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COMUNICACIÓN

Título:

Ampliando horizontes, cómo las empresas del cluster pueden aportar valor mediante la capacidad de intermediación. El caso del cluster del Valle del Juguete en Alicante

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Área Temática:

S07 - Industry 4.0 and sustainability in regions, clusters & industrial districts.

Resumen:

El presente trabajo profundiza en el análisis de la capacidad de intermediación, o de brokerage, por parte de las empresas de un cluster. Considerando al cluster como una metáfora de red generada a partir de las relaciones que se establecen entre los actores que lo integran, la literatura existente confirma que la ubicación de una empresa en dicha red, es un factor que facilita el acceso a conocimiento local. Sin embargo, la literatura también argumenta que posiciones excesivamente centrales pueden tener efectos negativos o de bloqueo, por lo que las empresas amplían sus horizontes relacionales hacia el exterior de la red, derivando esfuerzos y recursos a la exploración de nuevos conocimientos. Estas actividades, que aparentemente pueden reducir la

conexión del actor a su red local, en realidad podrían potenciar el valor que es capaz de aportar a través de la transmisión de conocimiento del exterior del cluster hacia su interior, en definitiva, incrementando su capacidad de brokerage. A su vez, esta capacidad de brokerage se puede ver beneficiada por otros factores, ya sean internos a la propia empresa, como la capacidad de absorción, o externos, como el establecimiento de vínculos con las instituciones locales. Para abordar estas cuestiones de investigación, se ha llevado a cabo un estudio empírico en el cluster valenciano del Valle del Juguete, en la provincia de Alicante. Los resultados revelan que los enlaces extra-cluster influyen sobre la capacidad de intermediación de la empresa, así como, el efecto moderador de los factores internos y externos. Finalmente, consideramos que este trabajo tiene aportaciones de interés al debate abierto en la literatura sobre el valor de los brokers de conocimiento en redes o clusters.

Palabras Clave: *Capacidad de intermediación, Brokerage, Cluster, Industria juguetera*
Clasificación JEL: R15, Z13

Abstract:

The present work deepens in the analysis of the capacity of intermediation, or brokerage, on the part of the companies of a cluster. Considering the cluster as a network metaphor generated from the relationships established among the actors that integrate it, the existing literature confirms that the location of a firm in such a network is a factor that facilitates access to local knowledge. However, the literature also argues that excessively central positions can have negative or blocking effects, so that companies broaden their relational horizons outside the network, diverting efforts and resources to the exploration of new knowledge. These activities, which may apparently reduce the actor's connection to its local network, could actually enhance the value it is able to contribute through the transmission of knowledge from outside the cluster to its interior, in short, increasing its brokerage capacity. In turn, this brokerage capacity can benefit from other factors, whether internal to the firm itself, such as absorptive capacity, or external, such as the establishment of links with local institutions. To address these research questions, an empirical study has been carried out in the Valencian cluster of the Toy Valley, in the province of Alicante. The results reveal that extra-cluster linkages influence the intermediation capacity of the firm, as well as, the moderating effect of internal and external factors. Finally, we consider that this work has interesting contributions to the open debate in the literature on the value of knowledge brokers in networks or clusters.

Key words: Intermediation capacity, Brokerage, Cluster, Toy Industry
JEL classification: R15, Z13

1. INTRODUCTION

Major benefits accrue to organizations that are well positioned within networks of relations with others. In fact, previous studies in this field agree about the extent to which an actor increases its knowledge and its potential learning through networking

activities (Phelps et al., 2012). Particularly, networking seems to be crucial to acquire knowledge and competences in contexts as clusters, characterized by geographical concentrations of SMEs firms (Lazerson and Lorenzoni, 1999; Boari and Lipparini, 1999; Munari et al., 2011, Giuliani 2011).

However, networking might be costly and time-consuming and also demands some specific conditions for actors. In fact, there are empirical studies in the specific literature of clusters that question the benefits effects of networking, arguing that centrality in a network of geographically close actors has either no strategic effect (Owen-Smith and Powell, 2004) or only a small positive influence (Whittington et al., 2009).

On the other hand, brokerage activities can be considered as mechanisms though which firms and actors exploit and take advantages for holding a central position in their network (Gould and Fernandez, 1989). In this respect, analyzing brokers may help to understand and valuate the potential benefits of networking for firms. Brokers are located in-between and they can enjoy privileged access to information, control and facilitate interactions and knowledge transfers with other actors.

This is why a rapidly developing part of cluster literature has been focused on knowledge brokers, which are actors transferring and combining extant ideas and knowledge among unconnected firms and institutions. Specifically, previous research has already addressed the potential roles of knowledge brokers (Giuliani and Bell, 2005) and the performance implications of particular types of as gatekeeper (Graf and Kruger, 2011).

In spite of increasing attention to the broker notion, a need for a better understanding of the phenomenon is claimed, particularly if one wants to go beyond the mere focus on broker's performance (e.g. Kirkels and Duysters, 2010; Guler and Guillen, 2010; Ho and Liu, 2012**).** In this paper, specifically we address the question of which are the firm's factors (internal and external ones) relevant for developing broker activities in clusters.

Generally speaking, a cluster may be defined as a category of a dense strong-ties network with intense, frequent and close relationships between members (Trigilia, 2001). Therefore, a cluster represents a system of inter-organizational relations among

various partners, such as customers, competitors, suppliers and institutions (Piore, 1990). In particular, knowledge flows are very common, so we studied the role of the broker in a technological knowledge network.

With the aim of deepening the understanding of these arguments, we have drawn our research on a sample of firms located in the so-called Toy Valley in the Spanish region of Valencia. The aim of our research is to contribute to this major issue by focusing directly on how different factors at different levels influence on the brokerage roles of the clustered firms.

We have structured the paper as follows: we present the theoretical framework and hypotheses, then, we explain the research setting, method, and results, and finally, main conclusions of the study are given.

2. THEORETICAL FRAMEWORK

2.1 Brokerage activity

There is a general agreement in social network literature about the advantages of being a bridge between other actors in the network, frequently also referred to as critical links (e.g. Burt, 2004; Granovetter, 1973). Marsden (1982) defines brokerage as a process by which intermediary actors facilitate transactions between other actors lacking access to or trust in one another. Specifically, Burt (1992) argued that accessing new opportunities and ideas is related to how an actor's contacts are connected to each other, that is, if a structural hole exists between a focal actor's contacts. The notion of structural hole defines social capital in terms of the information and control advantages of being a broker in relations between people who are otherwise disconnected in the social structure. Therefore, the information benefits of being a broker can be defined in terms of better access to external information, better timing in this access, and a better referral for the actor (Burt, 1992).

The concept of knowledge broker is identified as the role played by particular actors (individual or organization) that are able to connect different communities, thus generating flows of knowledge between them (Boari and Riboldazzi, 2010; Hargadon, 1998). In the context of geographical clusters firms acting as brokers are connectors between subclusters maintaining bridging ties. For instance, McEvily and Zaheer (1999)

theorized that bridging ties connect a focal firm to sources of information and opportunities that are not available from other network contacts. Firms' networks of bridging ties are relevant sources of differences in cluster firms' competitive capabilities.

Actors holding a preferred location in the network receive innovation-related information that other firms might miss (Becker, 1970). Galunic and Rodan (1998), based on the work of Hargadon and Sutton (1997), found that a firm at the confluence of several industries was able to broker the knowledge derived from the multiple industries to create new business concepts. Recently, the importance of knowledge brokers in generating innovation has been widely evidenced (Boari and Riboldazzi, 2010; Uzzi and Spiro, 2005), and in cluster literature, the relationship between brokerage activities and innovation was mainly focused on gatekeepers accessing external sources of knowledge (Morrison, 2008; Wink, 2008; Giuliani, 2011; Graf 2011), eventually combining it with local knowledge (Graf and Kruger 2011; Munari et al., 2011). Also, the intensity of a gatekeeper activity may have an impact on innovation performance (Graf and Kruger, 2011).

To sum up, brokerage roles might provide firms some relevant and strategic advantages, such as better access to high quality knowledge sources, enhancing competitive capabilities and innovation of the firm.

2.2 Extra-cluster connectivity

The idea of external openness is related to the concept of bridging capital with external networks, providing new (and exclusive) information and knowledge of the cluster firms. Overall, the positive impact of external openness has been supported previously by authors like Bathelt et al. (2004) and Giuliani (2013). Extra-cluster linkages enable actors to explore new and non-redundant knowledge providing novel solutions and allowing radical innovations (Bathelt el al., 2004). In clusters, as Giuliani (2007) and Morrison (2008) suggest the existence of highly connected firms that managing the local-global interfaces. They connect local units with external repositories of knowledge without the cost of maintaining side-by-side relations (Rychen and Zimmermann, 2008). For instance, Malipiero et al. (2005) focused on the role of focal firms in industrial clusters as gatekeepers that introduce external technological novelties in the

cluster and enact new useful knowledge production at the local level. According to who act as broker between cluster internal and external networks.

In consequence, and on the basis of the previous arguments, we can propose the following hypothesis:

Hypothesis 1. Extra-cluster Connectivity has a positive influence on firm's Brokerage Activity in Cluster.

2.3 Firm internal attributes and brokerage activities

Acting as a broker requires some internal conditions. Brokers have to detect, understand and exploit existent knowledge resources in the network, since sometimes knowledge is not easy to identify neither to be transmitted to others. In this sense, Burt (1997) pointed that the actor's contribution to knowledge sharing depends on its internal resources in other words knowledge sharing depends on actor's characteristics (Cohen and Levinthal, 1989). Among these required internal factors probably is the absorptive capacity the most crucial to determine to what extent actors can gain knowledge that will subsequently be transferred.

Moreover, organizational literature suggests that technological based resources facilitate relationships and collaborations (Han and Park, 2006; Uzzi, 1997). Some levels of similarity in the individual technological bases are required for a fluid exchange of resources between actors. Additionally, internal resources and absorptive capacity allow further elaboration of acquired knowledge. This reinforces the advantages of the brokerage position and increases the value of the knowledge transferred. Therefore, we can expect Absorptive Capacity to strengthen the relationship of a firm's Extra-cluster Connectivity with Brokerage Activity in Cluster. Therefore, we can formulate the following hypothesis:

Hypothesis 2. Absorptive Capacity would positively moderate the relationship between the firm's Extra-cluster Connectivity and its Brokerage Activity in Cluster.

2.4 Local institutions connectivity

The notion of supporting organizations within the specific context of the so-called industrial clusters is used in this paper. Supporting organizations are defined as locally oriented entities that provide firms in the area with a host of collective services.

Universities, research institutes, vocational training centers, technical assistance centers, and professional trade associations or financial partners are frequent examples of these organizations. For this paper purposes we focus specifically on the so-called the Knowledge Intensive Business Services (KIBS). Following Bettencourt et al. (2002: 100-101), they are organizations whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customized service or product solution to satisfy the client's needs. The role of KIBS is to provide expertise to the cluster firms. They are sources of innovation, acting as co-producers of innovation (Den Hertog, 2000, Van Ark et al., 2003; Muller and Doloreux, 2009). The KIBS operate as an interface between the knowledge base available in the whole economy and knowledge available within the client company. So, these services have a central role in producing and disseminating knowledge (Aslesen and Isaksen, 2007), as they provide substantial opportunities for learning, acquiring valuable information and enhancing firm capabilities in nowadays economy. The availability of KIBS in the close context of the firm facilitates the creation and commercialization of new products, processes and services (García-Quevedo et al., 2010). In brief, these supporting organizations can explore and transfer new, exclusive information, knowledge, and opportunities that are continually refined because of internal redundancy, proximity, and transactional intensity (Molina-Morales and Martínez-Fernández, 2003). Therefore, we can expect connectivity with local institutions to exert a positive reinforcement on the relationship of a firm's extra-cluster connectivity with the intermediation activity in the cluster. Therefore, we can formulate the following hypothesis:

Hypothesis 3. Local Institutions Connectivity would positively moderate the relationship between the firm's Extra-cluster Connectivity and its Brokerage Activity in Cluster.

3. METHODOLOGY

3.1 Research setting

The Spanish toy industry exemplifies how technical and managerial innovation practices facilitate persistence in a competitive environment governed by large corporations and Far-east manufacturers. The production is particularly concentrated in

the Valencia region which generates 41.3% of the jobs and 38.4% of total sales. Built around four cities at south of the region (Ibi, Onil, Castalla and Tibi), the Toy Valley cluster agglomerates 98% of the regional economic activity thanks to the specialization in different types of production addressing distinct market niches. In addition, with 61% of exporting companies selling more than 400 million euros abroad, the Spanish toy industry is a recognized player on the world stage.

The genesis of the nowadays local production system, is based on the development of SMEs and the progressive consolidation of common institutions that prompted collective efficiency and competitiveness. During the first half of the 20th century, incoming information through rudimentary channels impelled to transform the traditional pottering and tinsmith activities into the manufacture of toys. The availability of raw materials and skilled workers allowed leading entrepreneurs to push on the production of the creation of miniatures or dolls in the cities of Ibi and Onil. With the structural changes induced by the introduction of novel materials and technologies (e.g. plastic and injection), the Toy Valley experienced a “golden age” since 50’s. Supported by a growing community of providers, sometimes result of spin-off processes, local entrepreneurs launched successful projects and trademarks that frequently vanished with the globalization spiral. However, the intensification of innovation practices and new strategies (offshoring, licensing, diversification) have slowed down the decline of local activity.

In this way, the renascence and vitality of the cluster is based on proximity and key supporting organizations. Progressively, local firms strengthen their technological competences and innovation capabilities through collaborative practices and well-designed programs (Albadalejo, 2002). For instance, both AIJU (a toy technological institute) and AEFJ (a business association), among others, acted as specialized providers and main policy inductors. By providing specific services at reasonable cost, AIJU still plays a pivotal role actor in the construction of firms' and systemic capabilities (Holmström, 2006). Additionally, it serves as a valuable repository of novel knowledge and fosters innovation by assisting or lowering in spheres such as product development, manufacturing or training (Holmström, 2006). AEFJ has also contributed decisively to local competitiveness and innovation. Further than providing a variety of

services (legal assistance, institutional representation or training), the business association represents a real forum where valuable managerial experiences are diffused within local firms. Besides, several projects have transformed AEFJ into a real lighthouse for the development of new products or the identification of market trends.

3.2 Sample and data collection

We developed a questionnaire in 2021 on the basis of previous literature (Giuliani 2007; Morrison and Rabellotti 2009). Our tool tackled different aspects such as firm's characteristics, innovation practices and inter-organizational relationships. The preliminary questionnaire was only slightly modified as few problems were encountered during the pre-test pilot. To collect network data, "roster-recall" methodology was applied. Each interviewee was asked to select from an open list of local firms from which technical and knowledge advice was received on a regular basis.

At the end of the process, a total number of 75 firms accepted to collaborate. This yields a response rate of 95% on the total population identified from reliable databases (SABI, AIJU and AEFJ). Peer debriefing by AIJU's experts confirmed that all relevant players were considered and missing actors were very scarce.

3.3 Measures

Dependent variable

Brokerage Activity in Cluster. We define the raw brokerage score for a firm as the number of such triads in which a firm is involved. Furthermore, a standardized brokerage rate can be obtained based upon the ratio between the observed occurrences and the hypothetical instances for a random network. Along this study, we used the standardized brokerage scores computed for the knowledge network as dependent variable.

Independent variables

Extra-cluster Connectivity. Global pipelines are the connections deliberately established with distant knowledge sources, providing access to different knowledge pools, new technologies and markets (Bathelt et al., 2004; Bathelt, 2008). The effect of the extra-

cluster sources of knowledge was evaluated through the weighted sum of international linkages with consultancy services, universities, public research centres and private research centres. The variable ranges from 0 to 1, where 1 indicates that connections with these four groups of actors exist.

Absorptive Capacity. The absorptive capacity, defined as the ability to successfully recognise, assimilate and apply incoming knowledge (Cohen and Levinthal, 1989), facilitates access to new knowledge and subsequently fosters performance (Robertson et al., 2012; Nooteboom et al., 2007, among others). Initially, using an economic perspective, Cohen and Levinthal (1989) associate this ability to ingest external knowledge to investments in R&D. Further elaborations expanded the construct by accounting for the cognitive characteristics of learning (Cohen and Levinthal, 1990). Along this paper, we opted for the economic perspective based on the idea that higher R&D efforts enhance the organizational ability to benefit from external knowledge flows (Huergo, 2006; Vega-Jurado et al., 2008). Consequently, absorptive capacity was proxied through the ratio R&D expenses on total sales.

Local institutions Connectivity. In clusters, support organizations connect local actors to new sources of knowledge (McEvily and Zaheer, 1999; Molina-Morales, 2005). With a strong knowledge base and an extensive network of connections to external information, firms translate new knowledge into the worldview of their local colleagues and facilitate subsequent diffusion within the agglomeration (Morrison 2008). In our model, a variable was included to assess the total number of connections to support organizations.

Control variables. Finally, we controlled for the effects of firms age, measured as the logarithm of the number of years since foundation, as prior knowledge and brokerage experiences may influence the actual standardised brokerage rate. Additionally, larger organizations often exhibit extended knowledge bases and higher status, which influences their mediating activity. So, we also included the logarithm of the number of employees during 2021 in the models. Variables were labelled as Age and Size respectively.

4. EMPIRICAL RESULTS

Basic descriptive statistics and correlation coefficients of our measures are summarized in Table 1. Detailed analysis of the results in Table 1 confirms the non-existence of significant correlations between them.

Table 1. Descriptive statistics and correlations of the variables

Variables	Mean	S.D.	1	2	3	4	5	6
(1) Brokerage Activity in Cluster	-1.19	2.07	1					
(2) Extra-cluster Connectivity	-.073	.497	.385*	1				
(3) Absorptive Capacity	.074	.082	.513*	.316*	1			
(4) Local Institutions Connectivity	3.05	2.05	.406*	.437*	.543**	1		
(5) Age	3.08	.709	.086	.085	.184	.158	1	
(6) Size	1.03	.514	.060	.094	.289*	.370*	.226*	1

N=75 ** p<.01; * p<.05

The structure of the knowledge network of the cluster is represented in Figure 1. In the network, each node represents one firm, and a line between two actors indicates a relationship between them. Relational data collected were organized them in a matrix composed of 75 rows and 75 columns, corresponding to the number of firms analysed. The cells in the matrix show 1 for the existence of a tie between actor i in the row to actor j in the column and 0 otherwise. The matrix is asymmetric given that the transfer of knowledge from actor i to actor j may not be bi-directional.

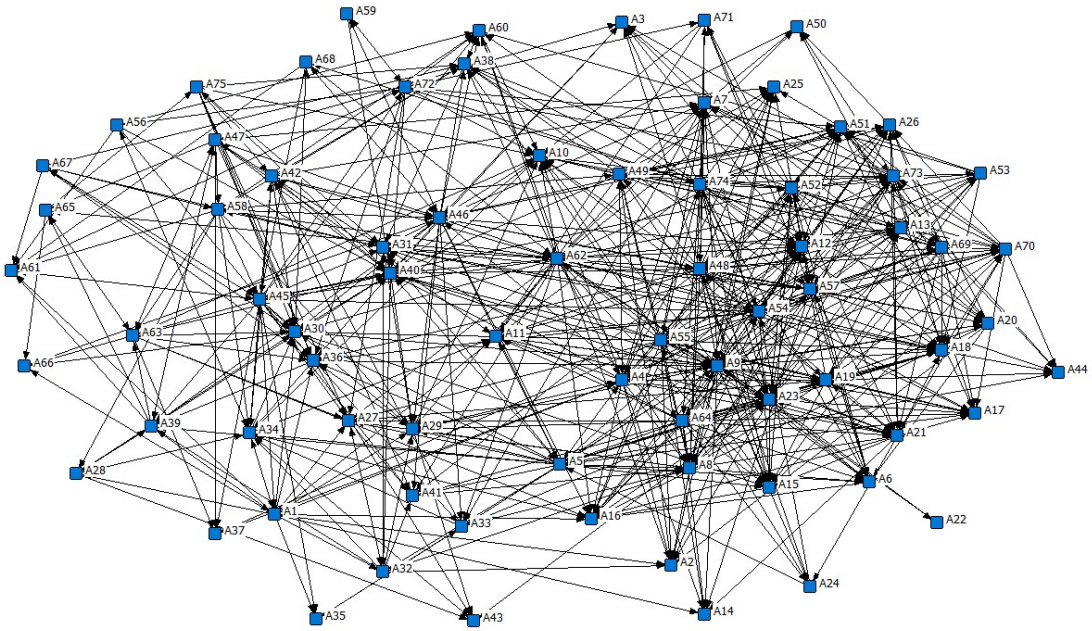

Figure 1. The knowledge network of cluster firms.

Established procedures based in bootstrapping were used to test significance of possible moderation effects (Preacher and Hayes, 2004). After setting the bootstrap sample to 10.000, we examined the moderating effect of Absorptive Capacity and Local Institutions Connectivity on the link between Extra-cluster connectivity and the standardized Brokerage Activity score. Table 2 presents statistical results for both models. In both models, the moderating variables have a positive and significant effect, confirming the hypotheses.

Table 2. Regression results of models

Dependent variable: Brokerage Activity in Cluster			
	M1	**M2**	**M3**
Independent and moderating variables			
Extra-cluster Connectivity (ECC)	2.702**	-.248	-1.374
	(.736)	(.825)	(1.397)
Absorptive Capacity (ACAP)		12.597**	
		(3.487)	
Local Institutions Connectivity (LIC)			.550**
			(.196)
Control variables			
Age	.253	.007	.095
	(.533)	(.443)	(.494)
Size	.019	-.141	-.101
	(.125)	(.107)	(.123)
Linear moderating effects			
ECC x ACAP		26.002**	
		(6.756)	
ECC x LIC			.983**
			(.366)
Model *F*	4.782**	12.028**	7.187**
Adjusted R^2	.120	.435	.294
Change in R^2		.107**	.065**

N= 75; **p< .01; *p< .05
Non-Standardized regression estimates

Additionally, we have applied the Johnson-Neyman technique in order to delimit the regions of statistical significance of the model. This technique allows us to explore the interaction as a conditional effect (Hayes, 2017), establishing from what point, or value of the distribution of the moderator variable, the independent variable exerts a statistically significant effect on the dependent variable. This technique is applied when the moderating variable is quantitative, and over a wide range of values, beyond the analysis of simple slopes offered by the Pick-a-point approach when the moderating variable is qualitative.

The results obtained are shown in Table 3, and indicate that when the Absorption Capacity variable score is greater than or equal to 0.059, that is, an R&D investment of 5.9%, the extra-cluster links have a greater impact on the company's brokerage activity. This occurs in 42.86% of the companies in the study. On the other hand, the company needs at least 3 links with local institutions to increase the impact that external connections have on the brokerage capacity. This occurs in 64.29% of the companies.

Table 3. Johnson-Neyman Technique results

Variable	Value	% below	% above
ACAP	.059	57.14	42.86
LIC	2.93	35.71	64.29

The graphs of the moderation effects are shown below in Figure 2.

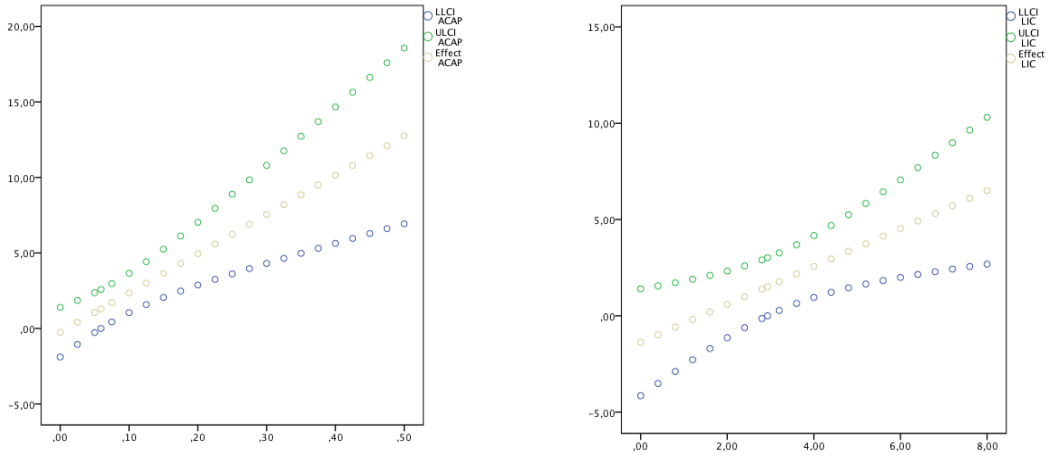

Figure 2. Johnson-Neyman graphics

5. CONCLUSIONS

This study deals with the influence of Extra-cluster Connectivity, and other factors as Absorptive Capacity and Local Institutions Connectivity, have on the role of brokerage activities in clustered firms. Using data from a sample of firms belonging to the Valencian Toy Valley cluster in the Spain region of Valencia, this paper contributes to the literature in several different ways.

Firstly, the results show that establishing relationships beyond the cluster implies for the firm the acquisition of new knowledge that it subsequently adds value within the cluster. This makes the firm assume greater leadership in the cluster, playing a prominent role as a knowledge broker, as well as improving its status in the network towards privileged positions. Secondly, solid knowledge base favours absorption and transformation of external knowledge. This refined knowledge seems increasing crucial for alters, fostering the creation of linkages and brokerage activity. Finally, the influence of the connectivity with local institutions is an input of knowledge that,

combined with the knowledge obtained externally to the cluster, strengthens the firm's brokerage activity.

The complex relations between extra-cluster connectivity, absorptive capacity, local institutions and brokerage activities cannot be subsumed within simple lineal models, but might also depend on moderating relationships. As it has been hypothesised, we observed that moderation mechanisms might differ in subgroups of participants. In particular, the moderating effect of Absorptive Capacity on the relationship between extra-cluster connectivity and intermediation score is significant above a threshold close to 6% in R&D. This implies that the firm should have a projection over time towards the search for innovation-based improvement. In short, the moderating effect is not only through access to external knowledge, but would have a multiplicative effect together with other resources internal to the firm. With respect to connectivity with local institutions, the moderating effect is significant from a value of 3 connections onwards. This result implies the need for the firm to have a dose of heterogeneity and diversity in the connections it establishes with the different local institutions in the territory, far from focusing on the most representative one.

This research is not exempt from some limitations that may affect the potential generalization of the conclusions. Focusing on one single industry may provide us with some advantages but it also presents certain drawbacks. The research allows us better control over the specific aspects of this industry but it would be hard to compare between different industries. However, it must be accepted that studying a particular industry may introduce bias into the conclusions, thus limiting potential generalizations to other contexts. In conclusion, we must be cautious in generalizing results and conclusions, and a broader analysis is therefore needed to analyse how other cases vary.

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