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CROWD-FOODING. THE ROLE OF CROWDFUNDING PLATFORMS IN THE FOOD INDUSTRIES OPEN INNOVATION

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ABSTRACT

The goal of this paper to analyze the effects of crowdfunding on the open innovation capabilities of the agri-food businness. The research is based on a survey methodology, which is useful to enhance the generalization of results (Dooley, 2001).

The paper builds on the theoretical framework and the consequent conceptual model to conduct the empirical research, which follows two main steps. First, the literature review led us to develop the questionnaire and therefore the variables of our model. Second, we have tested the model and the hypotheses through hierarchical regression model, which was considered a suitable method in innovation management studies.

Keywords: open innovation, crowdfunding, access to new knowledge, agri-food business

INTRODUCTION

Open innovation is becoming increasingly important in the food sector. According to Sarkar and Costa (2008), there is rapid growth in the number of open innovation projects.

Around the world, consumers are increasingly opting for specialized diets that address their desire to eat organic, low-fat, low-carb, or eliminate ingredients based on food sensitivities, allergies or personal convictions. Approximately two-thirds of the respondents (64%) in Nielsen's new Global Health and Ingredient-Sentiment Survey said they follow a diet that limits or prohibits consumption of at least some foods or ingredients (Nielsen Research, 2016). Moreover, a majority of European consumers are believers in positive nutrition, with 56% using food/drink to improve health (Vitafoods Europe, Datamonitor Consumer Survey, 2016).

In order to address these challanges, the Italian agri-food business have to increase their innovative capacity by creating new products and services, commanding a premium (OECD,2013)

As Michael Porter states (2007), the actual models of competitiveness rely on radical innovations and home based factor endowments in achieving competitive

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advantages. As presented by Carayannis and Wang (2009), there are two types of competitiveness: resource-led and innovation-led competitiveness. The resource-led competitiveness model states that higher productivity results from through lower cost of natural resources or lower costs of an unskilled labor force. On the other hand, the innovation-led competitiveness model emphasizes that a higher productivity is achieved through a higher efficiency and this is based on knowledge and innovation. This means that the fast development of technologies and the rapidly changing markets, combined with increased global competition (also due to relieve of EU's protection measures) and changing customer demands, imply that a firm's focus on production capacity and cost reduction can only generate a temporary competitive advantage. In this scenario, Knowledge management (KM) has already been recognized as a key managerial process necessary for achieving competitive advantage (Carayannis, 1999; Argote and Ingram, 2000; Dias and Bresciani, 2006). Specifically, it assumes that tangible resources are sources of competitive advantages only when they are applied with certain knowledge (Grant, 1996), consequent to the difficulty of imitating knowledge (literature (Nonaka, 1994; Spender, 1994; Nonaka and Takeuchi, 1995; Alavi and Leidner, 2001; Soto-Acosta and Merono-Cerdan, 2008; Bresciani, 2010).

Despite of this, innovation is becoming increasingly complex and expensive making difficult for individual businesses to develop and introduce new products and processes independently. Innovation has become an unavoidable interplay of various parties who combine their knowledge and turn problems into design requirements. This is the reason why the concept of open innovation introduced by Chesborough (2003) has thus become a key concept. This term characterises the shift to a system in which chain partners, knowledge institutions, governmental bodies and even competitors work together to develop new products and processes quickly and effectively.

In order to assess these challanges, this study would analyze agri-food business typically described as a relatively mature and slow-growing area of business. Small agri-food business displays a relatively low level of R&D investment and are quite conservative in the type of innovations they introduce to the market(Costa & Jongen, 2006). Moreover they shows much lower innovation-absorption capabilities than their larger counterparts and a lack of effective technology transfer and flexible IP-

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management rules (OECD, 2015; FAO,2015). Due to the lower innovation-absorption capabilities and to the limited resources for in-house R&D, agri-food business must maintain a broad network of partners to provide them with scientific and technological input (Knudsen, 2007). In the current dynamic environment, firms increasingly have to heighten internal Knowledge Management Capacity (KMC) in order to manage inward and outward flows of knowledge exploiting and exploring external opportunities (Santoro, Vrontis, Thrassou, Dezi,2017).

IT applications could allow firms in conveying relevant information useful to reconfigure innovative mechanisms (Del Giudice and Della Peruta, 2016). In particular, Web 2.0 technologies are empowering firms to outsource their internal business tasks and activities to individuals, or the crowd, on the Internet who are capable of completing these business tasks. The crowd can also invest in business ideas and projects that are initiated by entrepreneurs in the crowd who do not have the traditional monetary resources, such as banks and investment agencies, to implement their ideas. These entrepreneurs can pledge for financial resources from the crowd in various open social communities. This emerging approach of raising money via the Internet is called crowdfunding. Massolution reported that the volume of crowdfunding grew 81% from 2011 and reached $2.7 billion in 2012. In addition, the reward-based type of crowdfunding [3,4] was expected to reach $1.4 billion in 2013.

As a result, we propose that open innovation is directly associated with innovation capacity, and that crowdfunding positively affects the relationship between open innovation and Innovative capacity.

The paper is structured as follows. First, we review extant literature on the application of the open innovation and Knowledge management concepts in the food industry. Next, we analyze the impact of the crowdfunding on open innovation. Finally, we summarise the conclusions of our analysis, draw implications for the future of open innovation in the food sector and highlight areas where more empirical research is needed

THEORETICAL BACKGROUND AND HYPOTHESES

Open innovation in the agri-food business

Recent important changes in the nature of both food demand and supply, coupled with an ever-increasing level of competitiveness, have rendered innovation not only an unavoidable corporate activity, but also one that is increasingly vital for overall agribusiness profitability.

Recent general advances in areas like biotechnology, nanotechnology and preservation technology offer an unprecedented number of opportunities for

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added-value applications in the food industry, many of which have the potential to adequately meet modern consumer demand (Juriaanse, 2006).

Such perceived wariness, together with the necessary stringency of legal requirements related to safety, transforms food product and process innovation in a highly complex, time-consuming and risky endeavour, and hence one not to be lightly undertaken.

Many of the emerging technologies that can potentially sustain (or complement) a wave of successful new food applications (e.g. nanotechnology) are being developed outside the processing industry. The pressure on these organizations forces them to continuously adapt to the environmental shifts (Greenwood & Hinings,1996) and to create organizational forms able to provide faster and innovative response to market threats and opportunities (Coleman, 2009).

On another hand, drivers of opening up infood industry are closely related to the growing number of chain actors, the contradictory requirements of chain actors, the heterogeneous needs/new trends in consumers' demand, the Mass customization market and to the Legislators (Sarkar, Costa, 2008; Bilgliardi, Galati, 2013).

The market issues and the number of actors of different sectors involved in food production, together with their difficulty to single-handedly meet all the heterogeneous requirements of intermediate customers, end-users and legislators, determine that innovation activities must be carefully coordinated. This in turn compels innovation processes to be managed both within and across organizational boundaries along the value chain (Costa & Jongen, 2006; Grunert et al., 2005; Mikkelsen et al., 2005).

Cooperating with others on the development and commercialization of new products and technologies is an important way to innovate. This is one of the several ways to start 'open innovation' (Chesbrough et al., 2OO6). Open innovation can be defined as the combination of internal and external paths for both the development and commercialization of new technologies and products (Chesbrough et al., 2OO6). Open innovation (OI) could involve outside-in and inside-out flows of technologies and ideas (defined as 'technology acquisition' and 'technology exploitation') (Lichtenthaler, 2008).

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The establishment and management of inter-organizational relationships with customers, competitors, suppliers, public and private research institutions or even seemingly unrelated businesses, with the aim of acquiring additional knowledge and skills for innovation processes are increasingly growing (Gatignon, Tushman, Sith, & Anderson, 2002; Hauser, Tellis, & Griffin, 2006; OECD & Eurostat, 2005). Amongst the highest profile adopters of OI is Procter & Gamble (P&G), with former CEO, AG Lafley, inspiring a culture change from "not invented here" to "proudly invented elsewhere". P&G's Connect & Develop (C&D) programme has been highly successful, producing more than 35% of the company's innovations, including Pringle Prints, and billions of dollars of revenue.

Another example of the application of OI in the food sector is International Flavors and Fragrances. IFF taps into the creative potential of its customers when conceptualising and designing products. Using an internet toolkit with a large database of flavours, the company involves the customer when creating a new flavour. Co-creation allows it to increase its ability to meet individual customer expectations and to reduce time-to-market.

Despite of this, Open innovation (OI) approach works well for the high-tech industry but it doesn't well perform for the low-tech industries. Moreover, given the high number of actors of different areas involved in italian food supply as well as their difficulties to single-handedly meet all the heterogeneous requirements of intermediate customers, end-users and legislators (Costa & Jongen, 2006; Grunert et al., 2005; Mikkelsen, Kristensen, & Nielsen, 2005), cross-boundary innovation management should thus be a widespread practice in food value chains and networks.

Consequently, the goal of this study is to analyze open innovation capabilities in small and medium agri-food business, focusing on the role of readiness to collaborate, partner intensity (Ahn et al., 2016) and openess variety capabilities (Laursen and Salter, 2006; Aloini et al., 2015).

As Mortara (2007) argued, agri-food sector recognises the potential power of OI: the 'outperformers'in the food industry use external sources of innovation. From this pespective, OI could improve successful approach to achieving sustained high growth and containing innovation costs.

By cooperating in networks, firms have better access to new knowledge enhancing the innovative potential of an organization. Moreover, by cooperating with different partners along the value chain, firms are able to cover a larger part of the value chain. This can lead to increased added value for customers by offering a total solution. At the same time, by combining (financial) resources in which cost and risk reduction play a crucial role, new knowledge can be developed which was impossible for each member to obtain alone. Open innovation will lead to added value for participating firms (De Rochemont et al, 2OO7).

The next section will explore the role of knowledge management as a key to open innovation.

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Knowledge management: key to open innovation

The trend towards open innovation requests an integrative perspective and calls into question traditional perspectives on firm boundaries (Chesbrough, 2006; Santos and Eisenhardt, 2005; West, 2008) considering knowledge exploration, retention, and exploitation inside and outside organizational boundaries. These dynamics describe 'knowledge capacities' as a firm's capabilities of managing different knowledge processes.

Quantitative empirical studies on external knowledge sourcing provide evidence that involving a large number of external sources of knowledge in innovation is a promising choice for large firms (Lakhani et al. 2006; Laursen and Salter 2006). Open innovation scholars also agree that external sourcing of knowledge does not replace in-house R&D and highlight the importance of "absorptive capacity," which allows firms to identify, absorb, and make use of external knowledge (Cohen and Levinthal 1990; Dahlander and Gann 2010).

According to the Community Innovation Surveys (OECD, 2016) conducted on more than 1300 european innovative food firms, since most food firms don't have the competencies nor the capital needed to innovate on their own, they need to find partners to join forces in open innovation collaborations. However, Small and Medium Sized Enterprises (SMEs) in the food sector often face difficulties in establishing a strategic and efficient network.

Agri-food companies are as innovative as companies in other industrial sectors, but the innovations developed are largely incremental (about 2/3 of innovations). Between 2006 and 2008, 44% of companies implemented a product or process innovation. If we broaden the measure of innovation to take account of intangible innovation (organisation, marketing), 61% of agro-food companies report that they innovated between 2006 and 2008 (Lesieur, 2011). Organisational innovations are, incidentally, the most used category of innovation because 36% of agro-food companies implement them, regardless of size. The proportion of companies who innovate decreases for the other kinds of innovation (32% for marketing or process, 28% for products).

Following these evolutionary analyses, a large number of works have been concerned with the role of the diverse relationships and cooperation developed by firms with other stakeholders to "absorb" (Cohen, Levinthal, 1989; 1990) external knowledge. The idea of these authors is that the capacity of a firm to exploit external knowledge is a critical determinant of its capacity for innovation: a firm will be more or less able to exploit the technological opportunities of its environment depending on its knowledge-base and the learning process that occurs within this.

The survival of a brand in this kind of market depends on its capacity to distinguish itself from its competitors, this capacity being reflected in particular in a strategy of innovation in products and processes (Martin et al., 2006 a). In particular, companies with fewer than 50 employees, and

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particularly those with fewer than 20 employees, favour changes in their organisation and marketing innovations slightly more than technological innovations. With few resources to develop innovations (R&D staff but more generally human and financial resources), these SMEs innovate in an incremental way by continuously improving their organisation, their products and processes.

To capture internal and external knowledge exploration, retention, and exploitation, six knowledge capacities are needed (Argote et al., 2003; Lane et al., 2006): inventive, absorptive, transformative, connective, innovative, and desorptive capacity.

	Knowledge exploration	Knowledge retention	Knowledge exploitation
Internal (Intrafirm)	Inventive capacity	Transformative capacity	Innovative capacity
External (Interfirm)	Absorptive capacity	Connective capacity	Desorptive capacity

Fig. n 1 Capability-based view of open innovation processes (Chesbrough, 2003, Argote et al., 2003; Zollo and Winter, 2002)

When adopting an open innovation approach, firms tend to build up collaborations with actors of their ecosystem, which generate vibrant inward and outward flows of knowledge (Chesbrough, 2006). The role of absorptive capacity in agri-food business is critical to compensate for lower internal research capabilities (Carpenter et al., 2003; Dyer et al., 2004; Huston and Sakkab, 2006).

While inventive capacity refers to internally exploring new knowledge, absorptive capacity relates to exploring external knowledge. Based on Cohen and Levinthal's (1990) original definition of recognizing, assimilating, and applying external knowledge, Zahra and George (2002) differentiated between potential and realized absorptive capacity. In a similar vein, Lane et al. (2006) distinguished exploratory, transformative, and exploitative learning processes. Following these reconceptualizations, absorptive capacity in the knowledge management capacity framework focuses on knowledge acquisition, i.e. potential absorptive capacity (Zahra and George, 2002) and exploratory learning (Lane et al., 2006). Because of this focus on knowledge exploration processes (Lichtenthaler, 2009), it does not guarantee successful knowledge commercialization, which is part of the knowledge exploitation processes. External knowledge sourcing may span various kinds of external innovation partners, who relate to different knowledge flows and can provide access to widely differing knowledge domains such as science, technology, design, societal trends, customer insights and product-market trends (von Hippel 1988; Sidhu, Volberda, and Commandeur 2004)

On another hand, due to the lower innovation-absorption capabilities and to the limited resources for in-house R&D, agri-food business must also maintain a broad network of partners to provide them

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with scientific and technological input (Knudsen, 2007) Interorganizational relationships, e.g. alliances, may be considered as a firm's external knowledge retention (Grant and Baden-Fuller, 2004; Gulati, 1999). Similar to internal knowledge retention, external networks have to be maintained and managed over time (Kale and Singh, 2007). From this perspective, connective capacity refers to a firm's ability to retain knowledge in interfirm relationships, it comprises elements of alliance capability (Kale and Singh, 2007) and relational capability (Lorenzoni and Lipparini, 1999).

Connectivity capacity is closeley related to absorpite capacity. As a matter of fact, the more knowledge a company has in a particular field, the easier it is to manage interfirm relationships and to profit from external knowledge retention. Accordingly, connective capacity comprises the process stages of maintaining knowledge in interorganizational relationships and subsequently reactivating this knowledge (Garud and Nayyar, 1994; Grant and Baden-Fuller, 2004).

To be effective, agri-food business need to improve also Innovative capacity transmuting knowledge and converting this knowledge into new products or services (Khilji et al., 2006). In order to generate innovations from internal or external knowledge and improve commercialization opportunities, a company needs sufficient prior knowledge (Kogut and Zander, 1992; Smith et al., 2005).

Despite of this, it should not be overlooked that Italy is mainly composed by SMEs and, under a family control (Maggioni & Del Giudice, 2012). For this reason, we do not have to be satisfied with some best practices, but we must act in a systematic way in Italy. Moreover, it is necessary to trigger a virtuous circle that increases the awareness of the importance, rather of the need, of investing massively on digital innovation at all levels. Because digitalism is a transversal gap, a decisive step in this direction can only begin to argue in the light of the ecosystem for firms, universities and institutions and civil society to join forces and travel united (Carayannis & Campbell, 2012).

Even if SMEs have increased their activity in open innovation, inbound open innovation is far more diffused than outbound open innovation (van de Vrande et al. 2009). Moreover, due to the the resource constraints and the role of informal interorganizational relationships in innovation, SMEs prefer nonmonetary activities such as networking and informal knowledge sourcing over pecuniary and complex transaction-based ones, such as acquisitions and in-licensing.

All these factors could negative affect desorptive capacity as well as the ability to externally exploit knowledge.

Open innovation proposed by knowledge management literature suggested that firms can and should use external as well as internal ideas, and internal and external paths to market, as they look to advance their technology (Chesbrough, 2004; p. 1). Thus, new innovation models entlais new forms of interactions and collaborations for fostering new products and processes development (Wang et al.,

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2015; Chebbi et al., 2015) and within varying contexts (Bresciani et al., 2013; Ferraris and Santoro, 2014).

Exploiting internal and external knowledge flows, and developing digital ecosystems through new ICTs, could be essential in bearing the acquisition and management of knowledge (Del Giudice and Straub, 2011).

Crowdfunding could represent a novel mechanism of fundraising to cope the resource constraints as well to improvemformal interorganizational relationships. According to some scholars, crowdfunding is based on digital platform embedded in the current financial innovation (Moenninghoff & Wieandt, 2013), which operates in order to produce convergent innovation (Dubé et al., 2014). It means innovation that produces both economic and social (human) outcomes.

As also Loren (2011) suggested, open innovation can be implemented using crowdsourcing, or the issuance of a challenge to a group of experts and non experts found outside the organization, using an Internet-based platform. More thoroughly, Chesbrough and Appleyard identify four challenges for effectively managing open innovation processes:

- attracting participation from a broad group and sustaining it over time;
- effectively competing for contributors in a world with a limited supply;
- effectively setting the tone and expectations for the meaning of involvement on the part of users through careful leadership and agenda formation; and
- finding ways to profit from activities carried out in an open environment. (Chesbrough and Appleyard, 2007).

In the next section we will analyze the role Crowdfunding in open innovation.

Crowdfunding for open innovation: hypotheses development

The concept of "crowdfunding" is related to the one of "crowdsourcing", which refers to the outsourcing to the "crowd" of specific tasks, such as the development, evaluation or sale of a product, by way of an open call over the internet (Howe, 2008). The type of contributions by the investor – and related rewards - may vary, depending on the internet platforms, the type of firms and the projects. Indeed, as new platforms are created across countries, in a context of low regulation, new features and business models are continuously emerging. The types of funding may range from donations to equity, thus giving rise to processes with different degrees of complexity and different contractual relationships between the firm and the individual investor (Kleeman et al. 2008).

Crowdfunding has been proved as useful tool to connect entrepreneurs, researcher and potential funders, individuals who can supply financial capital (Wheat et al., 2013; Marlett, 2015). This is

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possible thanks to intermediation internet based platforms, which act as marketplace where is possible to collect and canalize the scattered unlocked private capitals to sustain business ideas, also decreasing the weight of geographical proximity in the innovation process (Agrawal et al., 2011).

Despite the advantages, adopting open innovation throughout crowdfunding platforms is a challenging process (De Jong, 2007 and Chesbrough et al., 2006). Collaborating with a number of partners is more complex because of increased coordination and control efforts (Doz and Hamel, l998 and Das and Teng, 2002). Previous research has demonstrated that many firms do not feel comfortable in these 'open' scenarios in which the return especially depends on the partnering actors. Networks of innovating partners bring with them significant strategic and organizational challenges, about which there is little prior knowledge (Vanhaverbeke and Cloodt, 2006). Moreover, prior research shows that the failure rate of bilateral alliances is quite high, ranging from 50-75% (De Rochemont et al., 2007). Cooperating in groups with an increased number of participants raises the likelihood of conflicting interests, and consequently, could lead to a breakdown of the cooperation (Park and Russo, l996).

For the above reasons we can hypothesized what follows:

Hp. 1: The greater Knowledge exploitation through ICT, the Higher level of Open Innovation

Hp. 2: The higher level of Open Innovation, the higher the effects of Knowledge exploitation through ICT on Open Innovation

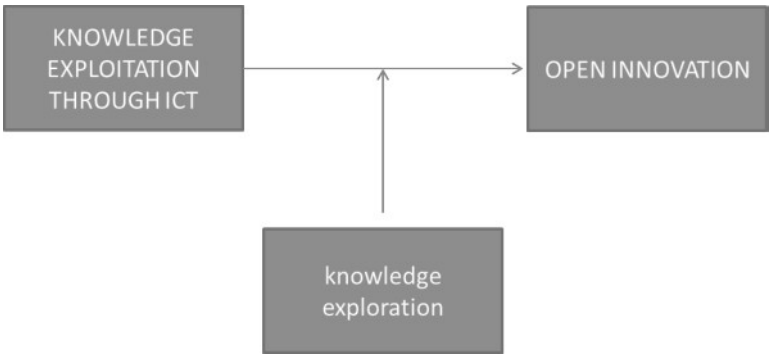

Fig 2 Conceptual Model

METHODOLOGY

Research sample and design

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The research involves data gathered from European agri-food business involved in crowdfunding campaigns on Kickstarter and Indiegogo platforms. An email with invitation to participate in the survey along with a letter containing an explanation of the study's purpose was sent to all the firms. In total 192 firms have expressed the interest in entering the study. A questionnaire, composed of several questions (open and closed), was sent to these firms, which was answered and returned by 80 firms, which represents the final sample. The answers for all the variables and general information of the firm were gathered from the different key managers to avoid concerns regarding common method bias. Therefore, the research is based on a survey methodology, which is useful to enhance the generalization of results (Dooley, 2001).

The paper builds on the theoretical framework and the consequent conceptual model to conduct the empirical research, which follows two main steps. First, the literature review led us to develop the questionnaire and therefore the variables of our model. Second, we have tested the model and the hypotheses through regression model, which was considered a suitable method in innovation management studies. The questions were stated according to a funnelling technique. Therefore, general questions were followed to the specific one. In this way, we have collected general information about the time successful gain of the Crowdfunding campaign goals, strategies firm such as number of employees, industry, financial data, etc. Consequently, specific questions were outlined and focused mainly open innovation, knowledge exploration and knowledge expoitation. The single questions of the questionnaire have been separated in order to reduce the risk of rationalizing the answers of the respondents. Moreover, we placed dependent and independent variables in different position within the questionnaire to limit potential common method variance.

Variables employed

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Data acquired from the questionnaire were used to develop the variables of the quantitative study. Accordingly, variables were developed using multi-item scales according to relevant literature to ensure their validity. In particular, we asked to respondent to evaluate several statements with a seven-points likert scale.

With regard to knowledge exploration as dependent variable, it measures the ability of a firm of developing new products or services, creating dialogues, learning and communities of practices, and explore knowledge externally (Edvardsson, 2008; Parida et al., 2012). To assess knowledge exploration we asked to the respondent to indicate the importance of: a) exploring external knowledge; b) developing innovative ideas and knowledge regarding products and processes; c) exploring innovative ideas and knowledge externally (Lichetnthaler and Lichtenthaler, 2009).

With regard to Open Innovation we focused on the combination of internal and external dimension (Chesbrough et al., 2OO6). In this regards, we asked to indicate the level of: a) Partner Intensity (Laursen and Salter, 2006; Aloini et al., 2015); b) Openness variety (Laursen and Salter, 2006; Aloini et al., 2015); c) Interaction with Experts on Intellectual Property Rights (IPR) (Bessant and Rush 1995; Hurmelinna-Laukkanen, Kyläheiko, and Jauhiainen 2007).

Finally, we employed the variable ICT knowledge exploitation according to the literature which emphasises its role for knowledge storage and sharing (Merono-Cerdan et al., 2007). In detail, we asked to evaluate the usage of collaborative technologies for knowledge sharing and the ICT adoption.

Table 1. Variables and items

Dimension	Items	Related literature
Open innovation	Partner Intensity	Laursen and Salter, 2006; Aloini et al., 2015
	Openness variety	Laursen and Salter, 2006; Aloini et al., 2015
	Interaction with Experts on Intellectual Property Rights (IPR)	Bessant and Rush 1995; Hurmelinna-Laukkanen, Kyläheiko, and Jauhiainen 2007
	Readiness to collaborate	Ahn et al., 2016
Knowledge exploration	Absorptive capacity	Lichetnthaler and Lichtenthaler, 2009
	Inventive capacity	Lichetnthaler and Lichtenthaler, 2009
Knowledge	Converting knowledge into new products or	(Khilji et al., 2006).

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Expoitation through ICT	services	

Finally, we assessed internal consistency of each independent variable (*Cronbach's alpha Open innovation=0.841; Cronbach's alpha knowledge exploitation ICT =0.898; Cronbach's alpha Knowledge exploration=0.937*), which shows good results.

Finally, we controlled for several variables that can influence the other variables and the analyses. We controlled for the size of the firm (calculated as the number of employees of the firm) because it can be considered as a measure of greater capabilities (Dewar and Dutton, 1986). Second, the age of the firm (calculated as the number of years since founding) can detect the experience of the firm accumulated through the years (Huergo and Jaumandreu 2004). The log term of these two variables has been processed in the models.

DISCUSSION AND CONCLUSION

Descriptive statistics show that most of the firms of the sample are small (the average number of employees is 98.90), spend internal R&D 10% in average and they are rather innovative in terms of (1) knowledge exploration (5.369), (2) knowledge retention (5.10) and (3) knowledge exploitation through ICT (5.108). This positively affect (4) open innovation performance in terms of partner intensity, openess variety e Interaction with expert on Intellectual Property Rights (5.25). Then, they have (5) a good performance in terms of time to successful gain crowdfunding campaign goals (65%).

Table 2. Descriptive statistics

	N	Min	Max	Mean	Standard dev.
Size	80	2	172	98.90	252.502
Age	80	3	95	25.61	24.117
R&D	80	0.00	0.480	0.100	0.126
Open innovation	80	2.50	7	5.255	1.270
ICT knowledge exploitation	80	2	7	5.108	1.173
Knowledge exploration	80	2.33	7	5.369	1.027

We tested the hypotheses using regression analysis and the results are presented in table 3. We developed three models that test the direct effect of knowledge exploitation through ICT on open innovation and the moderating effect of knowledge exploration.

In detail, in model 1 just the control variables are entered, which effect is non-significant. In model 2 the effect of ICT knowledge exploitation and Open Innovation are considered. Knowledge explotation

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through ICT is positively and significantly associated with Open Innovation (0.180; p<0.05). Model 3 considers the moderating effect of knowledge exploration on the relationship between ICT knowledge exploitation and Open Innovation, which is positive and significant (0.623; p<0.001). Finally, we can conclude that HP 1 and HP 2 are both confirmed by our analyses.

Table 3. Results of regressions

Variable	OPEN INNOVATION Model 1	OPEN INNOVATION Model 2	OPEN INNOVATION Model 3
logSize	-0.130 (-1.315)	-0.077 (-1.216)	-0.072 (-1.166)
logAge	-0.037 (-0.370)	0.000 (-0.005)	0.008 (0.132)
R&D	0.179 (1.958)	0.069 (1.170)	0.044 (0.768)
KNOWLEDGE EXPOITATION THROUGH ICT (KEI)		0.180 (2.877)*	0.396 (5.904)***
KNOWLEDGE EXPLORATION (KE)		0.340 (5.459)***	0.493 (6.285) ***
KEI*KE			0.623 (7.325)***
R^2	0.051	0.620	0.647
Adjusted R^2	0.027	0.603	0.629
F-value	2.125	37.785***	35.120***

Notes: *p<0.05; **p<0.01; ***p<0.001

The first conclusion to be drawn from our review and analysis is that the time to successful gain Crowdfunding goals is positively related to Open Innovation.

Knowledge Expoitation through ICT measured through the capability of Converting knowledge into new products or services. From this perspective, Crowdfunding could help agri-food business to improve Innovative capacity transmuting knowledge and converting this knowledge into new products or services (Khilji et al., 2006).

Moreover, results show that open innovation takes place within the food sector, in spite of this being known as a relatively more traditional and mature industry. In particular our sample shows a good performance in openness variety (considering the number of external sources involved in the innovation process) and partner intensity (assessing the depth of the relationship between the focal firm and the extern context). At the same time, sample shows a moderate level in Interaction with expert on Intellectual Property Rights. In order to improve successful knowledge commercialization, Interaction with Experts on Intellectual Property Rights (IPR) is fundamental. To access technological knowledge, SMEs may rely on intermediate service providers. Experts on IPR can provide crucial information services that help to bridge the gap between a technological opportunity and its successful commercialization (Bessant and Rush 1995). However, the involvement of IPR experts is costly and also requires SMEs to deal with complex regulations and drawn-out patent protection

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procedures. Thus, it may make it more difficult to quickly move an idea to the commercialization stage (Hurmelinna-Laukkanen, Kyläheiko, and Jauhiainen 2007). Interaction with Network Partners could adress this challange creating longterm relationships with network partners as well as joint value rather than efficient transactions. (Nooteboom et al. 2005).

The second conclusion to be drawn from our review and analysis is that Active investments by the crowd improve access to new knowledge. Entrepreneurs offer investors to become active in the initiative, next to offering rewards to them. This may provide valuable feedback to the entrepreneur on potential market demand and product characteristics that the market may prefer most. Also, the active involvement may be structured in forms discussed above under the concept of crowdsourcing. Making investors become active by giving making investors become active by giving.

We also found evidence of a good effect of the ICT knowledge exploitation on the relationship between open innovation practices and knowledge exploitation. It reflects the Innovative capacity of business and the related capability to applicate knowledge that has been explored and retained inside or outside the firm (Khilji et al., 2006; Lane et al., 2006). Therefore, we could assess that Crowdfunding positively affect innovative capacity as a firm's ability to internally exploit knowledge. Crowdfunding seems a successful approach to achieving sustained high growth and containing innovation costs. Combining financial resources in which cost and risk reduction play a crucial role, new knowledge can be developed which was impossible for each member to obtain alone. By cooperating in networks, firms have better access to new knowledge enhancing the innovative potential of an organization. By cooperating with different partners along the value chain, firms are also able to cover a larger part of the value chain. This can lead to increased added value for customers by offering a total solution

Our analysis of crowdfunding practices provides avenues for future research. One urgent question is the relation with intellectual property rights. Entrepreneurs making use of crowdfunding will need to disclose some of their ideas to the crowd well in advance, creating risks of idea stealing due to the fact that potentially valuable information is put into the public domain. In the next reserch we will also anlyze which kind of business models of crowdfunded ventures and crowdfunding platforms perform better in terms Access to new knowledge by cooperating in networks. To this aim we will use classification proposed by Lambert and Schwienbacher.

Moreover, open innovation strategies come in a variety of forms and, as such, are also met with a wide variety of outcomes. Consequently, there is a clear need for a better understanding of open innovation in the food sector, which should be addressed by the performance of more and more focused case-studies and empirical research.

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Another interesting question concerns the informational content for entrepreneurs for obtaining the crowd committing capital. To which extent this affect the precision about potential demand that the entrepreneurs may receive for his product as well as which remuneration scheme for the crowd generates the most information about potential demand.

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