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**TERRITORY AND SOCIAL NETWORKS. DIRECT AND
INTERACTIVE EFFECTS OF BROKERAGE ACTIVITIES ON
INNOVATION IN CLUSTERED FIRMS**

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AERT-UJI



STRUCTURE OF THE PRESENTATION

CONTEXT OF THE RESEARCH (Justification and recent evolution of the literature)

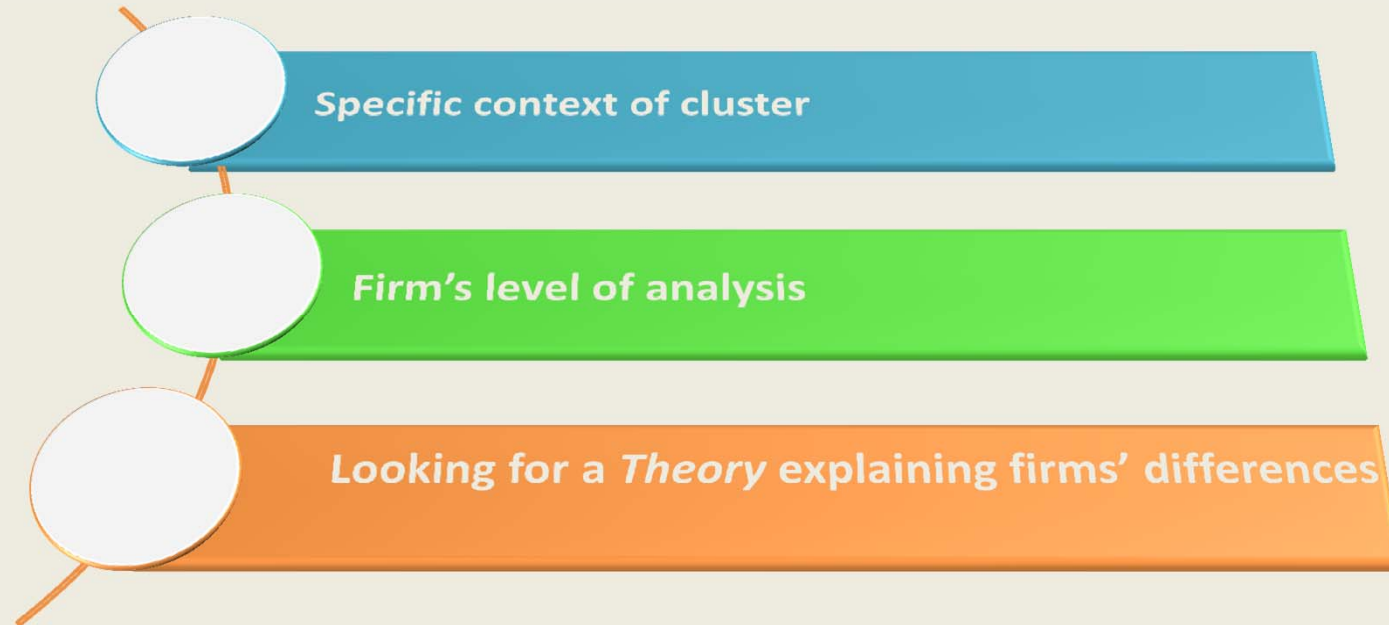
F. Xavier Molina-Morales

DIRECT AND INTERACTIVE EFFECTS OF BROKERAGE ACTIVITIES ON INNOVATION IN CLUSTERED FIRMS.

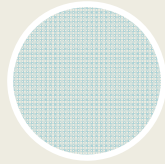
BALANCING INFORMATION EXCHANGES AND INTERMEDIATION TO ENHANCE FIRMS' PERFORMANCE IN CLUSTERS.

Luís Martínez-Cháfer

CONTEXTUALIZATION OF THE RESEARCH



Firm positioning in the social network explains access to external knowledge sources and consequently to the firm's value creation and innovation.



Evolution of the cluster literature

From district effect to the analysis of brokerage activities

In the 90's

District (cluster) effect (Signorini, 1994, Panicia, 1998, 1999, in Spain Ybarra, 1991; Soler and Hernández, 2001; Molina-Morales, 2001).

Problems around the identification and membership issues (Sforzi, 1990, Boix and Galleto 2006, 2008, Molina-Morales and Martínez-Fernández, 2004).

Intra-cluster relations for knowledge exchange (Saxenian 1991, Porter 1998, Maskel and Malmberg 1999, Breschi and Lissoni, 2001, Cooke, 2002)

More recently, new directions in cluster research

Overcoming previous limitations...

Different types (dimensions) of proximity (Boschma, 2005; Boschma and Frenken, 2010), cognitive dimension (in Spain, Parra et al. 2010).

The individual actor level analysis (Lazerson and Lorenzoni, 1999; Boari and Lipparini, 1999; Munari, et al, 2011, Giuliani 2011). Heterogeneous firms (Boschma and Ter Wal 2007), distinct attributes (Giuliani and Bell 2005) Opportunities and constraints are also unevenly distributed (Giuliani 2007), distinct absorptive capacity (in Spain, Hervas-Oliver, et al., 2012).

Longitudinal and evolutionary perspective, the concept of resilience related to diversity (external shocks adaptation) Balland et al, 2012; Suire and Vicente (2014).).

Relational perspectives...

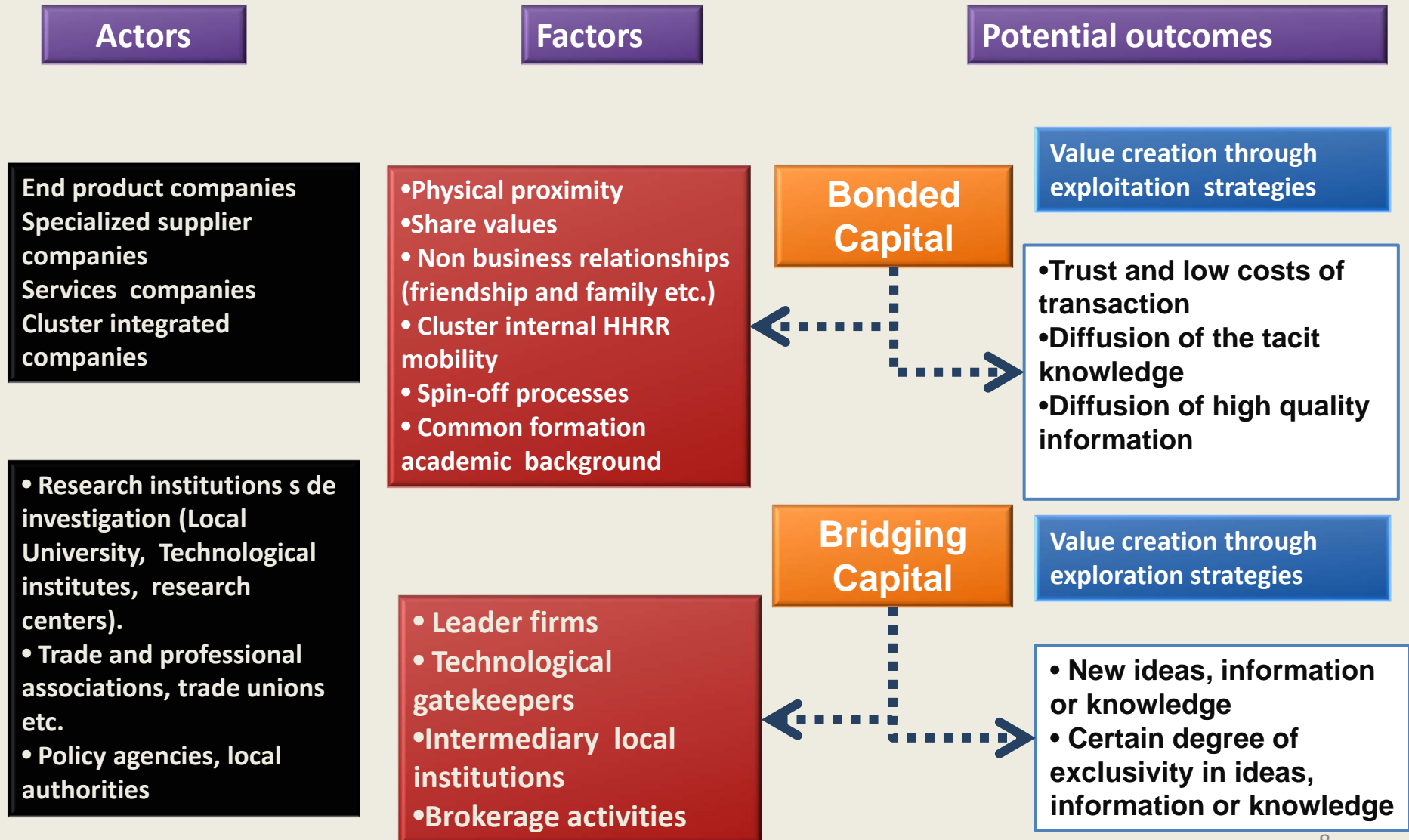
Cluster conditions generate both bonded values: trust, cohesion and bridging opportunities new and exclusive access to external resources (McEvily and Zaheer, 1999, Molina-Morales and Martínez-Fernandez, 2009)

Social Network Analysis, the network positioning of the firm and its implication on the clustered firms outcomes can be analyzed (Giuliani, 2011). Interactions between both levels of analysis (moderator and mediator effects) (Belso-Martínez, et al., 2011)

In addition, diverse categories of internal flows were detected such as business information, technological knowledge etc (Lissoni 2001; Breschi and Lissoni 2001; Boschma and Frenken 2006; Morrison and Rabelotti 2009 among others). Similarly, Morrison and Rabelotti (2005) talked about, core and periphery notions (In Spain, Molina-Morales et al., 2012). Or distinguishing internal and external relations identified as local buzz and global pipelines (Bathelt et al., 2004)

Brokerage roles of the cluster organizations: effects and implications. Specific roles such as the gatekeepers (Boari and Riboldazzi, 2014; Molina-Morales and Martínez Chéfer, 2014).

THE CLUSTER AS A SOCIAL NETWORK



Illustrative examples

DIRECT AND INTERACTIVE EFFECTS OF BROKERAGE ACTIVITIES ON INNOVATION IN CLUSTERED FIRMS

Boari, C. (Università di Bologna); Molina-Morales, F. X. (Universitat Jaume I) & Martínez-Cháfer, L. (UJI) – Preliminary Draft

The effects of holding a central position in the cluster network

BALANCING INFORMATION EXCHANGES AND INTERMEDIATION TO ENHANCE FIRMS' PERFORMANCE IN CLUSTERS

Larrañeta, B. (Universidad Pablo de Olavide); Molina-Morales, F.X. (UJI); Martínez-Cháfer, L. (UJI) - Preliminary Draft

What is the best position in the cluster network ?

Example 1: DIRECT AND INTERACTIVE EFFECTS OF BROKERAGE ACTIVITIES ON INNOVATION IN CLUSTERED FIRMS

Boari, C. (Università di Bologna); Molina-Morales, F. X. (Universitat Jaume I) & Martínez-Cháfer, L. (UJI)

Preliminary Draft

Objective:

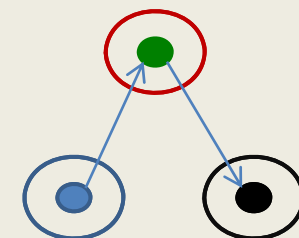
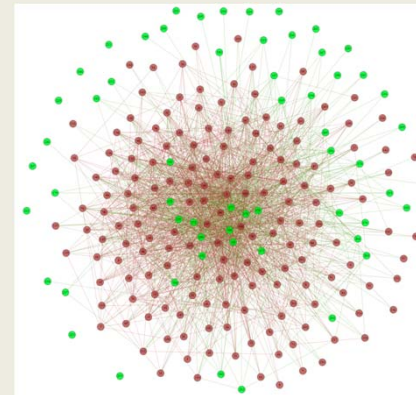
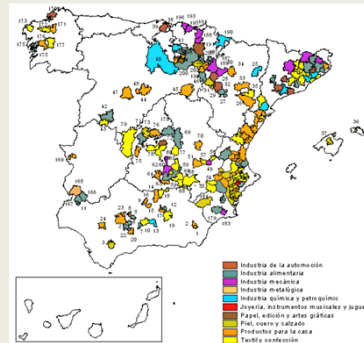
Our research addresses to a **central question** in the industrial cluster context: What is the **firms' brokerage influence** on innovation?

We explore how different **brokering activities** (By analyzing four types of roles) **affect innovation** of companies located in clusters. Furthermore, since these effects may in turn depend on the capabilities of firms (Zaheer & Bell, 2005) **we combine the effect of brokering activities with the internal capabilities** of firms to try to explain innovation.



Theoretical Context

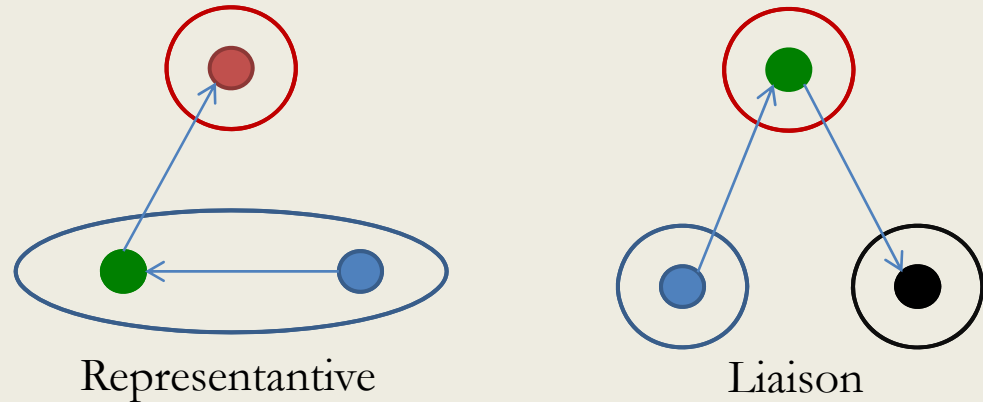
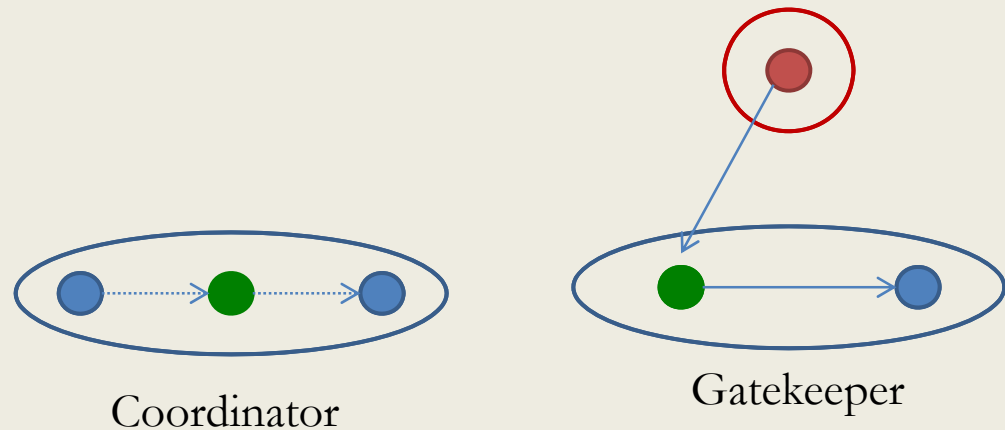
- Clusters
- Networks
- Brokerage



Theoretical Context

Brokerage is defined as *a process by which intermediary actors facilitate transactions between other actors lacking access to or trust in one another* (Marsden 1982).

We can identify **four types of brokers** based on the subgroups that participate in a brokerage relationship: *Coordinator, Gatekeeper, Representative and Liaison* (Gould and Fernández, 1989)

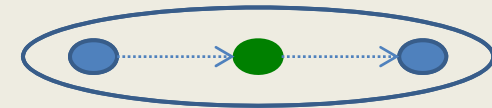


Theoretical Context

Being located **in the middle of a transaction**, as happens to brokers, **can be beneficial for the knowledge contribution** that fosters firm's innovative capacity (Becker 1970; Galunic and Rodan 1998; Uzzi and Spiro 2005; Boari and Riboldazzi 2010).

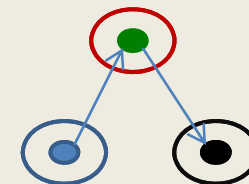
The impact of **horizontal relations** on innovation has received less attention from researchers. There is evidence that, if present, horizontal ties are less important than vertical ones (Tomlinson, 2010). Based on this reasoning, we are able to predict a different effect of distinct brokerage roles on the innovation of the firms in the industrial cluster.

Horizontal Relationships



Some authors observe that **many product innovations come from end-users** (Von Hippel 1977). These **vertical relationships** are those established **between firms and suppliers inside the cluster**. Suppliers are able to develop competencies and contribute with knowledge that sustains the competitive advantage of final products (Boari 2001)

Vertical Relationships



Theoretical Context

H1: The level of intensity in the brokerage activity of a cluster firm will be positively associated to its innovative performance.

H2: Different brokerage roles played by cluster firms have different impacts on their innovative performance. In particular, cluster firms playing a liaison role have the highest innovative performance, while cluster firms playing a coordination role have the lowest.

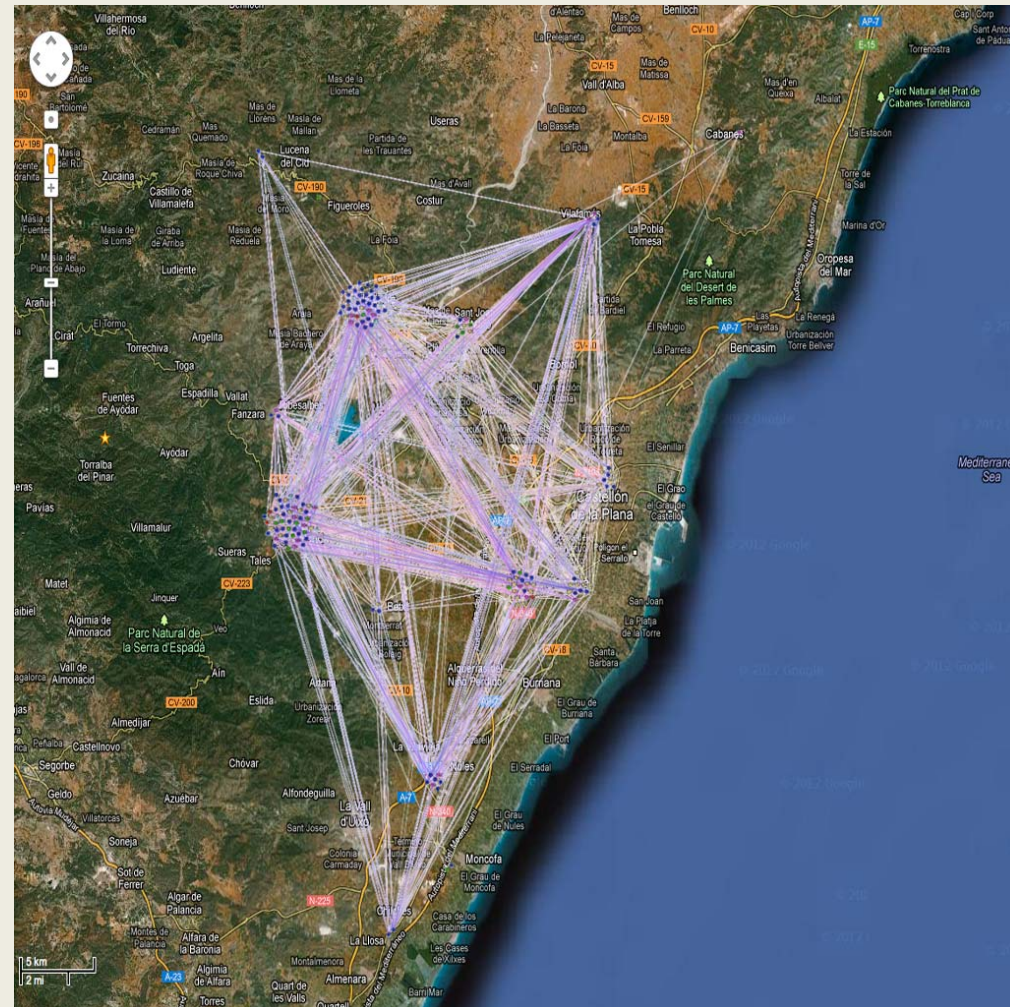
H3: Absorptive capacity moderates the effect of the brokerage activities (of all types of roles) on innovative performance for the clustered firms.

The Study Setting

Example 1

Ceramic Tile Cluster

	Ceramic tile cluster
Firms' Size	
<i>Small</i>	13,25%
<i>Medium</i>	55,42%
<i>Large</i>	31,33%
Sample Size	166 / 240
Business Activities	<ul style="list-style-type: none"> • End product firms • Glaze and frits • Machinery • Decorative pieces • Atomized clay • Ceramic additives
Exporters	73%



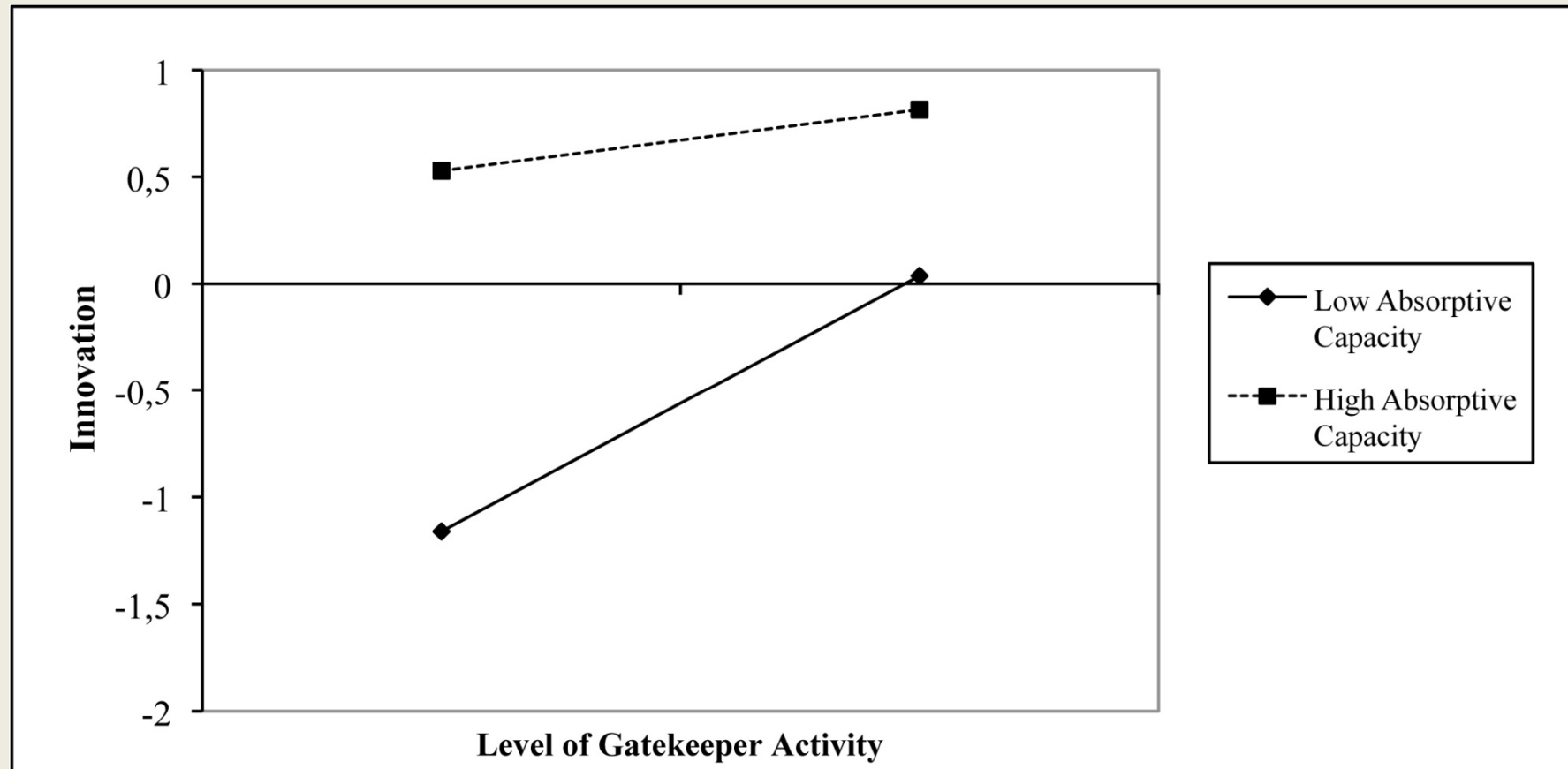
Results

Example 1

Models of the interaction effects				
	Model 1	Model 2	Model 3	Model 4
Constant	0.000 (0.074)	0.000 (0.070)	0.000 (0.067)	0.217 (0.103)**
Size	0.206 (0.085)**	0.125 (0.081)	0.098 (0.078)	0.113 (0.077)
External openness	0.151 (0.085)*	0.122 (0.080)	0.184 (0.078)**	0.178 (0.077)**
Coordinator		0.140 (0.074)*	0.132 (0.071)*	0.117 (0.136)
Gatekeeper		0.076 (0.083)	0.044 (0.080)	0.371 (0.179)**
Representative		0.022 (0.084)	0.002 (0.081)	0.022 (0.147)
Liaison		0.357 (0.074)***	0.347 (0.071)***	0.554 (0.113)***
Absorptive Capacity			0.265 (0.070)***	0.617 (0.128)***
Absorptive Capacity × Coordinator				0.023 (0.073)
Absorptive Capacity × Gatekeeper				-0.228 (0.106)**
Absorptive Capacity × Representative				-0.041 (0.100)
Absorptive Capacity × Liaison				-0.348 (0.142)**
F	8.483***	7.532***	9.065***	7.211***
R2	0.094	0.221	0.287	0.340
R2 adjusted	0.083	0.192	0.255	0.293
Increase of R2	0.094***	0.127***	0.065***	0.53**

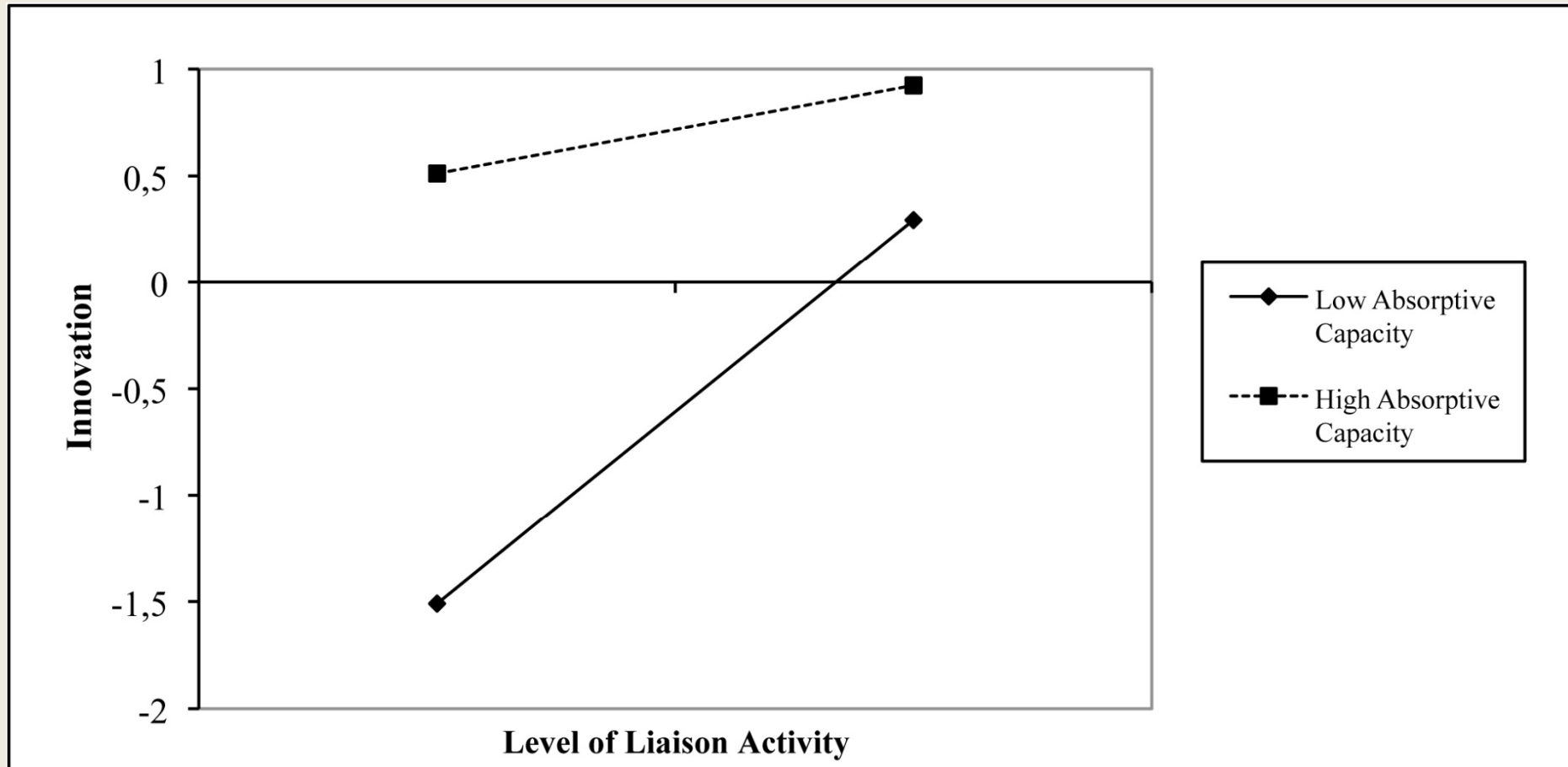
Results for Gatekeepers

Example 1



Results for Liaison

Example 1



Conclusions

Example 1

Our results show that different **brokerage roles** played by clustered firms **have different implications in terms of innovation**. We found that **some of them are positively associated to innovation, but others are not**.

The positive relation between **the liaison role** and innovative performance suggests the **opportunity for a broker to benefit from intermediating between different subgroups**.

The same relation exists between **the gatekeeper role** and innovative performance. **Intermediating knowledge between suppliers and rivals could have a positive impact on innovation**.

Absorptive capacity moderates the effect of liaison and gatekeeper roles on the firm's innovative performance.



Conclusions

Example 1

Besides the **contribution to the debate on the internal heterogeneity** of knowledge distribution in clusters and its relation with innovation, another contribution to the cluster literature is related to **the importance of inter-activity relationships**.

Our findings suggest a **relevant explanatory capacity of a firm's brokerage activities on its innovative performance**. In this sense, the findings coincide with those in the social network literature in highlighting **the importance of external resources available to the firm through its networks** (Gulati, 1999; McEvily and Marcus, 2005)

In addition, our results concerning **the contingent effect of absorptive capacity** on the relation between the gatekeeper and liaison suggest that **internal resources and capabilities are still relevant to firms' outcomes**, as suggested by the RBV, to explain **differential firm performance** (Barney, 2001)



Limitations and Future Research

Example 1

We collected **data from one cluster**. This limitation should be kept in mind when contemplating findings and implications. We must be **cautious in the generalizations of conclusions** to other different contexts.

The **static view** applied captures the essence of the brokerage phenomenon at a certain moment, **but relationships obviously evolve**.

We analyzed **knowledge broker roles within the cluster**. A more complete study should **include** the analysis of brokerage activities involving **firms located outside the cluster**.

Finally, other possibility is to **explore in greater depth** the conditions that explain the **distinctive purposes and consequences of each brokerage role** and their combination

Example 2: BALANCING INFORMATION EXCHANGES AND INTERMEDIATION TO ENHANCE FIRMS' PERFORMANCE IN CLUSTERS

Larrañeta, B. (Universidad Pablo de Olavide); Molina-Morales, F.X. (UJI); Martínez-Cháfer, L. (UJI)

Preliminary Draft

Objective:

This paper aims to analyze potential differentiated **performance effects produced by each alternative firm's role in the cluster knowledge system.** (as a source, receiver or mutual exchanger)

Theoretical Background

Uneven distribution of knowledge relations in clusters

Firms do not participate in cluster knowledge exchanges in a **selective uneven manner** (Giuliani 2007; Lissoni, and Pagani 2003; Morrison 2008 among others).

Morrison and Rabelotti (2009) supported the idea that knowledge flows are restricted to a **tightly closed group of local producers**, which are **significantly different from the rest** of the members of the group.

Fundamental role of **focal firms** (including leading firms, anchor tenants, strategic centers, **brokers or gatekeepers**). Gatekeepers, defined as a **specific type of agent**, saving **external organizations** with local, **transferring their knowledge to cluster firms** (Morrison 2008. , Wink 2008 , Graf 2010 , Giuliani 2011) and eventually **combining them with local knowledge** (Graf and Kruger 2011 , Munari et al 2011).

Theoretical Background

Performance implications of firms varying roles in the cluster knowledge system.

Authors like Giuliani and Bell (2005) have used the **balance between outdegree and indegree scores** to determine different cognitive positions of the actors in a network allowing them to distinguish **absorbers, sources, and mutual information exchangers**.

These types of actors have **remarkable differences in their knowledge contribution to the cluster**.

We consider that is **interesting to test the influence of these different cognitive positions** and their effects on individual cluster **firms' performance**, without postulate the sign positive or negative of these effects.

Theoretical Background

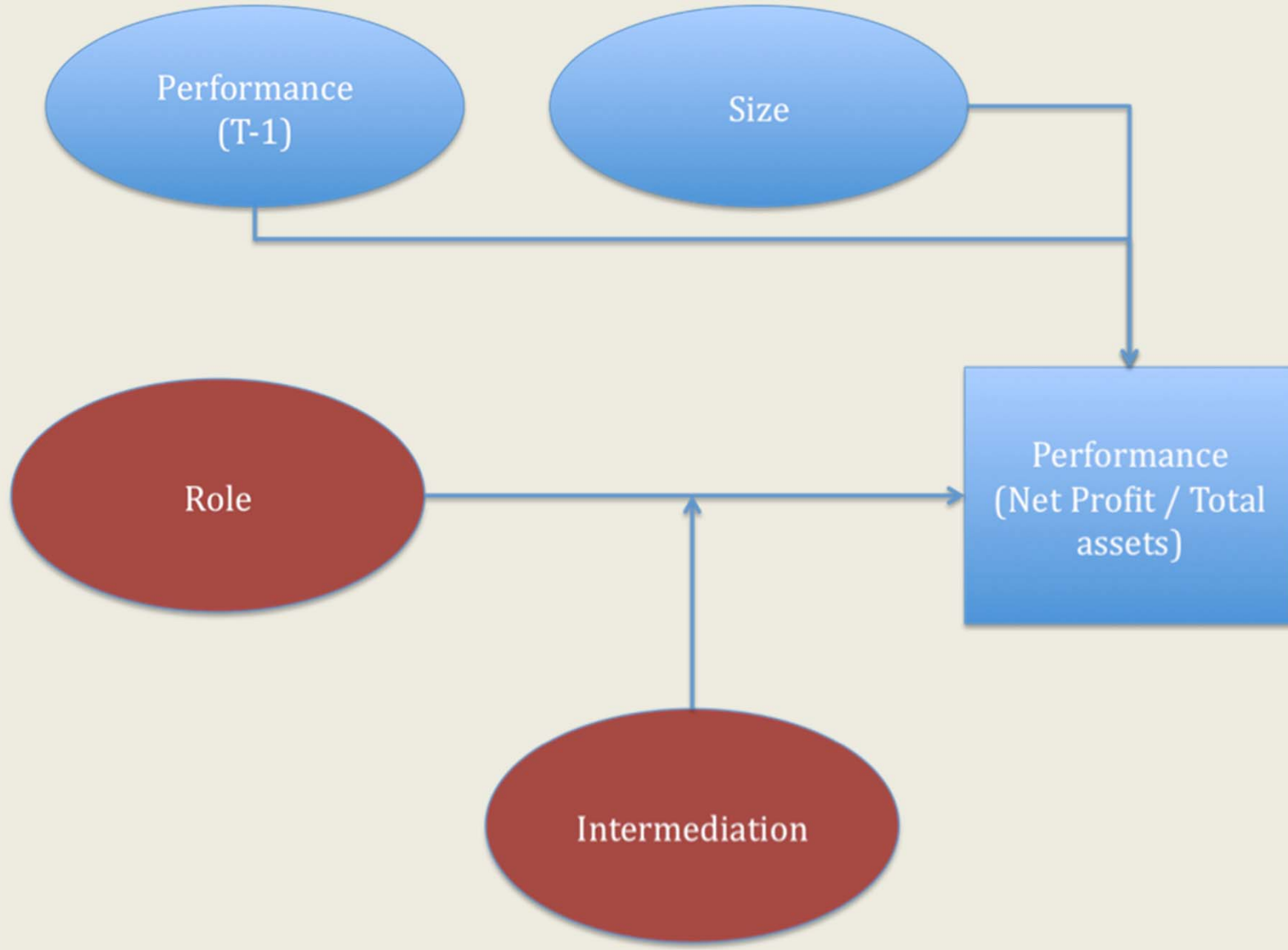
Performance implications of firms varying roles in the cluster knowledge system.

One of the important uses of the social network analysis is the **identification of the most relevant actor in a social network**. **Centrality measures** are used to that purpose.

We focus on betweenness. **The higher the betweenness score of an actor, the greater the capacity of that actor to act as a structural conduit connecting others in a given network** (Mehra, Kilduff, and Brass 2001).

It can be argued that **the betweenness of a firm influences on how resources exchange**, from in and out degrees, are exploited by firm and consequently to firm's performance.

Theoretical Context



Theoretical Background

Performance implications of firms varying roles in the cluster knowledge system.

H1 The firm's role in the cluster knowledge system (absorber, source or mutual exchanger) will affect its performance.

Theoretical Background

Performance implications of firms varying roles in the cluster knowledge system.

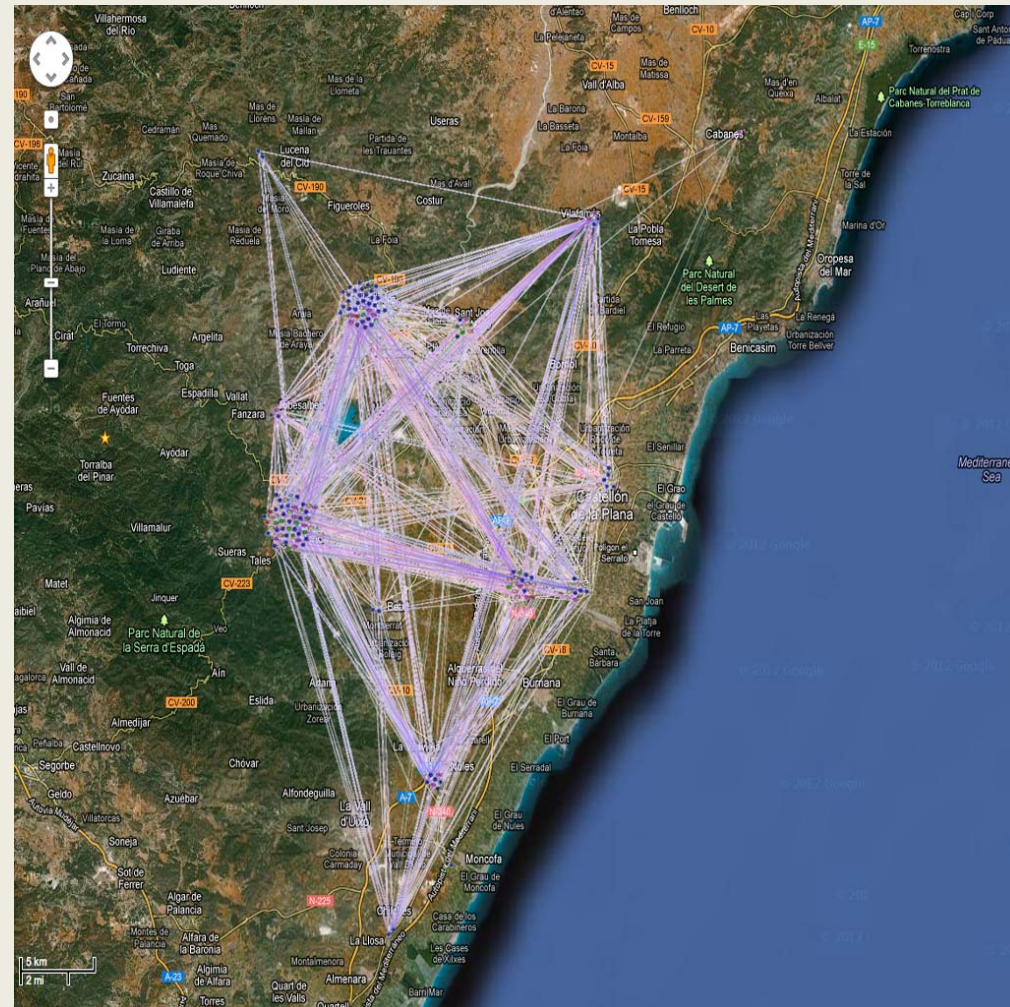
H2 The firm's intermediation in the cluster knowledge system would act as moderator in the association between its role (absorber, source or mutual exchanger) and performance.

The Study Setting

Example 2

Ceramic Tile Cluster

	Ceramic tile cluster
Firms' Size	
<i>Small</i>	13,25%
<i>Medium</i>	55,42%
<i>Large</i>	31,33%
Sample Size	166 / 240
Business Activities	<ul style="list-style-type: none"> • End product firms • Glaze and frits • Machinery • Decorative pieces • Atomized clay • Ceramic additives
Exporters	73%



Indicators

Performance: firm's net profit / total assets.

Size. based on a factor analysis of the following items: (1) Number of employees, (2) total assets, and (3) total revenues for the last year.

Previous Performance. This is also a control variable and is based on the results of the previous year.

Firm's Role: Independent variable. This indicator measures the ratio between the knowledge transferred (*Outdegree*) and received (*Indegree*) by each firm. Thus, three categories can be found:

- ABSORBER:** If $O/I < 1$, the firm is a net absorber of Information.
- SOURCE:** If $O/I > 1$, the firm is a net source of Information.
- MUTUAL EXCHANGER:** If $O/I = 1$, the firm engages in the mutual exchange of Information.

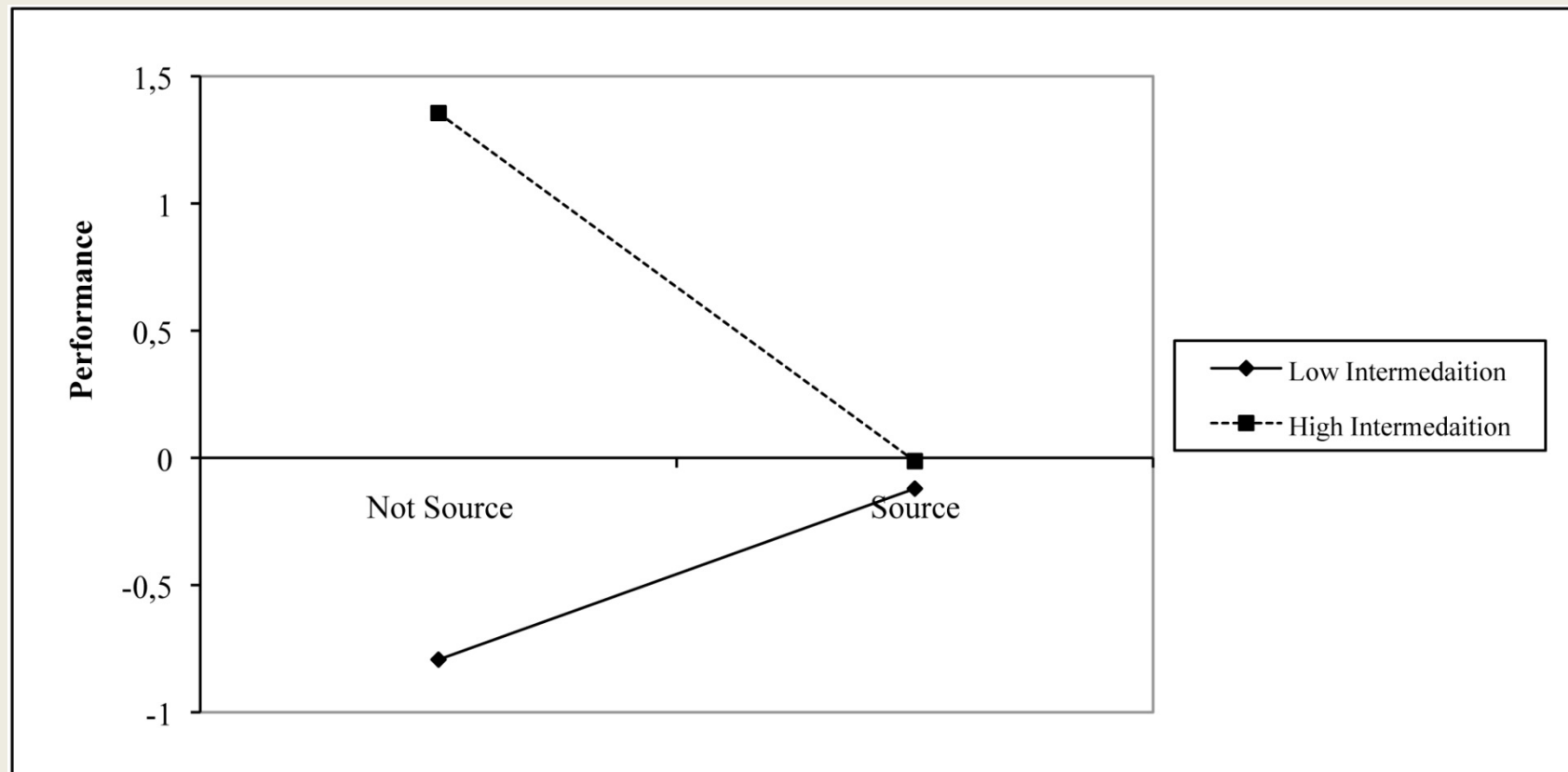
Intermediation. Betweenness centrality is a measure that considers the position of nodes in between the geodesic or shortest path that links with any other node in the network.

Results

Results for information sources

	Model 1		Model 2		Model 3		Model 4	
	B	Error	B	Error	B	Error	B	Error
Constant	.000	.078	.000	.078	.000	.073	.107	.067
Previous Performance	-.029	.079	-.029	.079	.027	.075	-.009	.066
Size	.005	.079	.021	.081	-,155*	.085	-.016	.077
Source			-.078	.080	-.125	.076	-,174**	.068
Intermediation					0,397***	.084	,564***	.078
Source * Intermediation							-,510***	.074
Adjusted R2	-0,011		-0,012		0.105		0.304	
Sig. Change in F	-		-		***		***	

Results for information sources



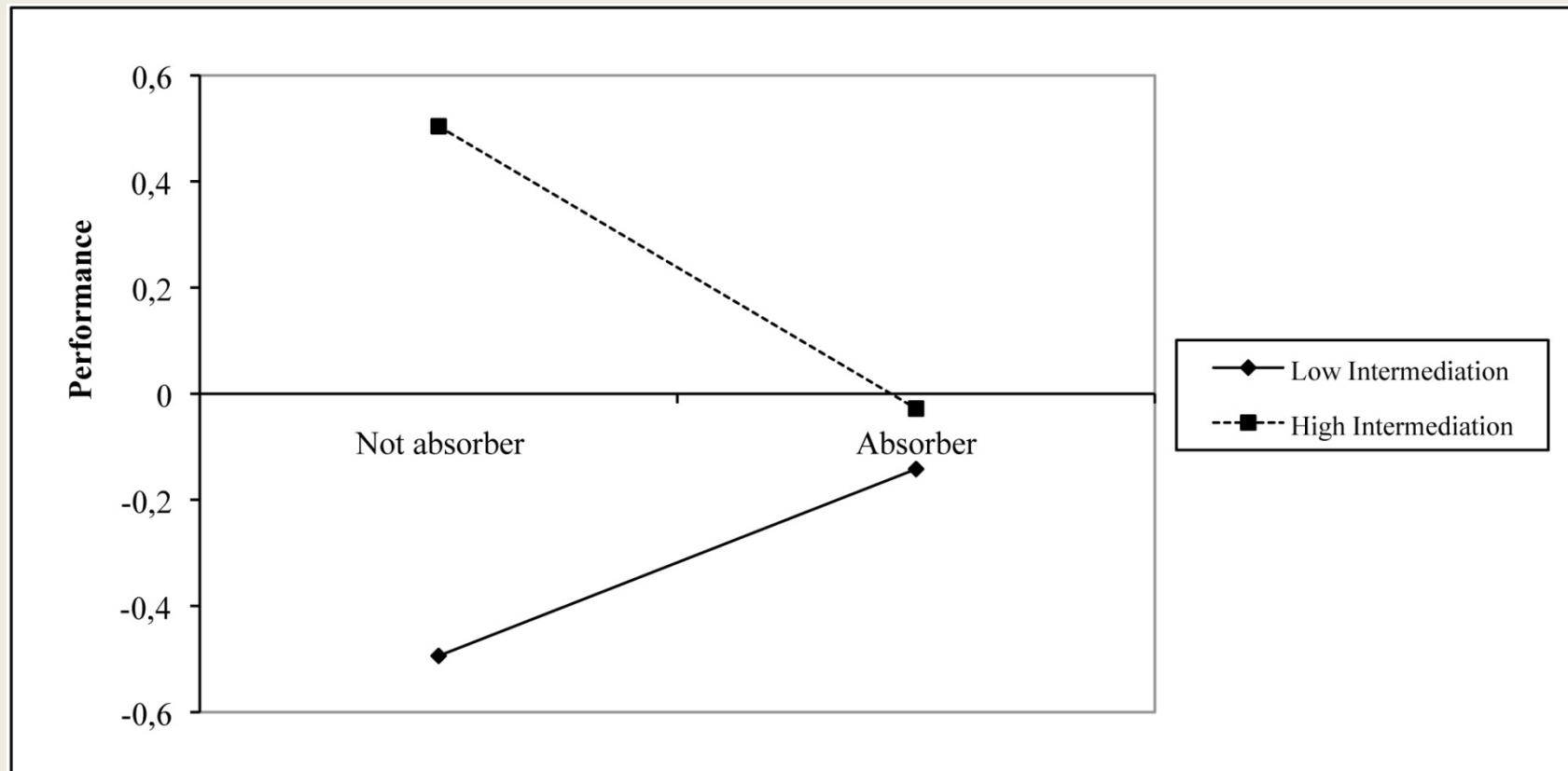
Results

Results for information absorbers

	Model 1		Model 2		Model 3		Model 4	
	B	Error	B	Error	B	Error	B	Error
Constant	.000	.078	.000	.078	.000	.074	-.040	.076
Previous Performance	-.029	.079	-.032	.079	.024	.076	.037	.075
Size	.005	.079	-.002	.079	-0,173**	.085	-205**	.085
Absorber			-.060	.079	-.008	.076	-.045	.077
Intermediation					0,377***	.085	0,278***	.097
Absorber * Intermediation							-,221**	.105
Adjusted R2	-0,011		-0,014		0.09		0.109	
Sig. Change in F	-		-		***		**	

Results

Results for information absorbers

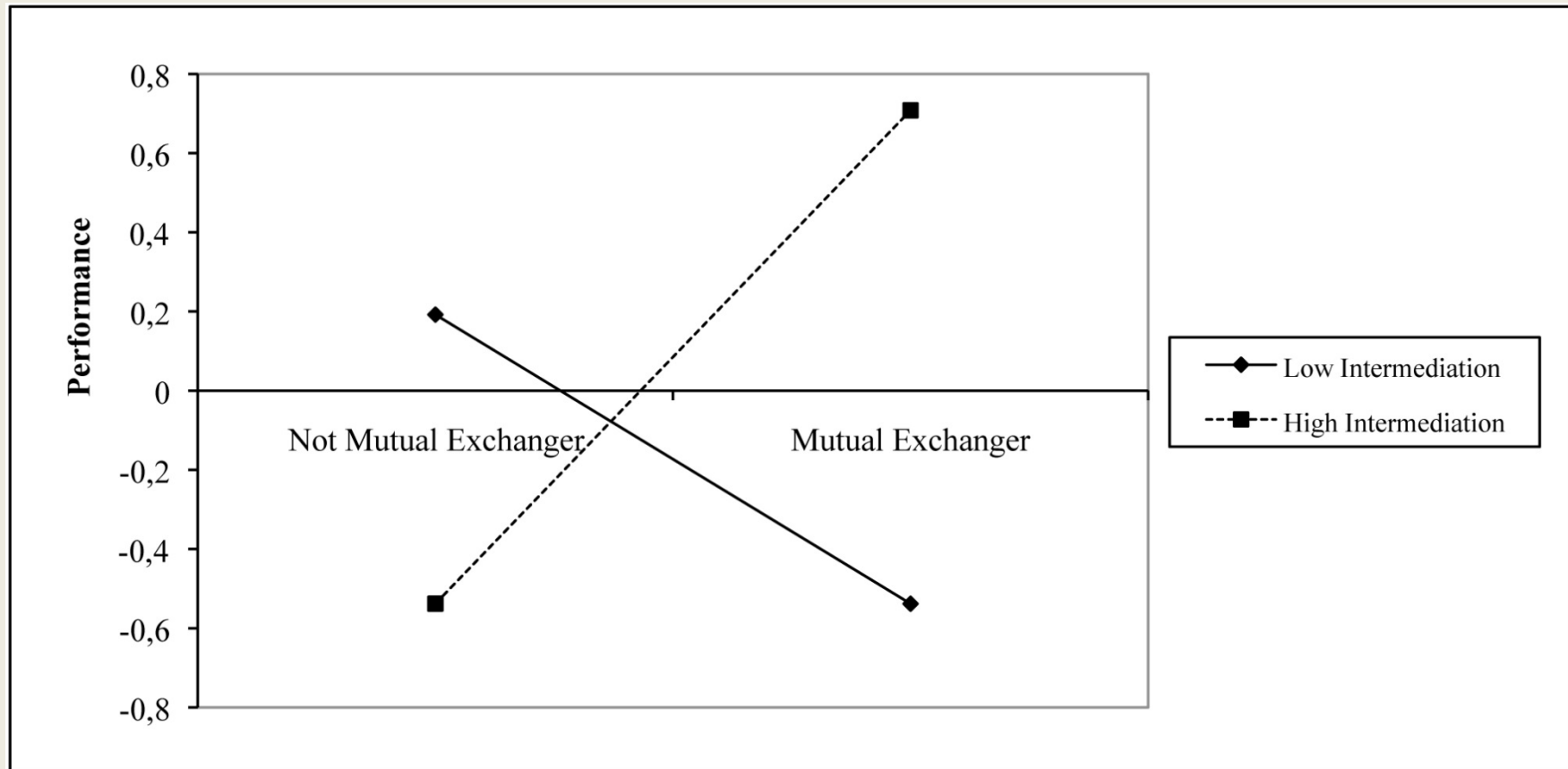


Results for mutual exchangers

	Model 1		Model 2		Model 3		Model 4	
	B	Error	B	Error	B	Error	B	Error
Constant	.000	.078	.000	.075	.000	.071	-.044	.047
Previous Performance	-.029	.079	-.032	.075	.016	.073	.001	.048
Size	.005	.079	.024	.075	-.137	.082	.002	.055
Mutual exchanger			0,306***	.075	0,266***	.072	0,129***	.049
Intermediation					0,338***	.082	0,129**	.056
Mutual exchanger * Intermediation							0,494***	.034
Adjusted R2	-0,011		0.077		0.161		0.634	
Sig. Change in F	-		***		***		***	

Results

Results for mutual exchangers



Our results show that the roles and intermediation in the cluster system of knowledge have different implications for their performance.

Being a mutual exchanger has positive implications for the firm performance, whereas being a source has a negative impact and the absorber role per se is not associated with performance.

The firm's intermediation in the cluster system of knowledge changes these prior assumptions, so that it enhances the positive performance effect of being a mutual exchanger and links the two alternative roles to performance.

Overall our paper contributes to both, the specific cluster literature and research in the field of networks.

The paper sheds light on the processes that clustered firms could use to enhance performance.

These findings also add to recent research in the field of networks.

The results support the importance of firms' positions in the network, particularly a firm's intermediation in a knowledge network.

Limitations and future research

Example 2

The empirical work on which this paper is based refers only to a specific industrial cluster, the ceramic industry.

Our work is also limited by the fact that our data refer to a specific moment in time and therefore should be complemented in the future with new empirical measurements that allow for a longitudinal analysis of the issue.

It would be interesting to investigate in more detail about these roles effects especially in their medium and long term.