138.

Hansen, T. (2022). The foundational economy and regional development. *Regional Studies, 56*(6), 1033-1042.

Hardeman, S, Frenken, K, Nomaler, Ö, and Ter Wal, A. L. (2015). Characterizing and comparing innovation systems by different 'modes' of knowledge production: A proximity approach. *Science and Public Policy, 42*(4), 530-548.

Henseler, J. (2017). Bridging Design and Behavioral Research With Variance-Based Structural Equation Modeling. *Journal of Advertising, 46*(1), 178-192.

Henseler, J, Hubona, G, and Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial management and data systems, 116* (1), 2-20.

Hervás-Oliver, J. L., and Albors-Garrigos, J. (2009). The role of the firm's internal and relational capabilities in clusters: when distance and embeddedness are not enough to explain innovation. *Journal of Economic Geography*, *9*(2), 263-283.

Hervás-Oliver, J. L., Albors-Garrigos, J., Estelles-Miguel, S., and Boronat-Moll, C. (2018b). Radical innovation in Marshallian industrial districts. *Regional Studies, 52*(10), 1388-1397.

Hervás-Oliver, J. L., Parrilli, M. D., Rodríguez-Pose, A., and Sempere-Ripoll, F. (2021). The drivers of SME innovation in the regions of the EU. *Research Policy*, *50*(9), 104316.

Hervas-Oliver, J. L, Sempere-Ripoll, F, Rojas Alvarado, R, and Estelles-Miguel, S. (2018a). Agglomerations and firm performance: who benefits and how much? *Regional Studies, 52*(3), 338-349.

Hervas-Oliver, J. L., Sempere-Ripoll, F., and Moll, C. B. (2022). Zooming into firms' location, capabilities and innovation performance: Does agglomeration foster incremental or radical innovation? *European Research on Management and Business Economics, 28*(2), 100186.

Howell, A. (2020). Agglomeration, absorptive capacity and knowledge governance: implications for public–private firm innovation in China. *Regional Studies, 54*(8), 1069-1083.

Huang, L, and Zheng, W. (2021). Novel deep learning approach for forecasting daily hotel demand with agglomeration effect. *International Journal of Hospitality Management, 98*, 103038.

Hu, L. T, and Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological methods, 3*(4), 424.

Huggins, R, Johnston, A, and Thompson, P. (2012). Network capital, social capital and knowledge flow: how the nature of inter-organizational networks impacts on innovation. *Industry and Innovation, 19*(3), 203-232.

Huggins, R, and Thompson, P. (2015). Culture and place-based development: A socio-economic analysis. *Regional Studies, 49*(1), 130-159.

Isaksen, A., Trippl, M., and Mayer, H. (2022). Regional innovation systems in an era of grand societal challenges: Reorientation versus transformation. *European planning studies, 30*(11), 2125-2138.

Juhász, S, and Lengyel, B. (2018). Creation and persistence of ties in cluster knowledge networks, *Journal of Economic Geography*, *18*(6), 1203-1226.

Kim, S. (1995). Expansion of markets and the geographic distribution of economic activities: the trends in US regional manufacturing structure, 1860-1987. *The Quarterly Journal of Economics, 110*(4), 881-908.

Kim, N, and Shim, C. (2018). Social capital, knowledge sharing and innovation of small-and medium-sized enterprises in a tourism cluster. *International journal of contemporary hospitality management, 30*(6), 2417-2437.

Kline, R. B. (2015). *Principles and practice of structural equation modeling.* New York, NY: Guilford publications.

Kobeissi, N., Hasan, I., Wang, B., Wang, H., and Yin, D. (2023). Social capital and regional innovation: evidence from private firms in the US. *Regional Studies, 57*(1), 57-71.

Kohtamäki, M, Partanen, J, and Möller, K. (2013). Making a profit with RandD services-The critical role of relational capital. *Industrial marketing management*, *42*(1), 71-81.

Kukalis, S. (2010). Agglomeration economies and firm performance: the case of industry clusters. Journal of Management, 36(2), 453-481.

Laursen, K., and Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal, 27*(2), 131-150.

Lazzeretti, L, and Capone, F. (2016). How proximity matters in innovation networks dynamics along the cluster evolution. A study of the high technology applied to cultural goods. *Journal of Business Research, 69*(12), 5855-5865.

Lee, R, Lee, J. H, and Garrett, T. C. (2019). Synergy effects of innovation on firm performance. *Journal of Business Research, 99*, 507-515.

Lefebvre, V. M, Sorenson, D, Henchion, M, and Gellynck, X. (2016). Social capital and knowledge sharing performance of learning networks. *International Journal of Information Management, 36(*4), 570-579.

Letaifa, S. B, and Rabeau, Y. (2013). Too close to collaborate? How geographic proximity could impede entrepreneurship and innovation. *Journal of Business Research, 66*(10), 2071-2078.

Lin, N. (2017). Building a network theory of social capital. In Lin, N, Cook, S. K, and Burt, S. R. (Eds.), *Social capital: theory and research* (pp 3-28). New York, NY: Routledge.

Lin, W. L, Yip, N, Ho, J. A, and Sambasivan, M. (2020). The adoption of technological innovations in a B2B context and its impact on firm performance: An ethical leadership perspective. *Industrial Marketing Management, 89,* 61-71.

Lis, A. M, Kowalski, A. M, and Mackiewicz, M. (2021). Smart specialization through cluster policy: Evidence from Poland and Germany. In *Gancarczyk, M, Ujwary, A, and González, M. (Eds.), Partnerships for Regional Innovation and Development* (pp. 218-245). New York, NY: Routledge.

Malecki, E. J. (2012). Regional social capital: why it matters. *Regional Studies*, *46*(8), 1023-1039.

Marco-Lajara, B, Claver-Cortés, E, Úbeda-García, M, and Zaragoza-Sáez, P. D. C. (2016). Hotel performance and agglomeration of tourist districts. *Regional Studies, 50*(6), 1016-1035.

Marco-Lajara, B, Claver-Cortés, E, Úbeda-García, M, García-Lillo, F, and Zaragoza-Sáez, P. C. (2019). The role of internal knowledge generation and external knowledge acquisition in tourist districts. *Journal of Business Research, 101*, 767-776.

Marco-Lajara, B., Sánchez-García, E., Martínez-Falcó, J., & Poveda-Pareja, E. (2022a). Regional Specialization, Competitive Pressure, and Cooperation: The Cocktail for Innovation. *Energies, 15*(15), 5346.

Marco-Lajara, B., Úbeda-García, M., del Carmen Zaragoza-Saez, P., & García-Lillo, F. (2022b). Agglomeration, social capital and interorganizational ambidexterity in tourist districts. *Journal of Business Research, 141,* 126-136.

Martínez- Ávila, M. and Fierro-Moreno, E. (2018). Aplicación de la técnica PLS-SEM en la gestión del conocimiento: un enfoque técnico práctico. *RIDE. Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, *8*(16), 130-164.

Martínez-Pérez, Á, García-Villaverde, P. M, and Elche, D. (2016). The mediating effect of ambidextrous knowledge strategy between social capital and innovation of cultural tourism clusters firms. *International Journal of Contemporary Hospitality Management, 28*(7) 1484-1507.

Molina-Morales, F. X, and Martínez-Fernández, M. T. (2009). Too much love in the neighborhood can hurt: How an excess of intensity and trust in relationships may produce negative effects on firms. Strategic *Management Journal, 30*(9), 1013-1023.

McCann, B. T., and Folta, T. B. (2011). Performance differentials within geographic clusters. *Journal of Business Venturing*, *26*(1), 104-123.

Molina, F. X. M., and Martínez, M. T. F. (2009). Too much love in the neighborhood can hurt: How an excess of intensity and trust in relationships may produce negative effects on firms. Strategic *Management Journal, 30*(9), 1013-1023.

Nahapiet, J, and Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of management review*, *23*(2), 242-266.

Nestle, V, Täube, F. A, Heidenreich, S, and Bogers, M. (2019). Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry. *Technological Forecasting and Social Change, 146*(1), 563-572.

Ozer, M., and Zhang, W. (2015). The effects of geographic and network ties on exploitative and exploratory product innovation. *Strategic management journal, 36*(7), 1105-1114.

Parra-Requena G, Molina-morales, F. X, and García-Villaverde, P. M. (2010). The mediating effect of cognitive social capital on knowledge acquisition in clustered firms. *Growth and change*, *41*(1), 59-84.

Parra-Requena, G, Ruiz-Ortega, M. J, and Garcia-Villaverde, P. M. (2013). Social capital and effective innovation in industrial districts: dual effect of absorptive capacity. *Industry and Innovation, 20*(2), 157-179.

Pekkarinen, S, and Harmaakorpi, V. (2006). Building regional innovation networks: The definition of an age business core process in a regional innovation system. *Regional Studies*, *40*(4), 401-413.

Prajogo, D. I, and Ahmed, P. K. (2006). Relationships between innovation stimulus, innovation capacity, and innovation performance. *RandD Management, 36*(5), 499-515.

Prashant, K., and Harbir, S. (2009). Managing strategic alliances: what do we know now, and where do we go from here? *Academy of management perspectives, 23*(3), 45-62.

Putnam, R.D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy, 6*(1), 65-78.

Pucci, T, Brumana, M, Minola, T, and Zanni, L. (2020). Social capital and innovation in a life science cluster: the role of proximity and family involvement. *The Journal of Technology Transfer, 45(*1), 205-227.

Pyburn, R, and J. Woodhill (2014). *Dynamics of Rural Innovation - A primer for emerging professionals*. Arnhem, NL: LM Publishers.

Resbeut, M, Gugler, P, and Charoen, D. (2019). Spatial agglomeration and specialization in emerging markets: Economic efficiency of clusters in Thai industries. Competitiveness Review: *An International Business Journal, 29*(3), 236-252.

Roldán, J. L. and Cepeda, G. (2019). *Variance-based Structural Equation Models: Partial Least Squares (PLS) for Researchers in Social Sciences.* Seville, ES: University of Seville.

Sarstedt, M, Wilczynski, P, and Melewar, T. C. (2013). Measuring reputation in global markets-A comparison of reputation measures' convergent and criterion validities. *Journal of World Business, 48*(3), 329-339.

Skala, M, and Rydvalova, P. (2021). Evolving insight of localization theories into cluster existence. In *Zizka, M. and Rydvalova P. (Eds.), Innovation and Performance Drivers of Business* Clusters (pp. 7-24). Cham, CH: Springer.

Škerlavaj, M, Song, J. H, and Lee, Y. (2010). Organizational learning culture, innovative culture and innovations in South Korean firms. *Expert systems with applications, 37*(9), 6390-6403.

Song, Y., Yang, L., Sindakis, S., Aggarwal, S., and Chen, C. (2022). Analyzing the Role of High-Tech Industrial Agglomeration in Green Transformation and Upgrading of Manufacturing Industry: *The Case of China. Journal of the Knowledge Economy,* 1-31.

Tasselli, S, Kilduff, M, and Menges, J. I. (2015). The microfoundations of organizational social networks: A review and an agenda for future research. *Journal of Management*, *41*(5), 1361-1387.

Troisi, O, Visvizi, A, and Grimaldi, M. (2021). The different shades of innovation emergence in smart service systems: the case of Italian cluster for aerospace technology. *Journal of Business and Industrial Marketing, 36*(3), 1-25.

Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative science quarterly, 42*(1) 35-67.

Wang, M. C, and Chen, M. H. (2016). The more, the better? The impact of closure collaboration network and network structures on technology-based new ventures' performance. *RandD Management, 46*(1), 174-192.

Wang, R.H, Lv, Y.B, and Duan, M. (2017). Evolutionary game of inter-firm knowledge sharing in innovation cluster. *Evolving Systems,8*(2), 121-133.

Weber, B, and Heidenreich, S. (2018). When and with whom to cooperate? Investigating effects of cooperation stage and type on innovation capabilities and success. *Long Range Planning, 51*(2), 334-350.

Xu, B, Xiao, Y, and Rahman, M. U. (2019). Enterprise level cluster innovation with policy design. *Entrepreneurship and Regional Development, 31*(1-2), 46-61.

Yu, H., Ke, H., Ye, Y., and Fan, F. (2023). Agglomeration and flow of innovation elements and the impact on regional innovation efficiency. *International Journal of Technology Management, 92*(3), 229-254.

Zeng, J, Liu, D, and Yi, H. (2019). Agglomeration, Structural Embeddedness, and Enterprises' Innovation Performance: An Empirical Study of Wuhan Biopharmaceutical Industrial Cluster Network. *Sustainability, 11*(14), 3922.

Zhong, Z. J. (2014). Civic engagement among educated Chinese youth: The role of SNS (Social Networking Services), bonding and bridging social capital. *Computers and Education*, *75*(1), 263-273.

ANNEX 1

	ITEMS	ITEM DEFINITION	MEASUREMENT
DAS	L1	Degree of agglomeration of employment in the sector in the region	Coefficient = 1 → national average // Coefficient >or<1 → above or below national average, respectively
	L2	Degree of agglomeration of companies in the sector in the region	
Social Capital	CapSoc1	My company interacts frequently with your contacts	Likert scale (-3 = Strongly disagree; +3 = Strongly agree).
	CapSoc2	My company knows your contacts on a personal level	
	CapSoc3	My company maintains close social relationships with its contacts.	
	CapSoc4	Exchanges of information, knowledge and other resources between my company's contacts often have a similar content.	
	CapSoc5	The contacts with whom my company has frequent relationships are generally known to each other	
	CapSoc6	The contacts from whom my company receives information or advice for important decisions know each other, i.e. they have reciprocal relationships.	
	CapSoc7	My company maintains personal relationships with its contacts.	
	CapSoc8	The relations between my company and its contacts are characterized by a deep mutual respect between the parties.	
	CapSoc9	The relations between my company and its contacts are characterized by mutual trust between the parties.	
	CapSoc10	The relations between my company and its contacts are characterized by a high degree of reciprocity (mutual benefit) between the parties.	
	CapSoc11	The relationship between my company and its contacts is characterized by the existence of a personal friendship between the parties.	
	CapSoc12	We share the same ambition and vision as our contacts.	
	CapSoc13	My company shows enthusiasm in the pursuit of objectives and missions common to the members of its relational network, with whom it shares its goals and objectives.	
	CapSoc14	We understand the strategy and needs of our contacts.	
	CapSoc15	The employees of my company and those of its contacts have a positive attitude towards cooperative relationships.	
	CapSoc16	My company and your contacts are often in agreement when it comes to selecting the right mode of interaction to make the relationship work.	
	CapSoc17	The business practices and operating mechanisms of my contacts are very similar to those of my company.	
	CapSoc18	My company's corporate culture and management style are very similar to those of your contacts.	
Cooperation	Coop1	Degree to which your company cooperates with its customers.	Likert scale (-3 = Far inferior in relation to my competitors; +3 = Far superior in relation to my competitors).
	Coop2	Extent to which your company cooperates with its suppliers.	
	Coop3	Degree to which your company cooperates with its competitors.	
	Coop4	Extent to which your company cooperates with universities.	
	Coop5	Extent to which your company cooperates with technology centers.	
	Coop6	Extent to which your company cooperates with other types of institutions.	
Innovative Performance	DI1	Degree of novelty of our new products.	Likert scale (-3 = Far inferior in relation to my competitors; +3 = Far superior in relation to my competitors).
	DI2	Use of the latest technological innovations in the new products developed by my company.	
	DI3	Speed of new product development.	
	DI4	Number of new products introduced by my company in the market.	
	DI5	Number of our new products that are a novelty in the market (they are the first to be launched on the market).	
	DI6	Level of technological competitiveness of my company.	
	DI7	Speed with which the latest technological innovations are adopted in our processes.	
	DI8	Degree to which the technology used in our processes is up to date or new.	
	DI9	Updating pace of our processes, techniques and technologies.	
	DI10	In my company, the development of new distribution channels for products and services is an ongoing process.	Likert scale (-3 = Strongly disagree; +3 = Strongly agree).
	DI11	In my company, customer suggestions or complaints are handled with urgency and attention.	
	DI12	My company develops better marketing innovations than its competitors.	
	DI13	My company constantly emphasizes and introduces management innovations.	
Size	TM	Company size.	Number of employees at 31/12/2020
Age	ANT	Seniority of the company.	Years elapsed between the date of incorporation of the company and the 2020 financial year