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Knowledge Networks and the Role of Family Firms: The Case of an Italian Regional Cluster

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Abstract: Studies on open innovation (OI) have highlighted the importance of inter-organizational knowledge networks. However, little is known about OI networks established by family firms, and their roles in such knowledge networks. By focusing on one of the most important Italian footwear clusters, this paper applies Social Network Analysis to investigate the role of family firms in exchanging knowledge according to their intra-cluster position and extra-cluster openness. Our results provide novel evidence on the role of family firms in OI networks, as they suggest that family firms mainly operate as gatekeepers in the technological and managerial networks, while they act as external stars in the market and managerial networks.

Keywords: open innovation; knowledge network; social network analysis; regional cluster

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1. Introduction

In the last few decades, the research emphasis on inter-organizational knowledge exchange and knowledge networks has increased in importance for organizational and business studies, in parallel with the global shift from a manufacturing-based toward a more knowledge-based economy [1,2]. Knowledge, and in particular heterogeneous and diversified knowledge, is fundamental to be innovative and create value [3–5]. Organizational knowledge transfer is viewed as "the process through which organizational actors–teams, units, or organizations–exchange, receive and are influenced by the experience and knowledge of others" [6] (p. 832), and networks are intended as those structures enabling knowledge flows. The relational structures and the competences owned by organizations are strongly interrelated: Belso–Martínez et al. [7] (p. 311) demonstrate that organizational relations are influenced by "the profile of the knowledge base, absorptive capacity or prestige of the actors involved", while for Zaheer and Bell [8], resources can be embedded in inter-organizational relationships through accumulated network experience and repeated exchange relationships.

In this vein, as described by Enkel et al. [9], open innovation (OI) has been embraced by organizations to access external knowledge and to use internally developed knowledge as an asset to be shared with others, in order to develop innovative products, processes, or services and improve business performance. This approach assumes that collaborations and long-term agreements are key to the development of new products, processes, or services, and receiving feedback from other parties is vital for the innovation process.

Networking is a relevant component of OI in family firms [10]: the lack of key skills and resources, combined with the low level of formalization and a long-term strategic

view characterizing these firms [11], might encourage the search for external relationships. Family firms are defined by the presence of two or more members of a family group in the firm's ownership or governance [12,13] and they differ from non-family firms because of their succession intentions, nonfinancial goals, governance structures, and outcomes [14]. The involvement of family members in the organization's ownership and management, and their interest towards non-financial aspects that meet family needs [15] have implications for the establishment of relationships with other organizations. As a result, family firms present some peculiarities when it comes to OI strategies. However, despite this evidence about the importance of OI for family firms and their distinctive approach to it, issues related to OI networks established by family firms have received little attention [10,16,17]. There is a lack of studies concentrating on the importance of OI knowledge networks for family firms and the roles played by these firms in inter-organizational knowledge networks. Therefore, we want to address the following research question: what are the roles of family firms in OI knowledge networks? Our objective is to understand and disentangle the role of family firms in inter-organizational knowledge networks, and contribute to a better understanding of the networking strategies adopted by family firms for supporting OI processes—which directly impact the management of these firms. To address this research gap, we analyzed three types of informal knowledge exchange, namely technological, market, and managerial knowledge, in the context of the Parabiago regional cluster, one of the most important footwear clusters in Italy. We used Social Network Analysis (SNA) to analyze the relational structures developed in this cluster, using the Giuliani and Bell's typology [18] to detect the main roles played by family firms in the OI knowledge networks.

2. Literature Review

OI focuses on the use of internal and external sources of knowledge to accelerate to innovation process and entering new markets [19,20]. According to Natalicchio et al. [21], knowledge has a pivotal role in OI; however, differently from previous theoretical frameworks, OI tries to balance the importance of external and internal knowledge, and hence the former is not just perceived as an addition to the latter in the innovation process [22]. External knowledge can be acquired through the establishment of inter-organizational knowledge networks, and their importance for OI has been widely discussed in the literature. Chiaroni et al. [23] argue that networks are one of the major dimensions of OI, and organizations should be able to establish different relationships with different partners to achieve their objectives. It is thus striking that the review of OI literature by Randhawa et al. [24] documents the lack of focus on inter-organizational networks, while it highlights the predominance on three themes, namely research on firm-centric aspects of OI, the management of OI networks, and the role of users and communities in OI. The review of West and Bogers [25] highlights that, while at the beginning OI was conceived as a linear model, interaction mechanisms based on feedback and reciprocal exchanges are more realistic in describing what happens in the innovation process—and these mechanisms are often observed in networks. These authors also point out that collaborative networks have a positive effect on innovation performance, both at the firm and the regional level. Indeed, the importance of the geographical aspect of networking is well documented: regional clusters are characterized by inter-organizational collaborative patterns based on knowledge exchange (e.g., [26,27]), and phenomena related to OI are rather common in such geographical locations [28]. Brunswicker and Vanhaverbeke [29] as well as van Hemert et al. [30] expanded this discussion about networks and OI by focusing on the peculiar networking activities of SMEs, which have often been ignored in the literature in favor of large high-tech companies [31] or multinationals [32]. Brunswicker and Vanhaverbeke [29] also pointed out that SMEs are more flexible than large companies, but they also have more limited financial resources. Hence, they are often searching for inter-organizational partnerships and collaborations to overcome this problem and acquiring new resources. These authors highlight another relevant aspect: SMEs prefer networking activities, in

particular those dedicated to informal knowledge exchange, over monetary and formal transactions. This suggests that "purposive external knowledge sourcing as nonpecuniary inbound is an important strategic dimension of openness in SMEs" [29] (p. 4).

A peculiar networking behavior is also observed in family firms. The innovation strategy of family firms is strongly influenced by the family involvement in the ownership and management system [33], and it is directly affected by the internal agreement between generations, which drives the strategic approach towards innovation activities and the organizational business model [34]. According to Del Vecchio et al. [14] (p. 980), "family firms' characteristics prepare them for outside-in open innovation", i.e., they tend to incorporate knowledge from or co-produced by other actors–with a preference for supporting co-production processes. Existing conceptual and review works have investigated the role of knowledge networks for family firms [35,36] and the micro-foundations of corporate entrepreneurship in family firms [37,38]. Moreover, empirical analyses discuss the role of knowledge management tools and processes of family businesses [39] and the importance of local informal networks for family businesses' internationalization strategies implemented through inter-firm cooperation [40]. Several authors have pointed out that these cooperation activities are made possible because of the presence of mutual trust and reciprocity between family firms (e.g., [35,41,42]). As described by Rondi et al. [16] (p. 438), "family firms may suffer from constrained availability of resources in terms of human, intellectual and financial capital so that they invest less in R&D; however, they are found better able to convert innovation input into output, thereby innovating more with less thanks to their better network access (social capital)". Indeed, social capital is a valuable asset for family firms [43–45], in particular for those embedded in regional clusters [46]. By using the resource-based view (RBV) as theoretical framework, Muñoz–Bullón et al. [15] pointed out that family firms have a competitive advantage over non-family firms because they own a unique bundle of resources due to the system of interactions between family members and the business; and social capital is one of these family-provided resources. Social capital derives from inter-organizational relationships, and it facilitates innovation through the access to external resources, internal coordination, and knowledge creation [15]. Social capital is frequently observed in the local context such as in regional clusters (e.g., [47]), and since it is associated with reputation, firms carefully select their partners for establishing relationships linked to OI [16,48]. When considering the socio-economic context in which family firms operate, Block and Spiegel [49] suggest that the strong presence of family firms in a geographical area dually favors cooperation in innovation activities. Recent evidence from Baù et al. [50] demonstrates that family firms use social capital as a distinctive strategic component, and that local embeddedness has a positive influence on their performance, confirming the importance of the social context when considering networking strategies for innovation [51]. Family firms can exchange different types of knowledge, and these knowledge flows generate unique network structures in which each firm assumes a specific role; moreover, family firms do not only establish relationships with other family firms, but also with non-family firms, universities, and other organizations, developing complex patterns of collaboration (e.g., [52]).

3. Materials and Method

3.1. Empirical Setting and Data Collection

Regional clusters show a marked tendency towards the establishment of knowledge networks: as pointed out by Gurrieri [35] and Terstriep and Lüthje [53], these settings are particularly supportive for the creation and transfer of knowledge, because being located in the same physical space is facilitating personal interactions, and therefore interactions between owners and managers of local organizations. At the same time, firms in regional clusters show a pronounced aptitude towards cooperation and reciprocity [46].

Our study concentrates on the footwear cluster of Parabiago in Italy, which is characterized by the presence of family and non-family firms operating along the entire footwear value chain. This choice is deemed particularly relevant for the purpose of the analysis

because Italian manufacturing clusters are characterized by an active role of family firms, which have a strong relation with the local territory [54]. This cluster is located within the northern area of Lombardy, one of the highly innovative Italian regions [55], and it has a long tradition in the footwear industry, with its origin dating back to the end of the 19th century.

The data collection process started in 2015 with the identification of the population firms active in the cluster. The census of active firms in the cluster was conducted by the local General Confederation of Italian Industry ("*Confindustria Alto Milanese*") together with a panel of industry representatives of the local firms. The result of this process led to the identification of a population of 57 family and non-family firms active in different phases of the local footwear value chain: footwear, accessories, mixed footwear-accessories, and tanneries. To identify family firms, we collected information about the ownership structure of each firm: since there is not a unique definition of family business [56], we decided to concentrate on one specific dimension of familiness: ownership. We collected data through seven focus groups, organized between March and May 2015 in Legnano (Italy), with the representatives of the cluster's firms. The invite to participate to the focus groups was sent to the owner, the president, and the CEO of each firm; the representatives of 39 firms responded to the invite and participated to the focus groups (17 CEOs, 13 owners/presidents, and nine top managers). The focus groups lasted around 90 min and were divided into two parts: a first part dedicated to the completion of a questionnaire, and a second part dedicated to discussing problems and opportunities of the cluster and strategic initiatives of the firms. The questionnaire consisted of a combination of multiple choice and network-related questions: in particular, we asked the respondents to indicate if, in the period 2012–2015, their company received or transferred technological, market, or managerial knowledge with other organizations in the cluster or outside the cluster. Indeed, scholars suggest that inter-organizational knowledge exchange is a broad concept which can be decomposed into different types [57–59]: technological knowledge, related to the development of new products and processes; market knowledge, related to the consumers' preferences and the market's structure; and managerial knowledge, related to those skills and competences required for organizing and supervising organizational resources and processes.

To collect network data, we used a roster-recall method [60]: respondents had the possibility to indicate the presence of different type of knowledge exchanges with each one of the 57 cluster firms, whose names were presented as a roster in a matrix, and indicate up to eight additional organizations—external to the cluster—with whom they exchanged knowledge. Although the questionnaires were self-administered, their completion was facilitated by members of the research team. All the participants to the focus groups completed the questionnaire: therefore, we collected data on 39 firms, which corresponds to a 68% response rate. The response rate is comparable to other studies focusing on inter-organizational networks in a similar context, if not higher [46,57,61,62].

3.2. Social Network Analysis (SNA)

SNA can be used to investigate the social relations established between a group of actors (individuals, organizations, countries, etc.), and how the network structures developed by these actors are influenced by (or they are able to influence) their attributes and/or their social behavior, and their positioning in the network [63]. This method has been widely employed to study inter-organizational networks in regional clusters [18,27,58,61,64] and it has also been recently applied in OI studies to investigate the performance of SMEs [31], as well as large companies and universities [65].

There are several approaches to SNA that can be used to understand the role of a firm within a network. In this study, we used the same approach developed by Giuliani and Bell [18], which has recently been adopted in other studies on OI in regional clusters (e.g., [59,66]). This approach is based on the following idea: it is possible to distinguish cognitive roles for cluster firms according to their external openness and cognitive position.

External openness is a measure of the firm's capacity to acquire knowledge from other organizations outside the cluster, and it is operationalized by Giuliani and Bell [18] by using the number of connections of a cluster's firm with other organizations external to the cluster. In our analysis, we used the information provided by the respondents about their knowledge exchanges (technological, market, and managerial knowledge) with other organizations outside the Parabiago cluster. We mapped directed networks, i.e., networks where ties (connecting network actors) have a direction for representing knowledge exchanges. For each knowledge network, we considered the number of connections established by each firm (irrespectively of whether knowledge was received or transferred) and calculated the average value for the whole network. We then divided the cluster firms into three groups according to their scores: low for those below the average; medium for those aligned with the average; and high for those above the average.

A firm's cognitive position indicates how much the firm is interconnected (n terms of knowledge received and transferred within the cluster, and it was operationalized as the ratio between in-degree and out-degree centrality for each firm [18]. In-degree centrality is the sum of the number of ties received by actor *i*, while out-degree centrality was calculated as the number of ties given by actor *i* to other network actors [63]. In this study, we estimated in-degree and out-degree centrality according to the relationships mapped within the cluster. According to Giuliani and Bell [18], the firm is a net absorber of knowledge if this ratio is above one, a mutual exchanger if it is equal to one, and a source of knowledge if it is below one. Moreover, if a firm does not have connections at all, i.e., it has zero in-degree and out-degree centrality, it must be considered as isolated.

The combination of external openness and cognitive position led us to identify four relevant cognitive roles in an OI system (Table 1): the gatekeeper, which identifies firms strongly involved in the diffusion of knowledge both within the network and outside the cluster; the mutual exchanger, when a firm is equally engaged in sharing and acquiring knowledge within the cluster and moderately active in establishing connections outside; the external star, a firm with many connections outside the cluster and mainly concentrated on absorbing knowledge from local firms; and the isolated firm, describing a situation where a firm does not have connections within the cluster and it has few connections (or none) outside.

Table 1. Cognitive roles.

		External Openness		
		Low	**Medium**	**High**
Cognitive position	Source			Gatekeeper [2]
	Mutual exchanger		Mutual exchanger [1]	
	Absorber			External star
	Isolated	Isolated firm		

[1] In their work, Giuliani and Bell [18] distinguished between active and weak mutual exchangers, yet in this study we kept them together as a unique role. [2] Giuliani and Bell [18] use the term "technological gatekeeper", but in order to avoid confusion with the concept of technological knowledge exchange we referred to this cognitive role as a "gatekeeper".

The analysis was carried out using the software UCINET 6 [67].

4. Results

The Parabiago cluster includes some large footwear firms, yet most of the surveyed firms are relatively small (Table 2), often producing shoes or accessories for larger companies. They are mainly family-owned (69%) and operating in the footwear sector for around 40 years. Only 37% have a dedicated R&D unit. Finally, while there are a few firms that are rather distant from the others, most of them are geographically close: on average, each firm is situated 10 km away from the others (Table 2).

Table 2. Descriptive statistics.

	Description	Mean	Std. Dev.	Min	Max
Age	Years of activity	38.92	22.81	1	96
Size	Number of employees	50.13	71.16	1	270
Family	Family firm dummy (0 = no; 1 = yes)	0.67	0.48	0	1
R&D activity	Presence of R&D unit (0 = no; 1 = yes)	0.37	0.49	0	1
Distance	Geographical distance in kilometers	9.28	8.29	0.10	44.40

These descriptive statistics refer to the 39 cluster firms who completed the survey.

Figures 1–3 show the knowledge networks, while network statistics are presented in Table 3. Red circle nodes indicate family firms, while blue circle nodes indicate non-family firms; the size of the nodes is proportional to the number of employees. From these figures, it is possible to see that large firms are very central in the network, while SMEs and micro-firms are largely peripheral—a situation comparable to other studies on regional clusters (e.g., [68]). The network with the largest number of relationships (i.e., ties) is the technological knowledge network; Table 3 shows the density value for each network (i.e., the number of ties existing in a network over the number of potential ties that could exist between all network actors; see [63]), and the technological network is the one with the highest score. This network has also the lowest number of actors completely disconnected from the others (i.e., isolates). On the other hand, the market and managerial knowledge networks present similar statistics, and the correlation calculated using the Quadratic Assignment Procedure–QAP [63,69] suggests the existence of a similar structure between these two networks (QAP correlation = 0.65, statistically significant).

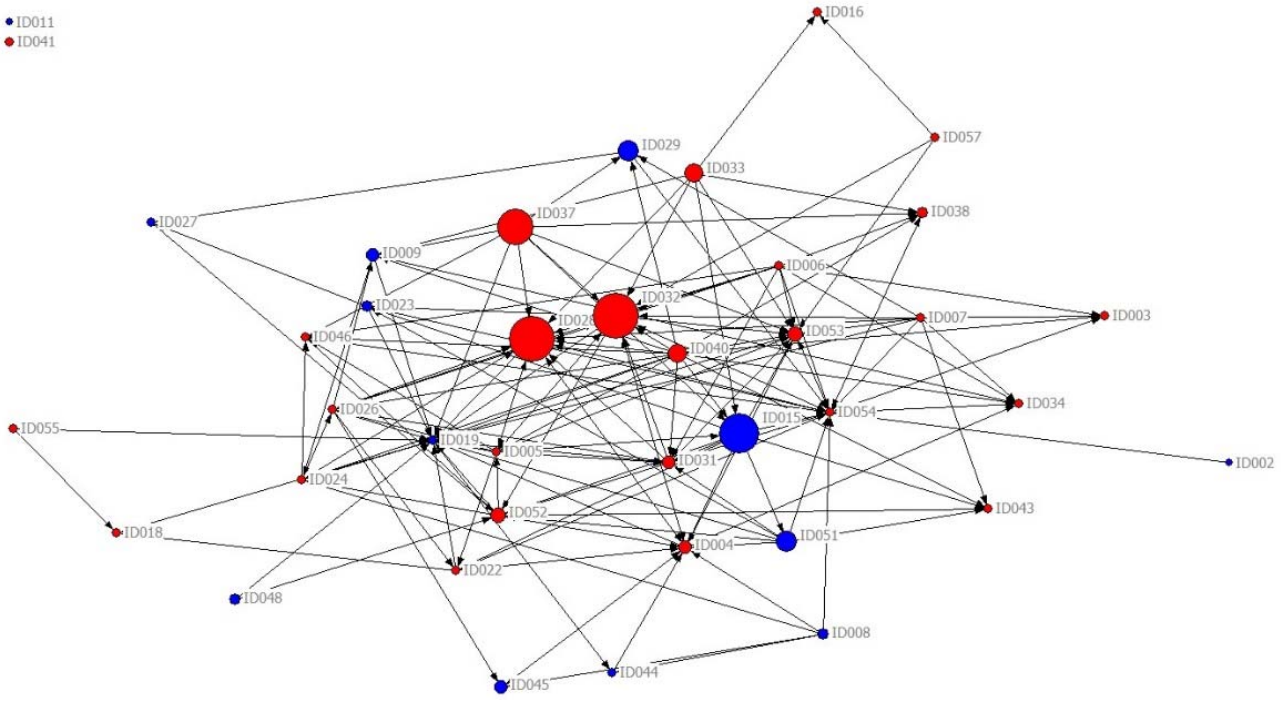

Figure 1. Technological knowledge network.

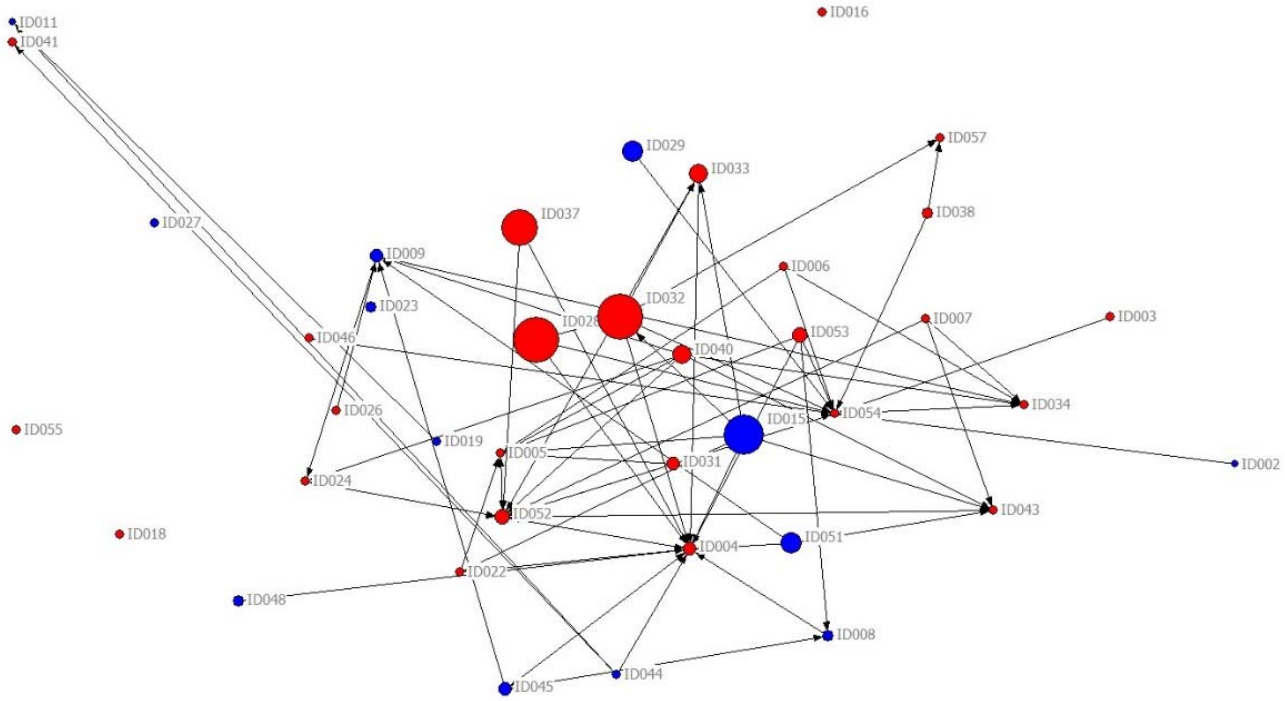

Figure 2. Market knowledge network.

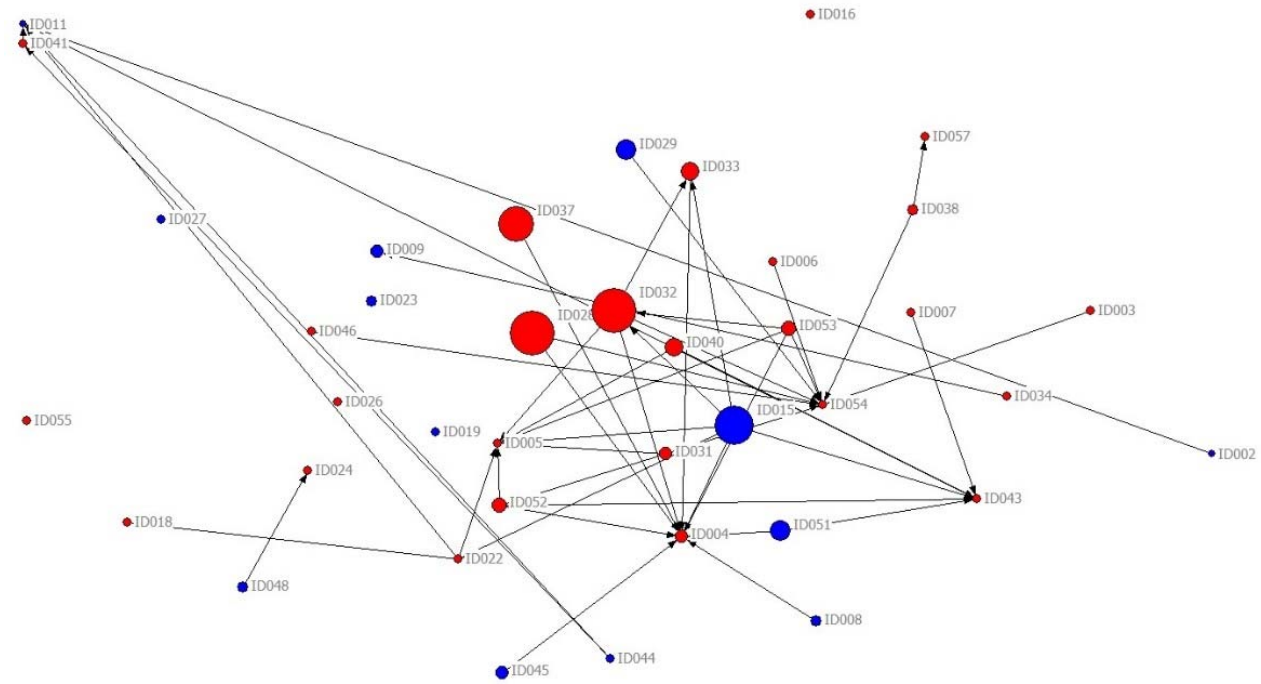

Figure 3. Managerial knowledge network.

Table 3. Network statistics.

	Number of Ties	Average Degree (in and out)	Density	Isolates	QAP Correlation	
Technological knowledge network	165	4.23	0.11	2		
Market knowledge network	68	1.77	0.05	5	0.34	
Managerial knowledge network	46	1.18	0.03	6	0.30	0.65

Network statistics are based on the networks created by firms within the cluster–external relationships are not considered in the computation.

The above analysis highlights an element already found in previous studies [58,59,61]: the types of knowledge are unevenly exchanged. In the Parabiago context, there is a prevalence of technological knowledge exchange over other types. The average degree centrality indicates that technological knowledge is exchanged around three times more than the other two types of knowledge, and more organizations are excluded from the network when it comes to exchange market or managerial knowledge. Moreover, there are cases where the network roles of cluster firms change radically. If we look at firms ID24 (family firm) and ID27 (non-family firm), we can see that their relational patterns are completely different according to the knowledge network considered. ID24 has multiple technological knowledge exchanges with several partners, less market knowledge exchanges with a subset of partners with whom it exchanges technological knowledge, and only one managerial knowledge exchange with a firm with whom it does not exchange either technological or market knowledge. ID27 has a few relationships in the technological knowledge network, mainly with other non-family firms, and no relationships at all for exchanging market or managerial knowledge. Indeed, these examples indicate that cluster firms assume different behaviors according to the nature of the relationship with other firms, and this applies also to the networks with extra-cluster organizations.

In order to disentangle the cognitive role of these firms in the OI networks, and in particular for detecting the role of family firms, we applied the methodological approach described in Section 3.2. Results are presented in Tables 4–6. A first result emerging from our analysis relates to the high number of firms which are not engaged in extra-cluster relationships (low external openness) and tend to spread knowledge within the cluster (cognitive position = source). This is particularly evident for the market and managerial knowledge networks, and it indicates that, when sharing these types of knowledge, cluster firms are more concentrated on developing favorable relationships with their neighbors—such as discussing about new market opportunities with other local firms. Gatekeepers (high external openness and cognitive position = source) are mainly found in the managerial knowledge network and most of them (four over five) are family firms; this means that family firms are particularly active in establishing contacts external to the cluster and transferring managerial knowledge within the territory. Family firms also have a clear role in gatekeeping when considering the technological knowledge network. Although there are only two firms classified as gatekeepers, they are both family firms and they are small enterprises (with less than 20 employees) unlike from the family firm gatekeepers in the managerial knowledge network, which are a mix of large and small firms. One mutual exchanger was detected in the technological knowledge network, but it is not a family firm. Family firms are playing a role as external stars (high external openness and cognitive position = absorber) in the managerial and, even more noticeable, market knowledge networks. The only non-family firm classified as external star was detected in the technological knowledge network. Finally, the number of isolated firms (low external openness and cognitive position = isolated) is higher in the managerial knowledge network and the proportion of family and non-family firms is according to the overall proportion of family/non-family firms in the cluster (two-third of family firms and one-third of family firms). In this network, there is also a non-family firm that, according to Giuliani and

Bell [18], could be described as locally isolated (high external openness and cognitive position = isolated), i.e., it has several extra-cluster relationships but no interactions with its neighbors.

Table 4. Cognitive roles: technological knowledge exchange [1].

		External Openness		
		Low	**Medium**	**High**
Cognitive position	Source	10 (**6**)	7 (**5**)	2 (**2**)
	Mutual exchanger	1 (**0**)	1 (**0**)	2 (**2**)
	Absorber	6 (**4**)	5 (**3**)	4 (**3**)
	Isolated	1 (**1**)	0 (**0**)	0 (**0**)

[1] The number of family firms is in parentheses and highlighted in bold.

Table 5. Cognitive roles: market knowledge exchange [1].

		External Openness		
		Low	**Medium**	**High**
Cognitive position	Source	23 (**15**)	0 (**0**)	4 (**3**)
	Mutual exchanger	0 (**0**)	0 (**0**)	1 (**1**)
	Absorber	4 (**2**)	0 (**0**)	3 (**3**)
	Isolated	4 (**2**)	0 (**0**)	0 (**0**)

[1] The number of family firms is in parentheses and highlighted in bold.

Table 6. Cognitive roles: managerial knowledge exchange [1].

		External Openness		
		Low	**Medium**	**High**
Cognitive position	Source	25 (**16**)	0 (**0**)	5 (**4**)
	Mutual exchanger	1 (**1**)	0 (**0**)	0 (**0**)
	Absorber	1 (**1**)	0 (**0**)	1 (**1**)
	Isolated	5 (**3**)	0 (**0**)	1 (**0**)

[1] The number of family firms is in parentheses and highlighted in bold.

5. Discussion

Although the literature highlights the importance of networking for family firms and the peculiar network strategies adopted by these firms compared to non-family firms (e.g., [70]), evidence on the role of family firms in OI networks is still limited [14]. Previous work discussed the importance of family firms in knowledge sharing within a local context, such as a regional cluster (e.g., [35,71]). Our findings, however, suggest that family firms do not just operate to further develop intra-cluster relationships based on knowledge exchange (low external openness and cognitive position = source; see Tables 4–6), but they also perform different cognitive roles according to the type of knowledge exchanged. Differently from non-family firms, family firms are predominantly gatekeepers in the technological and managerial knowledge networks, while being external stars in the market and managerial knowledge networks (Table 7). Independently from their attitude towards absorbing or spreading knowledge in the cluster (i.e., being a source or an absorber of knowledge; see Table 1), family firms have an high degree of openness when it comes to managerial knowledge; this is probably due to the phenomenon of family firm succession, an issue that emerged during the focus groups. Indeed, new generations can be supported by older generations in developing managerial skills and implementing entrepreneurial ideas [72], but they might want to search for additional support and views from organizations external to the cluster. However, when considering market knowledge, family firms absorb ideas from other cluster firms and try to establish extra-cluster connections; this seems much more like an opportunistic behavior, partially contradicting the idea of regional clusters characterized by high levels of trust [35]. On the other hand, when looking

at the technological knowledge network, family firms' gatekeeping behavior show that they have the potential to facilitate the diffusion of technological advancements which are relevant for the industry. These differences observed for the technological and the market knowledge networks confirm the main findings from Sammarra and Biggiero [58]: firms possess a set of different skills and resources, and their networking strategy reflects their internal capabilities and strategies. Moreover, our findings are aligned with those of Floris et al. [73], which suggest that family firms characterized by a strong focus on internationalization and local legitimization tend to adopt specific innovation strategies: in the Parabiago cluster, the strong bond between family firms and the local context can stimulate their capability to acquire and adapt new technological knowledge—by acting as gatekeepers—for developing traditional footwear products.

Table 7. Cognitive roles for family and non-family firms: summary of results by knowledge network.

	Isolated Firm	External Star	Mutual Exchanger	Gatekeeper
Technological Knowledge network	Prevalence of family firms	-	Prevalence of non-family firms	Prevalence of family firms
Market knowledge network	Prevalence of non-family firms	Prevalence of family firms	-	-
Managerial knowledge network	-	Prevalence of family firms	-	Prevalence of family firms

Family firms differ from non-family firms in their cognitive roles, yet we cannot say that these two groups are specialized in mutually exclusive roles. Our results confirm the peculiarity of family firms as organizations [14], which can operate effectively in a context where a diversity of organizations interact with diverse governance structures. Considering this diversity and the evidence on the different roles assumed by family firms in the multiple knowledge networks, our results thus support the spillover hypothesis on the importance of local economic and entrepreneurial diversity [5], and expand the OI evidence base applied to family businesses.

6. Conclusions

Our study contributes to the literature on OI by concentrating on the cognitive roles of family firms in a traditional OI ecosystem—A manufacturing regional cluster. We assess four potentially relevant cognitive roles of family firms (gatekeeper, mutual exchanger, external star, and isolated firm) in Parabiago, one of the most important Italian footwear clusters, while investigating three types of informal knowledge exchange, namely technological, market, and managerial knowledge. Our results suggest that family firms differ from non-family firms in their cognitive roles, and that the diversity of knowledge networks with regard to knowledge types is an important and largely neglected aspect of knowledge transfer among family businesses. The family involvement in the firm's strategy determines specific networking behaviors—an aspect that relates to the family firm's proactiveness, a complex phenomenon which is influenced by the temporal evolution of family goals, objectives, and personal relationships within and outside the firm [74].

In terms of policy implications, appreciating the differential relevance of multiple types of knowledge exchange allows avoiding the 'one size fits all' approach for stimulating innovation. As highlighted by Erkut [75], knowledge generation and exchange are contingent to market conditions and the environment in which firms operate. Policy interventions should be put in place to facilitate the exchange of knowledge and thus cooperative relationships, but the roles assumed by family firms suggest that policymakers need to understand the complexity behind this form of business and devise targeted policy measures: for example, supporting family firms in their predominant gatekeeping activity for exchanging technological knowledge, or stimulating their openness for exchanging more market knowledge. Although such implications supporting diversity of interventions seem obvious, it is striking that previous evidence suggests that policymakers are not fully aware of the importance of this strategic approach for firm networks, in the context of

OI [30]. In this vein, they need to understand how family firms behave according to the context: for example, if family firms tend to act only on specific roles, such as external stars, policymakers need to promote gatekeeping; the other way around applies if family firms are more externally focused. Policy interventions will fail if they do not recognize the multifaceted structure of knowledge transfer and the needs of family and non-family firms—which lead to different networking strategies and thus to different cognitive roles.

Our results can also inform the decision making of owners and managers of both family and non-family firms in a cluster. The different roles played by family firms with respect to different knowledge networks should be considered in terms of their implications for both the competitive as well as reputational reasons. Family firms adopt peculiar strategies to overcome barriers for knowledge acquisition because of their focus on non-economic goals and the importance of maintaining social reputation within the cluster. However, this does not evenly apply to all types of knowledge networks: family firm managers need to understand what strategies can lead to economic advantages when focusing on the exchange of specific types of knowledge in the short-term, and what strategies for networking and open innovation will be beneficial in the long run.

Nevertheless, our paper also faces several limitations, which could be considered for advancing research in this area. First, the regional nature of our research implies that the transferability of our results needs to be explored in future studies outside of Italy. Second, previous studies on OI concentrate on high-technology firms and corresponding regional clusters, hence an extension of our research could focus on family firms operating in other industrial sectors other than footwear. Third, as a function of the method and data employed, we have not been able to investigate the nature of inter-firm relationships in a dynamic context, in order to understand if there is a causality effect between knowledge transfer and performance. This is a relevant aspect which could explain the successful strategies adopted by family and non-family firms, i.e., if companies assuming specific cognitive roles, because of their knowledge network patterns, have a better performance than others.

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