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"What Do we Know about Entering Innovation Network by SMEs ?"

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Abstract

The importance of networking as a way to enhance innovation has been pointed out in many scientific papers, in particular for SMEs. A great number of scientific studies clearly establish the significant role of SMEs in economic growth, promoting flexibility and innovation in an economy. The process of successfully engage in a network represents a key for enhancing competitiveness. In order to improve effectiveness of network is pivotal the achievement of a better understanding of SME behavior.

The presented work aims to identify factors that characterize food SMEs entering in innovation networks by integrating findings from the literature review with a survey of food SMEs.

Keywords: *Network, food SMEs, innovation*

1 Introduction

Innovation is considered as a way to survive among growing competition (McGrath et al. 1996). The prompt to innovation can emerge from explicit market requirements or as a result of research and development activities undertaken inside enterprise. In industrialized economy where needs are in large part already met the latter approach represents a strategic opportunity to create new future market (Lambin, 2008). As stated by Tuomi (2002), innovation is not just a process of creating ideas but also the results of complex socila ineteraction, communication, knowladge exchange. Conventionally theories report innovation as an individually generated process (Weick, 1990). Nowadays instead there is a common belief that innovation happens in a highly interactive, iterative environment (Cooke, 1998; Gulati, 2007; Lundvall 1992; Weick, 1990). According to Konsti-Laasko et al. (2012) the generation of innovation within enterprise involves two elements: resources and capability in entering network. In fact, development of innovation implies the R&D support from outside (Tidd and Bessant, 2007) and the collaboration with other organizations (Jorgensen and Ulhoi, 2010). It is hence recognised the important role of network in fostering innovation and the essential participation of SME to network (Konsti-Laasko et al., 2012). The industry in Europe is charaterized by SMEs. It is estimated that in Europe the 77% of companies are ranked in the SMEs (Baardeseth, Dalen &Tandberg, 1999). In partiuclar SMEs are tipacally diffuse in the food sector in which they represent the 99.1 percent of the companies and employ 63 percent of the workforce (Schiemann, 2008). Hence, the strategic importance of SMEs for theeuropean economy is well understood. Despite this, food SMEs often lack of necessary financial, human and technological resources to innvoate succesfully in particolar considering the rapid changes that food sector has been facing (Batterink et al., 2010). Partnership is considered to be a way to enhance SMEs competitiveness in the food chains (Fearne, 1996; Wierenga, 1996; Fearne et al. 1998) Scientific studies steted not only that innovation performs more in firms embandness in network than isolated ones (Ahuja, 2000; Baptista, 2000; Baptista and Swan, 1998; Brass et al., 2004; Podolny and Stuart, 1995; Powell et al., 1996) but also that exists a positive

relationships between growth, innovation, and the use of external relationships of various type. (Carroll and Hannan 2000). Hence networking represents a possible solution which allows SMEs to overcome their constains and promoting innovation. However, literature also suggests that SMEs joining network in order to access to complementary resources and competences, are also vulnerable to risks and costs higher than those for big companies.

Literature provides a wide range of studies that investigate the establishment, evolution, maintenance, constrains and benefits of network and success factors of network, but shrinking on SMEs networking for innovation purposes academic literature provides limited input, in particular on factors contributing to network innovation (Thoegren et al., 2009). Thorgren et al. (2009) reported an extensive literature review on SME network providing 45 articles regarding SMEs strategic network but none of them is specifically target on innovation in network. As stressed out by Thoregren, Wincent & Örtqvist (2009) there are limited studies regarding successful factors for networking and some insight into network establishment (Ahlström-Söderling, 2003; Thorgren et.al, 2009).

Finally, since scientific literature commonly agrees in considering networking essential for SMEs competitiveness it is important to foster networking among these kind of enterprises. On this purpose the comprehension of factors determining the SMEs participation in network represents an essential driver for the designing process of successful network.

The presented work seeks to identify factors characterizing SMEs entering innovation networks by integrating outcomes of a literature review with a survey of food SMEs.

Information on SMEs is provided by 30 Italian enterprises operating in the food sector. Such information represents an initial insight of data obtained from a web survey undertaken for the ongoing project NetGrow.

2 Methods

Data collection of Italian food SMEs was accomplished by standardized questionnaires designed to be compiled on line. The questionnaire is developed as part of a larger ongoing European project, NetGrow, which states as a general aim the innovation enhancement of food SMEs through the management of strategic network behavior.

The questionnaire is mainly composed of two sections one investigating on determinants and strategic behaviour of SMEs in networking and the other analyses preferences expressed by SMEs for some network types. In the first section, regarding determinants, respondents were ask to provide information on their organization in relation to the following factors: firm primary's geographical market, firm size, profit and employees trend in the last two years, firm's innovation strategy, innovation (in terms of products process, markets and model business generated in the last two years) and participation to some network. Available data collected until now allows carrying out examination on results regarding the first section of the questionnaires and the paper presents an initial descriptive analysis derived from this preliminary processing of data.

The questionnaire is developed to be compiled anonymously by SME Managers. The invitation is sent through electronic mails containing the web-survey link for the access.

The SME population was extracted from AIDA (Analisi Informatizzata delle Aziende), which represents a wide database containing comprehensive information on companies in Italy such as company name, financials, corporate structures, street address and others. Since e-mail contacts, representing an essential element in order to deliver the web-survey, were not provided in dataset

from AIDA a considerable effort has to be made for their recognition on internet. Upon a total number of 19600 SMEs extracted from AIDA, 1600 SMEs e-mail contacts were collected. To these SMEs the invitation to participate to the web-survey was sent starting from 15th of October. In the time range of one month, 30 web-surveys were fully completed and based on this sample some elaborations are attempted as follows.

Data were processed by recoding data into categories, where appropriate, to enable meaningful comparison of sub-groups. Two categories were defined for the analysis: member and non-member of organization. The category non-member of organization includes SMEs declaring not to belong to any network or only to the Chamber of Commerce, because this is a mandatory requirement in order to start a business activity in Italy (Table 2.) Then simple cross-tabulations were used attempting to identify which factors have influence on Italian food SMEs entering innovation network. For this purpose a series of chi-square test were carried out to highlight possible associations between factor SMEs and SMEs decision to join the network. A cross-tabulation is produced in order to outline relation of networked SMEs producing innovation and profit variation (Table 5).

The presented data processing represents just an initial analysis aimed at providing a description of preliminary web-survey results that will be object of further analysis once the survey completion rate is reached.

3 Literature review

To answer the question which factors are related to food SMEs entering innovation network it was necessary to expand the boundary of the literature review, since there is a limited amount of academic papers on this specific topic. The categories of literature objective of the investigation are related to innovation in network, food SMEs and network and factors of SMEs entering network.

Findings show a large body of literature generally around innovation and network. Mostly these paper focus their attention on network dynamics leading to generation and diffusion of innovation (Giuliani and Bell, 2007; Gulati, 1998; Kogut, 2000; Iubatti et al. 2010; Konsti-Laakso, 2012), or extensively on SMEs barriers conveying innovation to the market (Grabher, 1993; McAdam et al., 2004). Concerning the second topic, few papers carry out studies investigating on food SMEs behaviour in network. Olsen et al. (2012) address their scientific work on the identification of driving factors for successful network of food SMEs and O'Reilly et al. (2003) presents a case study investigating the establishment and the evolution of the Parma Ham network. This later article briefly outlines some significant factors motivating the choice of joining the Parma Ham network. network innovation process.

Regarding factors identification of SMEs entering network, as stated by Thoregren et al. (2009), academic papers mostly focus their attention on those promoting innovation within network and successful network. A limited contribution is given to factors influencing creation and configuration of network (Ahlström- 2003; Henna e Faadeva, 2001).

Specific insights on factors associated to SMEs entering network are provided by Donckels and Lambrecht in 1997 and later in 2004, by MacGragor but not related to the food sector. MacGregor conducted a research work in Sweden based on the comparison of networked and non-networked SMEs, with the main purpose of analyzing the acquisition of e-commerce in SMEs. Besides this main topic, the paper reports a series of information related to SME factors in association with the decision of entering network. Based on this study five factors are identified as significantly associated with decision of networking: number of years in business, number of employees,

number of suppliers, market strategy and manager level of education. Instead, the analysis of factors such as business sector (industrial, service, retail, finance) geographical market focus and gender of CEO did not demonstrated any significant association in networking arrangement. From the analysis of literature some scholars such as Hite and Hesterley, (2001) consider the entrepreneur's social contact as an essential factor for networking. This aspect count especially at first stages of the network creation, because relationship engaged mostly depend on entrepreneur's social relation. Other authors suggest that the network formation process is supported by external facilitator entities such knowledge brokers (Howells, 2006; Burt, 2002; Harland and Knight 2001) that would allow SMEs network to expand their tied social network. On the role of chief executive office (CEO) in networking some inputs are provided by Donckels and Lambrecht (1997) that carried out a research study among small business enterprises in Belgium. They focused on firm elements having impact on network structures, and they identified the CEO's level of education and number of years in business as factors associated to the decision of entering network. CEOs with higher education level are more interested in networking then those with no academic qualification. Also MacGregor (2004) found association with CEO's level of education and the decision of entering network, but from his findings conversely, CEOs with none university qualification seek more for assistance in networking.

Regarding number of years in business, Donckels and Lambrecht (1997) report that young business operators (less than 10 years in operation) seek more to be involved in network than those operating from longer period. Results obtained by MacGragor (2004) outline a slight difference, they provide that firms ranged between 10 and 20 years in business tend to be part of formal network arrangement and those with more than 20 years usually remain outside the network. Firm size represents another factor that seems affect the network participation. According MacGregor (2004) and Smith et al. (2002) SMEs with less than 10 employees are more likely to seek for networking arrangement.

According to the author, the most significant factor remarked by the networked SMEs is the support in activities related to the brand development such as product differentiation, promotion and increasing of customer demand, market information, information flow and new market access. Related to the information flow, the aspect of accessing to regulatory information thanks to the consortium, is highlighted as an important factor that influence SMEs entering the network. It is also stressed out how motivations to join the network change over time. For example, by comparing early and later network participants, it can be observed how for the latter the market uncertainty assumes a pivotal role in the decision-process. However, none of these networks is specifically aimed to innovation. One more article produced by Colurcio et al. (2010) analyses food network with the purpose of highlighting the existence of asymmetric relationship in the food

To summarize, from a comprehensive literature review appears that no papers aim specifically to explore factors of food SMEs entering network for innovation purposes. Three closed topic were investigated reporting however limited knowledge on the topic. Consequently need for a scientific contribution on this direction is highlighted. In the following section, results from a preliminary data processing are reported in order to give a contribution on this issue.

4 Survey results

Data available from the web-survey allows drafting an initial pattern of factors determining SMEs participation in network for innovation.
On the 30 respondents, 25 declared they have been members of network in the last two years and 5 have been not participating to any network (see table 3.). Based on these responses, two categories were defined for the analysis: member and non-member of networks. The category non-member of any network includes also those that indicated only association with the Chamber of Commerce, because, as already mention, this type of contract is mandatory in order to start a business activity. Information such as number of years in business, firm's geographical market, firm size, trend in profit, trend in number of employees, innovation strategy, generated innovation available from the questionnaires are considered as factors to be tested. A series of chi-square test were performed to determine association between factors and the decision to network expressed by the category member/non-member. In Table 1 resulting p-values from the chi square test are reported. It can be observe that, probably due to the small sample size, no relations are significant and hence none of the above factors have direct influence on the decision of entering network. Also by comparing mean values of employee number in SMEs member and non-member, the performed T-test does no highlight any association between such factor and participation to network (see table 2.). However, based on information expressed by questionnaire respondents, the presented work attempt to provide some inputs in the description of an initial pattern for SMEs entering network.

Table 1. Relative frequency values of categories influencing SMEs entering network

Category		Network		p- value
		Member Relative Frequencies (%)	Non-member Relative Frequencies (%)	
Years in business	<10	8	20	0,451
	10-30	32	20	
	30-60	28	60	
	60-90	16	0	
	90 -120	0	0	
	120-160	16	0	
Firm's geographical market	Local/regional	7	20	0,3
	National	29	60	
	European	21	0	
	Global	43	20	
Firm size	Micro	28	60	0,301
	Small	56	20	
	Medium	16	20	
Trend of Employee	Decrease	12	0	0,517
	Unvaried	52	40	
	Increase	36	60	
Trend of Profit	Decrease	8	0	0,336
	Unvaried	24	0	
	Increase	68	100	
Innovation strategy	First to the market	36	20	0,787
	Seldom first but faster in following the market	16	20	
	Focus on our niche market	48	60	
Innovation (product, process, market, business model)	None	17	40	0,23
	1 or more	83	60	

The modal class of years in business is determined by calculating the relative frequency density. Results show that among SME participating in network the modal class of firm's year in business is ranked between 10-30 years. Firms ranked within 60-90 and 90-120 years show the same lowest density values. Instead, among SMEs non-member, two classes 30-60 and less than 10 years in business are equally qualified to be the modal class. Referring to non-member, lower frequency density values are calculated for the class 10-30 years in business and no firms are registered for the classes 60-90 and 120-160. The absence of firms in these two classes must not to be interpreted as a disinterest from aged firms in having network. Such results, in fact can be related to the small sample size of non-member category.

Based on relative frequency values calculated for firm's geographical market, shown in table 1, it can be stated that SMEs member of network are especially active in the global market and the lowest frequency is reported for local/regional market. Instead non-member enterprises are oriented toward national market.

The highest value of frequency for firm's size is reported for small enterprise types, hence according with the European classification with less than 50 employees. The modal class of non-member corresponds to micro enterprises i.e. with less than 10 employees.
For both member and non-member the trend in profit reports the increase of profit as the highest frequency class. Instead, frequencies related to trend of employees illustrate an unvaried trend for SMEs member of network and an increase for SME non-member.
As shown in table 1 relative frequencies calculated for the innovation strategy outline that both member and non-member of network adopt the strategy of focusing on a specific niche of market paying attention to industrial changes only if they have direct impact on their own activities.
To each respondent was asked the number of innovation generated in term of product, process, market and business model in the last two years by the enterprise. In Table 1 are reported results aggregated for type of innovation showing relative frequencies expressed in percentage, of network members producing innovation and non-producing innovation. Based on frequency class values the 83% of SMEs member of network generate innovation instead referring to SMEs non-member the value is 60%.

Table 2. Association between number of employees and SMEs member and non-member

Category	*Network*			
	Member mean value	*Non-member mean value*	*t- value*	*Sig. (2-tailed)*
Number of employees	37,28	25,8	0,56	0,578

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Table 3. Subdivision of member/non- member of network.

	Member	*Non-member*
Member of chamber of commerce	14	3
Member of industry association	24	0
Member of cluster	1	0
Member of technological park	2	0
Member of business park	1	0
Member of none of above	0	2

In Table 4 are shown organization types to whom the respondents tend to collaborate to gain resources with the purpose of innovating. It can be notice that, as highlight by academic literature, the technical knowledge is provided by collaboration with suppliers.

Table 4. Collaboration for resources.

Collaboration with the following organization for:	
Universities	Scientific Knowledge
Suppliers	Technical info & resources
Industry associations	Managerial and legal know-how
Clients	Market info &facilitation

The survey is specifically designed to investigate on SMEs entering network for innovation purposes. In tables 5 are reported relative frequencies of SMEs performing and non-performing

innovation in relation to the profit variation occurred in the last 2 years. It can be notice that there is a general statement of profit increase which is actually not in line with the economic trend of many Italian SMEs. This behaviors underling a possible bias in the sample probably because enterprises enhancing high performance can be more encouraged in taking the questionnaire.

Table 5. Trend of profit and innovation performance in SMEs.

Profit variation (within last 2 years)	***Innovation (product, process, market, business model)***			
	None	1 or more	(empty)	Total
Decrease	3,3%	3,3%	-	6,7%
Unvaried	3,3%	13,3%	3,3%	20,0%
Increase	13,3%	60,0%	-	73,3%
(empty)	-	-	-	-
Total	20,0%	76,7%	3,3%	100,0%

5 Discussion

Due to the limited amount, no significant relations are highlighted. However, available information from respondents participating in network allows providing an initial frame of factors characterizing SMEs member of network. Analysed SMEs operating in food sector and member of network are characterised by operating in business from 10-30 years, having less than 50 employees and focusing for innovation initiatives on their own niche market. Also, they seem to operate more on global market. This can be related to the agri-food sector which is characterized by international export market and raw material acquisition from abroad. Moreover, respondents highlight their preference in establishing relations with supplier with the purpose of having access to technical knowledge. This behaviour is reported by several authors (Keeble et al., 1999; Shindehutte and Morris, 2001; Donckels and Lambrecht, 1990; MacGregor, 2004) stating that relationship between suppliers and customer replace formal network with the aim of providing technical and marketing knowledge. It can be observed that there is a general statement of profit increase which is actually not in line with the economic trend of many Italian SMEs. This underling a possible bias in the sample probably because enterprises enhancing high performance can be more encouraged in taking the questionnaire.

6 Conclusions

This work seeks to elucidate the contribution of academic literature about factors SME entering innovation networks and highlights the insufficient knowledge about this topic. Particularly more than structural factors such as firm size, number of employees and similar, scientific contributions should focus in depth on the comprehension of factors related to market dynamic and strategies, institutional regulations and financial resources.

The presented paper also attempts to give an empirical contribution to this limited explored topic by providing a pattern description of survey preliminary results. Due to the small size of the sample collected so far significance level do not confirm any particular association however some initial inputs from SME respondents were derived.

The conclusion wants to stressed out the importance of SME factors comprehension, not only for their impact on the nature of the network but also for the conceptualization of proper network able to encourage firm's participation. In particular knowledge on factors influencing network

participation of SMEs can provide useful information into institutional environment for the development of policies aimed at supporting the networking process.
Additionally, it must be point out that results from such studies cannot be generalized and extended to outside SMEs nation, hence factors involved in other SMEs cultures need to be carefully investigated at country level.

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