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Collaborative modes with cultural and creative industries and innovation performance: the moderating role of heterogeneous sources of knowledge and absorptive capacity

Abstract

Organizations can no longer be isolated autonomous entities in the current dynamic competitive environment but tend to establish alliances and join networks with external parties. Recently research has suggested that organizations develop collaborative modes with cultural and creative industries (CCIs) to acquire and combine heterogeneous sources of knowledge (HSKs) within their organizational environment. Innovation thus becomes increasingly generated by a cross-process involving a diverse set of industries to improve performances. Nevertheless, few studies have assessed how knowledge from distant industries, such as CCIs, can affect firms' innovation performance. Accordingly, this empirical research on a sample of 187 firms evaluates whether formal and informal collaboration modes with CCIs affect innovation performance. Moreover, it assesses the moderating role of both HSKs and absorptive capacity. In particular, it aims to answer the following questions. What are the effects of collaboration modes with CCIs on firms' innovation performance? What are the differences (in terms of effects) between formal collaboration modes (FCMs) and informal collaboration modes (ICMs) with CCIs on firms' innovation performance? Do heterogeneity of knowledge sources and absorptive capacity increase the possibility of benefiting from FCMs and ICMs with CCIs in terms of innovation performance? The results contribute to the theory indicating that HSKs are important to benefit from knowledge from distant sources from the cultural point of view, while absorptive capacity does not fulfil the same role.

Keywords: *Cross-Innovation; Cultural and Creative Industries; Formal Collaboration Modes; Informal Collaboration Modes; Heterogeneous Sources of Knowledge; Absorptive Capacity.*

1. Introduction

More and more both small and medium-sized enterprises (SMEs) and larger enterprises are especially eager to develop innovation projects with other actors belonging to their ecosystem by setting up formal collaboration modes (FCMs) and informal collaboration modes (ICMs) (Del Giudice et al., 2012; Gomes et al., 2011; Scuotto et al., 2017; Spithoven et al., 2013).

Previous research has advocated that innovation seems to arise from collaboration across different industries (Smagina and Lindemanis, 2012). For instance, cultural and creative industries (CCIs) are considered to be a source of potential benefits for the whole economy, affecting the social and cultural aspects of people's life (Schiuma and Lerro, 2014). This paper seeks to answer the following questions. What are the effects of collaboration modes with CCIs on firms' innovation performance? What are the differences (in terms of effects) between FCMs and ICMs with CCIs on firms' innovation performance? Do heterogeneity of knowledge sources and absorptive capacity increase the possibility of benefiting from FCMs and ICMs with CCIs in terms of innovation performance?

Accordingly, the innovation management literature has mainly focused on collaborative and networking activities aimed at increasing creativity and innovativeness and thereby enhancing the competitiveness of firms (Capaldo and Petruzzelli, 2015; Dhanaraj and Parkhe, 2006; Gulati, 1998; Katila and Ahuja, 2002; Nieto and Santamaría, 2007). Especially, collaborations with customers and users (Franke and Piller, 2004), suppliers (Wasti and Liker, 1999), competitors (Chetty and Wilson, 2003), universities (Etzkowitz and Leydesdorff, 2000) and governments (Carayannis et al., 2000; Sandulli et al., 2016) have been addressed. However, despite numerous studies having been conducted on networks and collaborations for innovation, little attention has been paid to the diverse forms of ties with external innovation partners, such as FCMs and ICMs (West and Lakhani, 2008). Such modes have been demonstrated to be significant for the innovation process (Gilsing et al., 2008) and for supporting firms' growth (van de Vrande et al., 2009). In particular, FCMs consists of methods such as co-R&D, M&A and alliances, venture investments and licensing-in (Cassiman et al., 2005; Grindley and Teece, 1997; Hoang and Rothaermel, 2010; Santoro et al., 2016) based on contractual relationships, whereas ICMs involve sourcing knowledge from customers, suppliers and competitors and sharing facilities (Laursen and Salter, 2006; Mina et al., 2014) based on non-contractual relationships. Dahlander and Gann (2010) divided these collaborative modes into pecuniary and non-pecuniary types. The pecuniary case could be associated with FCMs in which enterprises acquire inventions and input for the innovative process through a formal transaction, while the non-pecuniary circumstance is in line with ICMs based on the outsourcing of ideas and knowledge from customers, suppliers, competitors and consultants.

As anticipated, CCIs could play a vital role in innovation efforts and growth. According to the Department for Culture, Media and Sport (DCMS) in the UK (1990), CCIs include cultural

industries (such as dance, music and crafts), creative arts that together produce creative products (visual arts, performing arts, films, music, etc.) and creative services (for example architecture, publishing and software services). CCIs have been identified as a combination of creativity and intellectual resources with business values and market needs (UNCTAD, 2008). Such a combination generates a virtuous cycle of innovation made up of the intertwining of culture-based and creativity-based processes (Schiuma and Lerro, 2014). Firms establish relationships with CCIs to increase their corporate social responsibility (CSR), to foster their marketing strategy and to develop new products and services (Schiuma and Lerro, 2014), thus increasing their innovativeness from diverse points of view. Despite these premises, few studies have analysed the collaboration between firms and CCIs. More generally, the literature has scarcely addressed the issue of how the distance in the knowledge bases of the actors involved in the collaboration could foster creativity and innovation, even though it has shown that entrepreneurial activities can be improved when firm innovation processes are open to various forms of influence (Ferraris et al., 2017a; Laursen and Salter, 2006; Peltoniemi, 2015; Petruzzelli and Savino, 2014; Schiuma, 2011). Through that mix of external knowledge with internal technical resources, firms' competitiveness can flourish (Hung and Chou, 2013; Laursen and Salter, 2006), especially when they have heterogeneous sources of knowledge (HSKs) and absorptive capacity (Enkel and Gassmann, 2010; Tsai, 2001). Similarity between partners has been suggested to be beneficial for innovation success through the absorption of common knowledge and technologies within the organizational environment (Cohen and Levinthal, 1990), whereas recent research has declared that different knowledge stocks also have the potential to lead to disruptive changes (Amit and Shoemaker, 1993; Flatt and Kowalczyk, 2008; Fleming and Sorenson, 2001; Hall, 1993; McCann et al., 2016) at the individual level, as diversity among employees may increase the knowledge base of the firm. The intertwining of power cultural distance and tacit knowledge thus generates an invaluable source for the innovation process (Enkel and Gassman, 2010; Nooteboom et al., 2007; Petruzzelli and Savino, 2014).

To investigate whether FCMs and ICMs with CCIs affect innovation performance moderated by HSKs and absorptive capacity, and to answer our questions, the paper conducts empirical research on a sample of 187 firms operating in various industries. Data were collected through a survey methodology and processed using OLS regression models.

The research contributes to the theory in two main ways. First, it provides evidence of differences between FCMs and ICMs within the open innovation phenomenon in terms of

effects on innovation performance. Second, it sheds light on open innovation modes among different and distant industries from a cultural point of view. In detail, we address collaboration between firms and CCIs given that the latter have been recognized as a new powerful source of creativity and knowledge (Schiuma and Lerro, 2014). In this view, the results contribute to the theory indicating that heterogeneous sources of knowledge are important to benefit from knowledge from distant sources from a cultural point of view, while absorptive capacity does not fulfil the same role.

The remaining sections of the paper are the following. Section 2 establishes the hypotheses, arguing theoretically the differences between FCMs and ICMs and whether these collaborations generate higher innovation performance. To conclude section 2, the moderating role of HSKs and absorptive capacity on the above relationships is discussed. Section 3 explains the methodological process, describing each stage based on the data collection and analysis. Section 4 discusses the findings, offering theoretical and managerial implications. Section 5 concludes with limitations and further research directions.

2. Theoretical background and development of the hypotheses

2.1 Formal and informal collaborative modes with cultural and creative industries

The concepts of networks, alliances and inter-organizational ties have become central themes in innovation management studies to investigate how enterprises tend to deal with intensive market changes and customers' needs (Bogers et al., 2017; Gulati, 1998; Powell et al., 1996; Santoro et al., 2017). Discussing whether firms are still autonomous entities that strive for a competitive advantage, scholars have demonstrated the significance of strategic alliances with external actors (Chesbrough, 2006). In fact, innovations can no longer be the outcome of a single firm's action (Campanella et al., 2017; Del Giudice and Maggioni, 2014; Nieto and Santamaria, 2007). Especially, a strategic alliance is considered to be a cooperative agreement aimed at the development, production and/or distribution of new products and services (Zollo et al., 2002). The reason for this alliance is usually a mutual, beneficial scope (Gulati, 1998).

Networks thus allow firms to achieve virtuous flows of knowledge that enable them to build on the broad pool of knowledge outside their boundary (Ferraris et al., 2017b; West and Lakhani, 2008) and develop a cross-innovation process (Enkel and Gassmann, 2010). As a result, firms become more innovative through cross-innovation processes spurred by the

development of new alliances and collaborative modes (Bresciani et al., 2017; Gnyawali and Madhavan, 2001).

In general, networks and alliances have been found to have beneficial effects on innovation performance and overall business performance in earlier studies (Ahuja, 2000b; Almeida and Kogut, 1999; Powell et al., 1999). For instance, joint R&D within well-organized networks has been demonstrated to be a suitable form of collaboration to implement a cross-innovation process. In this case, the R&D activities take place by combining a diverse set of knowledge and technologies (Baum et al., 2000; Becker and Dietz, 2004). In turn, firms that are involved in multiple formal collaboration modes (FCMs) and informal collaboration modes (ICMs) are more innovative due to the possibility to select different types of knowledge and technologies (Bellantuono et al., 2013; He and Wong, 2004; Stuart and Podolny, 1996; West and Lakhani, 2008).

In a nutshell, FCMs are formal arrangements among organizations with the objective of cooperating on research and development activities (Perkmann and Walsh, 2007). In particular, they involve partnerships with external actors through legal instruments and methods such as co-R&D, M&A and alliances, venture investments and licensing-in (Cassiman et al., 2005; Grindley and Teece, 1997; Hoang and Rothaermel, 2010; Perkmann and Walsh, 2007; Santoro et al., 2016), aimed at sharing costs, benefits and revenues. Particularly, firms tend to collaborate to acquire new knowledge to be combined within their internal system (West and Lakhani, 2008).

Meanwhile, ICMs involve types of collaborations that call for knowledge from customers, suppliers and competitors and the sharing of facilities. In this case, non-contractual relationships are stipulated (Laursen and Salter, 2006; Mina et al., 2014).

In the specific context of this research, firms can establish FCMs with cultural and creative industries (CCIs) through: a) co-R&D projects: developing cross-innovations leveraging the knowledge, vision and creativity of employees of the creative enterprise; b) M&As and venture investments: direct access to a creative firm's assets; and c) licensing-in: acquiring knowledge from a creative firm. Firms can also source knowledge from CCIs through informal practices, such as participating in meetings and conferences. In particular, ICMs focus on non-contractual interactions of the entities involved (Pyka, 2000). Moreover, these sourcing modes facilitate the flow of knowledge through informal communication processes that could comprise technical assistance, consulting or purposive collaborative R&D (Link et

al., 2007). In this guise, the concept of knowledge creation is associated with the *socialization process* (Nonaka, 1994), based on the exchange of tacit knowledge, which occurs by spending time together or just sharing experiences among staff members or with external actors. More specifically, socialization is seen as being particularly associated with novel and radical product ideas (Schulze and Hoegl, 2008). For example, case studies have indicated that informal ties between employers and an external pool of talent are crucial to develop cross-innovations (Chesbrough et al., 2006). Employers are thus spurred to take initiatives beyond the organizational boundaries or to use methods such as internal competitions (Van Dijk and Van den Ende, 2002). Through empirical methods, studies have found that firms (especially SMEs) prefer ICMs, such as external networking to acquire new or missing knowledge, rather than FCMs, such as venturing and licensing-in (van de Vrande et al., 2009). Consistently, Almeida et al. (2003) indicated that ICMs benefit SMEs more than larger firms, because informal modes do not require high investments.

The fundamental idea underpinning the research's conceptual model is that firms that develop formal and informal collaboration modes with CCIs have higher innovation performance. Indeed, firms can benefit from facing different knowledge domains within the whole network (O'Connor and McDermott, 2004). Moreover, sometimes CCIs have the ability of foresight and notice important emerging trends in the environment, which can help companies to read the environment better and develop innovative projects (Landry, 2006). Moreover, CCIs have skills of critical thinking, observation and comprehension of consumer needs, which could be leveraged and exploited (Schiuma and Lerro, 2014). CCIs are eager to look forward and anticipate new market trends, whereas other industries tend to be stuck in routines (Landry, 2006; Petruzzelli and Savino, 2014; Schiuma, 2011). Briefly, firms acquire knowledge across different industries and human resources with a diverse set of working experiences (O'Connor and McDermott, 2004).

Therefore, we believe that:

Hypothesis 1: Formal collaboration modes with CCIs are positively associated with innovation performance.

Hypothesis 2: Informal collaboration modes with CCIs are positively associated with innovation performance.

2.2 The moderating role of heterogeneous sources of knowledge

HSKs have been considered to be a relevant catalyst for enterprises' performance (Hagedoorn and Schakenraad, 1994; Hamel and Prahalad, 1990; Penrose, 1959; Porter, 1990). These sources have been identified in the "cognitive distance between innovation partners" (Enkel and Gassmann, 2010, p. 256). Some scholars have demonstrated the positive influence of these sources on the internationalization strategy (Costa et al., 2016; Elliot et al., 2015; Reuer and Koza, 2000) and in the process of innovation (Enkel and Gassmann, 2010; Majchrzak et al., 2004; Nooteboom et al., 2007; Wuyts et al., 2005). Especially the intertwining between tangible and intangible assets with HSKs has been demonstrated to be relevant to businesses' growth (Amit and Shoemaker, 1993; Flatt and Kowalczyk, 2008; Hall, 1993; McCann et al., 2016). However, others studies have recognized HSKs as a negative factor for firms' growth (Mowery et al., 1996, 1998; Penner-Hahn and Myles Shaver, 2005; Stuart, 1998; Tanriverdi and Venkatraman, 2005). Gulati (1998), for instance, declared that cognitive distance hinders the common understanding and thus the business performance. The complexity of knowledge heterogeneity among innovation partners can also pose an obstacle to the process of knowledge combination and integration within a firm.

However, the sharing of heterogeneous resources calls for diverse sets of meaning (Smircich, 1983), organizational perspective (Nooteboom, 2000) and organizational culture (Schein, 1985). Weick (1979, 1985) researched the different interpretations that people could form concerning a specific system. Nooteboom et al. (2007) theorized the positive influence of resource heterogeneity on the establishment of strategic partnerships. People bring and share their knowledge, encouraging the cross-development of new ideas (Enkel and Gassman, 2010; Nooteboom et al., 2007). Organizational knowledge is unique, diverse and mutually dependent (McEvily and Chakravarthy, 2002) on the level of sophistication and depth of a firm's knowledge and its partners' knowledge (De Luca and Atuahene-Gima, 2007). (nelle references c'era scritto solo Luca ecc... abbiamo aggiunto il "De" non sapendo se sia senza o con controlla)

Partners' variety and diversity increase the knowledge base of the firm and are likely to augment the cross-innovation processes and innovation performance (Ahuja, 2000a; Laursen and Salter, 2006; Santoro et al., 2017). Innovation involves a knowledge recombination process connecting different sources to achieve a competitive advantage (Arora et al., 2016). This is also true at the individual level. As suggested by Cohen and Levinthal (1990) in their study on absorptive capacity, "a diverse background provides a more robust basis for learning

because it increases the prospect that incoming information will relate to what is already known”.

In a nutshell, knowledge is a nuance of heterogeneous languages and cultural values generating by a bewildering variety of different entities (Hofstede, 1980, 2011). Each person brings distinctiveness that reveals his or her culture (Brandenburger and Vinokurova, 2012). Culture can be regarded as one of the main defining patterns of human significance by which knowledge is created, the world and thoughts are explained and actions are led (Del Giudice et al., 2012). According to Kluckhohn (1951), culture is formed by a group of identities, emotions, perceptions and values. It is a combination of old components with new elements that enhance innovation success (Petruzzelli and Savino, 2014).

In turn, heterogeneity of knowledge is not just a diverse set of complexities between technical knowledge belonging to innovation partners but also includes the “cultural distance between an enterprise and its innovation partners” (Hoffman, 1999; Lubart, 1999; Trevelyan, 1999). Early studies suggested that the smaller the cultural distance, the greater the effect on innovation performance (Hofstede, 1980; Lampikoski and Emden, 1996; Shane, 1992, 1993; Westwood and Low, 2003). Nevertheless, for other scholars, cultural distance and heterogeneity among partners were the optimal factor to encourage a new explorative innovation approach across industries (Laursen and Salter, 2006; Majchrzak et al., 2004; Nooteboom et al., 2007). In fact, the building of external networks for collaborative knowledge creation is highly dependent on previous ties (Crescenzi et al., 2016). This means that, by increasing the heterogeneity of its knowledge sources, a firm increases the possibility of benefiting from other ties. As prior knowledge is considered to be one of the main determinants of absorptive capacity, given that related knowledge is needed to understand and transfer external knowledge (Zahra and George, 2002), a broad experience base is particularly useful to absorb new knowledge from other unrelated domains. Consequently, a diverse set and base of knowledge creates the conditions to tap better into the knowledge deriving from creative partners such as CCIs, improving the cross-innovation processes.

Therefore, we deem that:

Hypothesis 3: Heterogeneous sources of knowledge moderate the relationship between formal collaboration modes and innovation performance.

Hypothesis 4: Heterogeneous sources of knowledge moderate the relationship between informal collaboration modes and innovation performance.

2.3 The moderating role of absorptive capacity

As mentioned earlier, both FCMs and ICMs with CCIs can increase the innovation performance. However, firms that want to exploit successfully the potentiality coming from external sources, especially distant sources of knowledge from the cognitive point of view, need to develop internal capabilities to absorb and incorporate external knowledge (Cohen and Levinthal, 1990; West and Bogers, 2014). In fact, knowledge that resides outside the company in CCIs is very often distant from the knowledge possessed by the firms. This can be interpreted as heterogeneity of sources or as “cognitive distance” in terms of differences in technological knowledge between firm employees and CCI workers (Nootboom et al., 2007). On one hand, a greater distance in the knowledge base of the actors involved in the collaboration can foster innovation; on the other hand, this is an issue because firms require superior capabilities to individuate and integrate this knowledge if they want to succeed (Del Giudice et al., 2012; Nootboom et al., 2007). This means that firms need to develop so-called “absorptive capacity” (Cohen and Levinthal, 1990; Zahra and George, 2002), namely the ability to scan the external environment and to integrate new external knowledge into their innovation process. Thus, absorptive capacity enables firms to increase their stockpile of knowledge (Lichtenthaler and Lichtenthaler, 2009) and to exploit external knowledge coming from CCIs better, and these in turn will improve innovation performance (Ahn et al., 2015; Berchicci, 2013). The development of these internal capacities increases the firms’ ability to access, absorb and assimilate innovation-relevant knowledge, information and creativity from employees of CCIs. The firm improves its ability in external sourcing and in recombining it with internal knowledge (Petruzzelli and Savino, 2014) and, at the same time, the firm is more efficient in drawing external sources of knowledge, resulting in better innovation performance (Vrontis et al., 2017).

Therefore, we deem that:

Hypothesis 5: The absorptive capacity moderates the relationship between formal collaboration modes and innovation performance.

Hypothesis 6: The absorptive capacity moderates the relationship between informal collaboration modes and innovation performance.

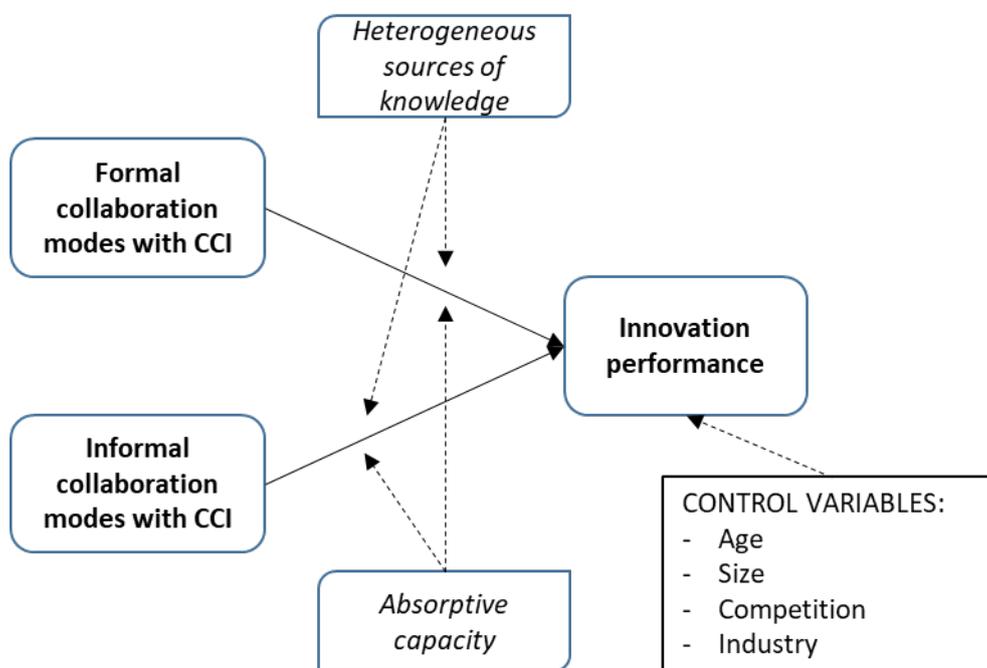


Figure 1. The conceptual model

3. Methodology

3.1 Research design and sample

Empirical research was carried out on a sample of Italian firms, and the data were assessed through quantitative methods. The quantitative methodology was chosen due to the nature of the topic, which calls for more fine-grained approaches to explore the relationships among variables. Moreover, this research approach is widely used in this field (Link and Bauer,

1987; Veer and Jell, 2012). As the first step, 1000 Italian firms from different sectors of both the manufacturing and the service industry were selected from the Italian database *AIDA-Bureau van Dijk*. Then, all the respondents received the questionnaire along with a brief introduction to the research scope via their direct email address. If an email address was not available, the respondent was approached by phone to request an email address and then the questionnaire was sent. Third, the questionnaire, composed of several questions (open and closed), was sent to these firms, which was answered and returned by 187 CEOs, who were the targeted respondents. All the CEOs had more than 10 years of tenure in their firm. This expertise further supports the validity of the informants for reporting data about their organization.

In total 19.8% of the sample was composed of small firms and 65.8% medium firms, while the remaining 14.4% consisted of larger firms. Therefore, the majority were medium-sized firms. They operated in a wide array of sectors, such as IT services, food and OEM automotive.

The questionnaire was developed according to the previously discussed literature. It was divided into two parts, with both open and closed questions. The first part sought general information about the firm, such as industry, number of employees, age and innovative, financial and economic performance. The second part investigated specifically approaches to innovation, collaborative modes with cultural and creative industries (CCIs), knowledge sources and absorptive capacity. Therefore, following Bryman's technique (1984), the questionnaire was structured to start with ancillary questions and progress to more focused ones. The reason for this structure was to offer an overall view of the situation along with enabling a deep analysis of some relevant issues. Individual questions were separated to reduce the risk of the respondents rationalizing the answers. Moreover, dependent and independent variables were placed in different positions within the questionnaire to limit the potential common method variance (Podsakoff et al., 2003).

We assessed the potential non-response bias by looking for differences between early and late respondents (Kanuk and Berenson, 1975). Accordingly, the order of responses to the survey was recorded and it was revealed to be non-significantly correlated with both firm age and firm size, suggesting that the concern regarding non-response bias was minimal (Hawes and Crittenden, 1984). We also found no substantial differences in either firm age or firm size across industries. This result is important given the heterogeneity of our sample. The firms were distributed across Italy, though the majority operated in the north of the country.

The data were processed through an OLS regression model, a widespread procedure in innovation management studies (Lichtenthaler, 2009; Parida et al., 2012).

3.2 Variables

Referring to the aforementioned literature, we individuated five key measures: formal collaboration modes (FCMs) with CCIs, informal collaboration modes (ICMs) with CCIs, HSKs, absorptive capacity and innovation performance.

Firms can acquire knowledge from CCIs through different methods, from meetings, conference and scanning CCI ideas to more formal and steady partnerships and sponsorships (Schiuma and Lerro, 2014), to generate “tangible goods and intangible intellectual or artistic services with creative content, economic value and market objectives” (UNCTAD, 2008).

The independent variables were FCMs and ICMs. To construct these variables, we asked the respondents to evaluate several statements on a seven-point Likert scale, where “code 1” meant strongly disagree and “code 7” meant strongly agree. Thus, a nominal-polytomous response scale for close-ended questions was applied to reduce the percentage of response bias (Sarlis and Gallhofer, 2014). All the sentences were developed according to the literature to maximize the content validity of the scales (Cassiman et al., 2005; Grindley and Teece, 1997; Hoang and Rothaermel, 2010; Mina et al., 2014; Nonaka, 1994; Schiuma and Lerro, 2014; Van der Meer, 2007). The constructs had a Cronbach’s alpha of 0.74 and 0.78, respectively, indicating high levels of internal reliability (Solomon et al., 2013).

The moderating variables were HSKs and absorptive capacity. The first was developed with two items, following the literature (Del Giudice et al., 2012; Hoffman, 1999; Laursen and Salter, 2006; Lubart, 1999; Trevelyan, 1999). The Cronbach’s alpha of 0.89 indicated high reliability as well. Absorptive capacity was evaluated by R&D intensity, namely the percentage of R&D expenses of the total sales in the year (Forsgren and Pedersen, 1998).

Finally, the dependent variable was innovation performance, measured as the percentage of sales derived from new products and services of the total sales, following previous studies (Cassiman and Veugelers, 2006; Laursen and Salter, 2006). This variable evaluated whether innovative products and services are accepted into the market and therefore provoke higher sales.

We controlled for firms' age, because it may affect the likelihood of having developed deep relationships with other organizations; thus, older firms are more likely to have developed embedded relationships, which can lead to better performances (Huerger and Jaumandreu, 2004). Age was measured as the number of years since founding. Moreover, we controlled for firms' size, measured as the number of employees, because attaining a certain size could influence the ability to scan, absorb and implement new ideas and innovations (Dewar and Dutton, 1986). We also controlled for competition within the industry, because it can affect innovative processes and strategies (Kato and Zhou, 2017). It was measured by asking the respondents to evaluate the intensity of competition perceived by the firms through a seven-point Likert scale.

Finally, we considered a dummy variable to control for the industry to which a firm belonged (1=manufacturing sector, 0=retail and service sector).

Table 1. Variables and items

<i>Measures</i>	<i>Items</i>	<i>C.A.</i>	<i>AVE</i>	<i>F.L.</i>	<i>Related literature</i>
<i>ICM with CCI</i>	The importance of steadily scanning ideas and knowledge from CCIs via informal methods (socialization)	0.74	0.62	0.77–0.80	Nonaka (1994)
	The importance of participating in meetings and conferences involving CCIs				Van der Meer (2007)
	The importance of sharing facilities with CCIs				Mina et al. (2014)
<i>FCM with CCI</i>	The significance of establishing co-R&D projects with CCIs	0.78	0.71	0.82–0.85	Hoang and Rothaermel (2010); Schiuma and Lerro (2014)
	The significance of making M&A and venture investments with CCIs				Cassiman et al. (2005)
	The significance of developing licensed-in knowledge and technologies from CCIs				Grindley and Teece (1997)
<i>HSK</i>	Cultural distance	0.89	0.75	0.84–0.86	Del Giudice et al. (2012); Hoffman (1999); Lubart (1999); Trevelyan (1999)
	Partners' heterogeneity				Laursen and Salter (2006)
<i>AC</i>	R&D expenses of the year of the total sales				Cohen and Levinthal (1990)
<i>Innovation performance</i>	Percentage of sales from new products and services of the total sales				Cassiman and Veugelers (2006); Laursen and Salter (2006)

Table 2 shows the descriptive statistics and correlation matrix. It is important to note that the majority of the sample is composed of SMEs, as the average of the number of employees is 157. Moreover, the data indicate that these firms on average prefer ICMs to FCMs.

Table 2. Descriptive statistics and correlation matrix

Variable	Min.	Max.	Mean	SD	VIF	1	2	3	4	5	6	7	8
<i>Age</i>	3	95	24.89	22.022	1.393	1							
<i>Size</i>	10	1200	157.02	169.835	1.205	.322**	1						
<i>Competition</i>	1	7	3.96	1.683	1.212	-.102	-.034	1					
<i>Industry</i>	0	1	0.4225	0.49528	1.378	.363**	.153*	.077	1				
<i>FCM</i>	1	7	5.0107	1.26477	1.413	-.106	.066	.241**	-.067	1			
<i>ICM</i>	1	7	5.6453	1.39577	1.644	-.148*	-.159*	.285**	-.280**	.482**	1		
<i>HSK</i>	1	7	5.1310	1.94278	1.420	.066	.077	.301**	.040	.328**	.384**	1	
<i>AC</i>	0	0.480	0.09253	0.112292	1.304	.161*	-.040	.136	-.190**	.158*	.155*	.344**	1

Note: * p<.05; ** p<.01; *** p<.001.

4. Results

Our six hypotheses were tested through OLS regression models, and the results are presented in Table 3. More specifically, moderated hierarchical regression analysis estimated by OLS was used for testing the proposed hypotheses. To check for multicollinearity, we calculated variance inflation factors (VIFs) for all the variables, which are below the recommended threshold of 10, as Table 2 shows (Kutner et al., 2004).

The dependent variable for all six models is innovation performance. Model 1 has an R² of 0.148 (the adjusted R² is 0.115) and an F-value of 4.750 (P<.001) and presents the effect of the control variables. Model 2 has an R² of 0.164 (the adjusted R² is 0.131) and an F-value of 5.007 (P<.001) and presents the effect of the independent variables (FCMs and ICMs) on the dependent variable. Model 3 has an R² of 0.168 (the adjusted R² is 0.135) and an F-value of 5.146 (P<.001) and shows the effect of the interaction term between FCMs and HSKs on the dependent variable. Model 4 has an R² of 0.164 (the adjusted R² is 0.131) and an F-value of 5.000 (P<.001) and indicates the effect of the interaction term between FCMs and AC on the dependent variable. Model 5 has an R² of 0.163 (the adjusted R² is 0.130) and an F-value of 4.972 (P<.001) and presents the effect of the interaction term between ICMs and HSKs on the dependent variable. Finally, Model 6 has an R² of 0.165 (the adjusted R² is 0.132) and an F-value of 5.008 (P<.001) and shows the effect of the interaction term between ICMs and AC on the dependent variable.

Table 3. Regression results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Age</i>	-0.198*	- 0.205*	-0.185*	-0.203*	-0.194*	-0.203*
<i>Size</i>	0.242**	0.256**	0.254**	0.256**	0.248**	0.249**
<i>Competition</i>	0.063	0.068	0.056	0.072	0.059	0.064

<i>Industry</i>	-0.015	-0.022	-0.051	-0.011	-0.016	-0.033
<i>FCM</i>		0.130	0.136	0.135	0.167	0.158
<i>ICM</i>		0.255**	0.393**	0.372**	0.269**	0.298**
<i>HSK</i>		0.267**	0.368**		0.298**	
<i>AC</i>		0.041		0.078		0.116
<i>FCM*HSK</i>			0.261**			
<i>FCM*AC</i>				0.102		
<i>ICM*HSK</i>					0.322**	
<i>ICM*AC</i>						0.075
<i>R²</i>	0.148	0.164	0.168	0.164	0.163	0.165
<i>Adjusted R²</i>	0.115	0.131	0.135	0.131	0.130	0.132
<i>F-value</i>	4.720***	5.007***	5.146***	5.000***	4.972***	5.008***

Note: * p<.05; ** p<.01; *** p<.001.

The results show that: first, FCMs does not have a significant impact on innovation performance ($\beta=0.130$), so hypothesis 1 is rejected; second, ICMs has a positive and significant effect on innovation performance ($\beta=0.255^{**}$), thus confirming hypothesis 2; third, the moderating effect of HSKs on the relationship between FCMs and innovation performance is positive and significant ($\beta=0.261^{**}$), thus supporting hypothesis 3; fourth, the moderating effect of AC on the relationship between FCMs and innovation performance is non-significant ($\beta=0.102$), thus rejecting hypothesis 5; fifth, the moderating effect of HSKs on the relationship between ICMs and innovation performance is positive and significant ($\beta=0.322^{**}$), supporting hypothesis 4; and sixth, the moderating effect of AC on the relationship between ICMs and innovation performance is non-significant ($\beta=0.075$), therefore rejecting hypothesis 6.

Regarding the control variables, two out of the four variables employed in the models significantly explain part of the variance in innovation performance, specifically age and size. The first is always negative and significant, while the second is always positive and significant. This means that younger and larger firms are likely to have higher innovation performance and benefit more from collaborative modes.

5. Discussion and implications

5.1 Theoretical implications

The aim of this paper was to investigate the collaboration modes between firms and cultural and creative industries (CCIs), in particular whether formal and informal collaboration modes with CCIs influence innovation performance and the moderating effect of HSKs and absorptive capacity.

Under this assumption, the findings suggest that the surveyed firms benefit from informal collaboration modes (ICMs) with CCIs but not from formal collaboration modes (FCMs) with CCIs. In this view, CCIs have grown in the last decades and are now a great source of innovation for firms, providing non-overlapping knowledge and proposing new creative approaches, methods and solutions that are useful to compete in the business arena nowadays (Schiuma and Lerro, 2014). According to our data, ICMs offer greater benefits than FCMs, providing firms with a quick and flexible way to benefit from knowledge coming from CCIs to improve their innovation performance. Therefore, the best-performing firms are those that have acquired knowledge from CCIs via informal modes. This result is similar to those of Gulati (1995) and Gulati and Singh (1998), who posited that firms tend to choose non-equity and informal structures for collaboration, and those of van de Vrande *et al.* (2009), who found that SMEs prefer informal ties to avoid structural investments.

The second key finding of this research points to the importance of the heterogeneity of a firm's knowledge base, which drives it to understand relevant sources of knowledge in the external environment and to benefit from these sources of knowledge. This factor can be considered as an opportunity rather than a threat, as previous studies have stated (Mowery *et al.*, 1996, 1998; Penner-Hahn and Myles Shaver, 2005; Stuart, 1998; Tanriverdi and Venkatraman, 2005). This means that the more firms involve HSKs in their business operations and activities, the more they will benefit from knowledge coming from distant industries, such as CCIs. This result is similar to those of previous studies that showed that searching widely and intensely is beneficial for firms' innovativeness (Ahn *et al.*, 2015; Laursen and Salter, 2006; Vrontis *et al.*, 2017), because accessing different knowledge domains could contribute to firms' creativity (Enkel and Gassmann, 2010; Zollo *et al.*, 2002).

In fact, such heterogeneity is recognized as a source for making radical and incremental innovations (Hargadon and Sutton, 1997; Majchrzak *et al.*, 2004; Nooteboom *et al.*, 2007; Wuyts *et al.*, 2005). Conceptualizing the cross-innovation process, HSKs are determinant in thinking of possible cross-industry processes and searching for a suitable innovation partner (Enkel and Lenz, 2009; Gassmann *et al.*, 2004; Herstatt and Kalogerakis, 2005). In this paper, we conceptualized the heterogeneity of the knowledge base through cultural distance and partners' heterogeneity (Laursen and Salter, 2006; Nooteboom *et al.*, 2007; Schein, 1985). Cultural distance is based on different individual interpretations and perceptions of a specific phenomenon (Del Giudice *et al.*, 2012; Kluckhohn, 1951; Nooteboom *et al.*, 2000; Weick, 1979, 1995). Even though the first assumptions considered such a distance as a barrier to firm

growth (Gulati, 1995), our data indicate that cultural distance stimulates curiosity and learning (Nooteboom et al., 2007). A cross-innovation process calls for interactions that can bring new knowledge (Enkel and Gassmann, 2010). In this sense, greater cultural distance could be linked to more cross-innovation projects. For instance, Nike established an informal collaboration mode with CCIs to improve the shock absorption of running shoes, even though there was cultural and knowledge divergence in the development of the new shoes (Enkel and Gassmann, 2010). On the other side, partners' heterogeneity provides firms with different sources of knowledge that are useful for remaining in touch with various scientific domains (Laursen and Salter, 2006).

The last important result of this research regards the non-significant effect of absorptive capacity. In detail, absorptive capacity does not have a significant or moderating effect on innovation performance, confirming the results of some previous studies (Laursen and Salter, 2006) and contrasting those of other studies (Berchicci, 2013). This means that higher investments in internal R&D do not lead to better innovation performance through collaborative modes with CCIs. This is quite a striking result but was perhaps driven by the measure of absorptive capacity employed in this study, namely R&D intensity, which sometimes does not consider some facets of absorptive capacity. Despite this, if taken together, the findings of this research provide an explanation concerning the factors that enable higher innovation performance, suggesting that the best performers are those that establish ICMs with CCIs, having HSKs within innovation processes, beyond absorptive capacity, which is not essential for better performance.

The above implications for theory can be outlined as follows. First, this research provides evidence of differences between FCMs and ICMs within the open innovation phenomenon in terms of their effects on innovation performance. Second, it sheds light on open innovation modes among different and distant industries from a cultural point of view. In detail, we address collaboration between firms and CCIs given that the latter are recognized as a new powerful source of creativity and knowledge (Schiuma and Lerro, 2014). In this view, the results contribute to the theory by indicating that HSKs are important to benefit from knowledge coming from distant sources from a cultural point of view, while absorptive capacity does not fulfil the same role.

5.2 Managerial and policy implications

From a managerial point of view, first this study points to the importance of networks and collaborations to improve innovation performance, following an open innovation logic. Increasing the number of ties with external actors is vital for gathering information, knowledge and technologies to increase the internal base of key resources. Considering the specific findings of this study, informal sourcing activities can provide knowledge quickly, achieving flexibility, and can ensure more appropriate responsiveness to sector dynamicity. As our findings posited, informal collaborations lead to higher innovation performance. This also creates an advantage for CCIIs. In fact, as highlighted by several studies, CCIIs usually lack resources and capabilities to develop and commercialize innovative ideas despite their bulk of creative knowledge and ideas (Chesbrough, 2010, 2013; Kutvonen, 2011). For that, they might exploit external paths to market by revealing or selling their ideas, knowledge and technologies, establishing outbound open innovation practices. In turn, firms could create competitive value and enhance their innovativeness by tapping into the resources and knowledge of CCIIs through FCMs and ICMs.

In the specific context of this paper, we stress that firms might be challenged to undertake two pathways. The first one concerns knowledge and creativity exploration with CCIIs by establishing ICMs, while the second regards the conversion of an informal CM into a formal one if the partnership produces successful achievements. As the employed items indicate, ICMs involve scanning ideas and knowledge from CCIIs through informal methods, participating in meetings and conferences and sharing facilities with CCIIs. Firms with the aim of thriving with creativity should consider these factors in their policies and managerial processes. Finally, policy makers must consider that innovation performance benefits from ICMs with CCIIs, especially when the organization has nuanced ties with external partners.

6. Conclusions

This research has tried to shed light on an emerging topic regarding collaboration modes with cultural and creative industries (CCIIs) for firms. In fact, the literature has scarcely addressed the issue of how the distance in the knowledge base of the actors involved in a collaboration could foster creativity and innovation. The results from the quantitative study suggested that informal collaboration modes (ICMs) have a greater effect on innovation performance than formal collaboration modes (FCMs). Moreover, heterogeneous sources of knowledge (HSKs) mediate the above relationships while absorptive capacity does not.

However, the research is not without limitations, which might encourage new research. For instance, the results are geographically limited. Italy is a small economy with a tradition of trustworthy business relationships, where much of the knowledge sharing occurs through informal networks, with the underlying general presumption that the parties will not take advantage of each other. This might be a reason to establish ICMs. Therefore, a qualitative approach could be applied to investigate this aspect in depth and/or to apply the research model to a different country in Europe or everywhere. This also creates the possibility of undertaking comparative studies across different countries. Additionally, the participants in the research were only CEOs and founders, but a different point of view could be analysed considering employees' perspective. Overall, the research was focused on the cross-innovation process between firms and CCIs through the moderating role of HSKs and absorptive capacity and would be a starting point for further research to investigate such a knowledge transfer.

Both ICMs and FCMs with CCIs require internal capabilities regarding the choice of knowledge to be acquired, relational capabilities to manage the relationship with partners and an understanding of cultural differences. As suggested by our data, higher investments in R&D do not lead to higher innovation performance through ICMs and FCMs. However, some capacities cannot be explained through the proxy R&D intensity, so future studies could explore this aspect in greater depth in the future.

Another limitation concerns the generalizability of our findings. In fact, our sample is composed of firms operating in diverse sectors. Despite this, the control variable industry indicated that no differences among industries explain the variance in innovation performance.

Finally, we acknowledge the fact that more research at the individual level is needed in the context of collaborative ties with external actors and in the investigation of heterogeneity among employees to foster innovation. In detail, future studies could address the antecedents of absorptive capacity and the collaborative process of innovation with a specific focus on employees' diversity and HR mechanisms (Bogers et al., 2017).

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