Promoting entrepreneurship in the agri-food industry: Policy insights from a pan-European public–private consortium

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ABSTRACT

Despite the importance of entrepreneurship as an engine for socio-economic growth, few attempts have been made to study how and to what extent industry-specific policies can sustain it. In particular, to date, there is only anecdotal evidence on which factors policymakers can utilize to foster entrepreneurship within the agri-food sector. In this paper, we attempt to fill this gap by developing, testing, and validating a multi-item scale, identifying five factors (i.e., people, money, network, technology, infrastructure) and sixteen specific tools (i.e., items) to be leveraged in promoting entrepreneurship within the agri-food industry. We carry out our study in the context of *Foodbest*, a pan-European public–private consortium created in 2012 to support entrepreneurship and innovation in the agri-food sector. By testing for differences in perceptions of factors' and tools' effectiveness, we find variations according to respondents' organizational and country affiliation. We thus offer new insights into how public policy and public–private consortiums can proactively promote entrepreneurship in the agri-food domain.

Keywords: agri-food; entrepreneurship; public policy; public–private consortium; scale development; factor analysis.

JEL codes: O3; L26; Q16, Q18,

Key points

We cover three key points. First, by conducting a literature review and working with a focus group, we identify a set of theoretically grounded factors and tools that could help promote entrepreneurship in the agri-food industry. Second, we develop and test a multi-item scale of these factors within the context of a pan-European public–private consortium. Third, we show that perceptions of factor effectiveness vary among consortium participants according to participants' personal characteristics and organizational affiliations.

1. Introduction

Entrepreneurship is nowadays believed to drive several benefits, such as fostering innovation and productivity, competitiveness, and socio-economic development (Reynolds et al., 1994; Westhead and Wright, 1998; Acs, 2008; Caree and Thurik, 2008; Parker, 2009). However, our understanding of whether, how, and when policymakers should intervene to assist entrepreneurs, and of the outcomes of those interventions, is still controversial (Audretsch et al., 2007; Minniti, 2008; Robson et al., 2009; Román et al., 2013).

Policies directed at sustaining entrepreneurship are designed to address distortions and market failures in either the availability of capable and willing individuals and organizations to engage into entrepreneurship (i.e., the supply side of entrepreneurship) or in the availability of entrepreneurial opportunities (i.e., the demand side of entrepreneurship) (Audretsch et al., 2007). To do so, policymakers can mobilize specific policy tools into a handful of policy domains directed at the supply side (e.g., people, finance, and networks) and on the demand side (e.g., technologies and infrastructures). However, because, in the field of entrepreneurship policy, "one size does not fit all" (Santarelli and Vivarelli, 2007; Minniti, 2008), effective policies will need to be context-specific (Minniti, 2008).

The issue of effective policy support for entrepreneurship is very relevant in low-tech, mature sectors, which represent the majority of the world's economy (Santamaría et al., 2009). In particular, this is the case for the agri-food sector. In Europe, agri-food is the second largest manufacturing industry, accounting for 14.5% of total manufacturing turnover (€ 917 billion) and 14% of employment (over 4.8 million workers) (European Commission, 2015). However, several weaknesses hinder the profitability of the European agri-food industry, such as extreme fragmentation

(around 283,000 small and medium enterprises) (FoodDrink Europe, 2014); companies' low capitalization and marginal innovation, research and development; and ICT rates (European Commission, 2009). All of this contributes to some of the lowest labor productivity and smallest revenue rates across all industrial sectors (European Commission, 2009).

Indeed, developing entrepreneurship in the agri-food industry may be key for both public and private bodies. As for the former, via entrepreneurship, the public sector can ensure food security and safety for citizens, target young and marginalized people, and thereby generate employment opportunities and boost national socioeconomic development (e.g., Allen, 1999). As for the latter, developing entrepreneurship can transform global food challenges (e.g., health, safety, sustainability, animal welfare, ethics, cultural differences) into profitable opportunities to be exploited locally by the private sector's actors (Downey, 2006; Alsos et al., 2011).

To date, however, there is only anecdotal evidence on what factors are relevant and can be stimulated through ad-hoc policies to support entrepreneurship in the agri-food industry. Thus, the questions we aim to answer are: (i) *What policy factors are relevant for policymakers to sustain entrepreneurship in the agri-food sector?* (ii) *Which tools can be mobilized to target those specific policy factors? (iii) Are these factors perceived differently according to country and organizational affiliation?*

We approach these questions by implementing a research design based on a two-step approach. In the first step, we carry out an *ex-ante* evaluation of what policy factors and tools policymakers may value the most to sustain entrepreneurship in agri-food. We do this through a comprehensive literature review and a focus group conducted with experts in the sector. In the second step, we build, test, and validate a

multi-item scale, accounting for the factors and tools that policymakers can mobilize to support entrepreneurship in the agri-food sector (i.e., each single tool is operationalized via a specific item). We then test for differences among individuals, according to the country of affiliation and type of organizational affiliation.

We carry out our study in the context of Foodbest, a pan-European public-private consortium launched in 2012 to support entrepreneurship and innovation in the food sector. The consortium brings together agri-food corporations, entrepreneurs, universities, and public entities from twelve European countries.

Our results show that training programs (i.e., people), funding opportunities (i.e., money), networking initiatives (i.e., network), access to technologies (i.e., technology), and availability of infrastructural services (i.e., infrastructure) are the tools to be mobilized to foster entrepreneurship in the agri-food industry. Moreover, as a result of multiple-group analyses, we find that the effectiveness of network-, technology-, and infrastructure-related factors is more important for people employed in private, for-profit organizations rather than for those working for public bodies (who value more money-related factors). Finally, people from the EU-Mediterranean area perceive technology-related factors as being more important whereas individuals employed in northern EU countries perceive money-related aspects as key.

This paper contributes to the literature by identifying a set of factors and tools that policymakers should emphasize to foster entrepreneurial behaviors in the agri-food industry. Specifically, it presents a multi-item scale referring to the policy factors and tools relevant to stimulating entrepreneurship in agri-food. This scale could be employed in future studies by other researchers, being modified and extended to fit different settings when necessary. Our work highlights the importance of contextual specificities in influencing needed policymaking support mechanisms.

The remainder of the paper is structured as follows. We first overview the policy factors that policymakers can utilize to sustain entrepreneurship. In so doing, we draw on the general entrepreneurship literature but also emphasize the idiosyncrasies of the agri-food sector. We next describe the research design and present the empirical analyses. We then discuss our findings, emphasizing their relevance for entrepreneurship theory as well as for policy and practice, and we conclude by setting the stage for future research in this domain.

2. Conceptual development

2.1 The case for policies to support entrepreneurship

Entrepreneurship is about discovering, evaluating, and exploiting opportunities (Shane and Venkataraman, 2000). Both individuals and opportunities are key to this process (Shook et al., 2003; Grégoire and Shepherd, 2012); however, they may behave and operate differently according to the context in which entrepreneurship unfolds (Romanelli and Schoonhoven, 2001; Cuervo, 2005). The context is, in fact, crucial to shaping and supporting the entrepreneurial process because it can provide entrepreneurs with both tangible (e.g., physical infrastructures and assets, financial capital) and intangible (e.g., human capital, social capital, entrepreneurial spirit, etc.) resources (Bahrami and Evans, 1995; Niosi and Bas, 2001; Fini et al., 2009; Dahlqvist and Wiklund, 2012). Along these lines, context-specific policy interventions aimed at fostering entrepreneurship can, therefore, play pivotal roles (Goetz and Freshwater, 2001; Verheul et al., 2002; Bolzani et al., 2014).[1]

[1] It is important to underline that entrepreneurship policy is distinct from small business policy (Hart, 2003; Audretsch et al., 2007) because it is directed at targeting novel and dynamic business activities and not just activities in small companies (Hart, 2003), thus using a more pervasive range of institutions and tools (Audretsch et al., 2007).

As highlighted by the seminal work of Verheul et al. (2002) and Wennerkers et al. (2002), levels of entrepreneurship can be influenced by two sets of factors. First, by *supply-side* factors (also referred as push-factors, see Vivarelli, 1991), which, from a labor-market perspective (Audretsch et al., 2007), refer to the pool of individuals with capabilities and preferences to carry out entrepreneurial activities. Second, by *demand-side* factors (i.e., pull-factors, see Vivarelli, 1991), which, from a product-market perspective (Audretsch et al., 2007), refer to the availability of entrepreneurial opportunities. Both demand-side and supply-side factors are relevant in determining entrepreneurial endeavors and outcomes. The rationale for policy interventions to sustain entrepreneurship lies in the existence of distortions and market failures on both the supply and demand sides (Audretsch et al., 2007).

Policy interventions to sustain entrepreneurship can thus be targeted, on the one hand, to the *supply side*, focusing on entrepreneurs' resources, abilities, and preferences (Verheul et al., 2002). In this regard, policymakers can intervene with policies that increase entrepreneurial motivation (Lundström and Stevenson, 2006). They can also initiate input-related policies: for example, favoring access to tangible (e.g., labor, financial capital) and intangible (e.g., education, training, counseling) resources (Verheul et al., 2002) as well as the development of entrepreneurial skills (Lundström and Stevenson, 2006). In this specific regard, extant research emphasizes three key factors: namely, *people*'s human capital, *financial* capital availability, and access to *networks* (e.g., Wennekers et al., 2002; Audretsch et al., 2007; Minniti, 2008).

On the other hand, policy interventions can be focused on the *demand side*, targeting the number, type of, and access to entrepreneurial opportunities (Verheul et al., 2002). In this regard, interventions can support the exploitation of technological

and market opportunities, stimulating technological advancements and the discovery of latent market needs, respectively. Extant research, in fact, mostly highlights access to *technologies* and *infrastructural* availability as the two key demand-side factors (e.g., Wennekers et al., 2002; Audretsch et al., 2007).

Because we may expect that the five aforementioned factors may also effectively operate across different industries, we may also envisage the existence of some industry specificities. Indeed, we contend that policymakers—although their willingness to promote entrepreneurship can universally make use of a set of factors directed at both the supply- and demand- sides—will need to differentiate their use depending on the specific context of application (Welter, 2011). In fact, previous studies have demonstrated that, in the field of entrepreneurship policy, "*one size does not fit all*" (Santarelli and Vivarelli, 2007; Minniti, 2008) and that policies need to be tailored to the specific institutional contexts that they are intended to target (North and Smallbone, 2006; Minniti, 2008). Therefore, industry is a very important contextual factor because industries can significantly differ in terms of their political, economic, socio-cultural, and technological conditions (Dess et al., 1990). Below we offer a review of the factors and tools that could be leveraged to promote entrepreneurship in agri-food.

2.2 Factors and tools to promote entrepreneurship in the agri-food sector

The agri-food industry is required to provide sound answers to governments' and citizens' needs for high-quality, healthy, safe, and sustainable products (European Commission, 2007; ETP Food for Life, 2012). Its development entails important socio-economic impacts; for example, it is the largest EU manufacturing industry and serves as a buffer during recession times (European Commission, 2007; UK Department of Agriculture and Rural Development, 2011). All this notwithstanding, it exhibits some of the lowest labor productivity and smallest revenue rates across all industrial sectors (European Commission, 2009). This is due to some characteristics of the industry and its players.

First, the entrepreneurial mindset is not spread in rural producers' areas, unless a tradition of entrepreneurship is found in the region (e.g., family-business culture) (North and Smallbone, 2006). More generally, the problem of an adequate level of education and training characterizes the sector, hindering long-run growth, innovation, and sustainability (North and Smallbone, 2006; Reynolds et al., 2009).

Second, the industry is extremely fragmented, accounting for a large number of small and medium enterprises (SMEs) (around 283,000 companies) (FoodDrink Europe, 2014). Agri-food SMEs are characterized by low capitalization (European Commission, 2009), especially those active in traditional manufacturing activities, which are not attractive to Venture Capitalists (VCs) seeking fast-growing, technology-based companies (Gruère, 2012). SMEs in food exhibit low research and development investment rates and marginal innovation rates compared to their large, multinational counterparts (European Commission, 2009). In fact, while the entire industry is characterized by a relatively low degree of innovation appropriability, studies comparing agri-food to other sectors have shown that retailers' increased

power and market concentration have a negative effect on food manufacturers' innovation (for a review see Karantininis et al., 2010).

Agri-food SMEs also lack appropriate tools for responding to increasing market regulation and competition (Gellynck et al., 2012). Despite governments' calls for the industry to become more innovative and update practices and procedures (e.g. European Commission, 2009) and companies' acknowledgement of the importance of product and process innovation and their engagement in these activities, several aspects of innovation remain linked to companies' age, size, and regional location (Avermaete et al., 2003).

Finally, both policy liberalization and demand-side changes have also caused some significant transformations within the agri-food sector, increasing complexity along the agri-food chain (Goodman, 1997) and generating new management and commercialization models (Robinson et al., 2011), new forms of innovation (Messeni Petruzzelli and Savino, 2012), and new business models (Svejenova et al., 2010).

By emphasizing individual agency, organizational design, and institutional change, entrepreneurship may be a sound approach to understand these profound changes within the agri-food domain. It thus appears that policymakers willing to sustain entrepreneurial development within this sector should target a set of specific factors with dedicated tools. Yet management scholars have long ignored the agri-food domain (Alsos et al., 2011; Knudson et al., 2005) because, traditionally, they have been interested in studying firms' entrepreneurial and strategic behaviors in high-tech industries rather than in low- and medium-tech ones (Hirsch-Kreinsen et al., 2006). However, the rationale for this choice seems to be conceptually unsound because high-tech entrepreneurship might be driven by different factors and unfold following different patterns if compared to those occurring in low- and medium-tech

sectors. It then follows that focusing only on high-tech industries would provide a biased understanding of the entrepreneurial process, thus resulting in ineffective policies unable to promote entrepreneurship across all domains. To tackle this issue, in the next sections, we review and structure the macro-factors and the micro-tools that we believe should be taken into account to design proper policies within the agri-food sector.

3. Research design

To answer the abovementioned research questions, we use a two-pronged research design, combining a qualitative-exploratory approach with a quantitative-validation one, as outlined in Figure 1. First, via a comprehensive literature review and a focus group, we carry out an *ex-ante* evaluation of what policy factors and tools are important for policymakers to sustain entrepreneurship in agri-food. Secondly, we build, test, and validate a multi-item scale, which we use to test for variations in perceptions in different groups of stakeholders involved in agri-food policymaking.

Insert Figure 1 about here

We carry out our research in the context of Foodbest, a project launched in 2012 to support the establishment of a Food4future Knowledge Innovation Community (KIC) that will bid into a future KIC call by the European Institute of Innovation and Technology (EIT) (http://eit.europa.eu/)[2]. Since its launch, the shared Foodbest consortium's vision has been to drive agri-food sector competitiveness by catalyzing

[2] As of the end of 2014, three KICs have already been financed by the EIT. The call for the "Food4Future - Sustainable Supply Chain from Resources to Consumers" is expected in mid 2016.

open innovation, entrepreneurship, and educational capacity in order to deliver against global food challenges. Foodbest is a pan-European initiative that involves public and private organizations from the following countries: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Spain, Sweden, Switzerland, The Netherlands, and the United Kingdom. The twelve countries are clustered into six macro-regions[3].

3.1 Phase 1 – Ex-ante investigation of policy factors and tools

Between February and March 2013, we carried out a structured review of published literature regarding the five identified policy factors and practical tools to implement them on the main academic repositories (ISI Web of Science, Scopus, ProQuest and Google Scholar). We identified 43 research contributions, including scientific and practitioner-oriented published works, working papers, book chapters, and reports from the EU commission and other European public and private institutions related to the subject. We then analyzed the material in order to associate each entrepreneurship domain with its specific tools to enable policymakers' actions to be effective. As a result of this exercise, a preliminary list of five policy factors and sixteen policy tools was compiled.

[3] In September 2014, Germany left the consortium. Before that time, the macro-regions were: Germany, Austria, and Switzerland; Denmark/Sweden; France/Spain; Italy; The Netherlands/Belgium; and United Kingdom/Ireland. More than 40 public institutions and 50 agri-food companies, including the biggest players in the industry, are involved in the consortium. The consortium is structured as follows. A management board, including one representative from each of the six macro-regions, is in charge of strategic planning for the initiative. Four working groups (namely, business model, content, education, entrepreneurship, and innovation) are responsible for the operations of the consortium. Each working group comprises a group leader and at least one delegate from each of the twelve countries. Authors X and Y have been actively involved in theses bodies since their inceptions. Specifically, since 2012, author Y has been serving on the management board representing the AAA region; author X has been leading the working group emphasizing entrepreneurship and innovation since 2013 (WG E&I).

In March 2013, the Working Group Entrepreneurship and Innovation of the Foodbest consortium organized a six-hour focus-group meeting[4], involving both public-body and industry people, to discuss and further refine the list of constructs. During the focus group, a panel of fifteen experts from the six macro-regions (see above) were presented the list of items identified through the literature review and were invited to discuss them. Specifically, the contribution of the focus group was to validate and enlarge the list of items generated via the literature review and to highlight their importance to the agri-food domain.

3.2 Phase 2 – Development and test of a scale

After the *ex-ante* analysis of policy factors and tools was completed, a survey instrument was created, including both Likert-like scales and open-ended questions, to collect data from the participants at the Foodbest 2013 plenary meeting[5]. The questionnaire was structured as follows. First, it recorded some demographic characteristics of the respondents: namely, gender, organization of affiliation, country of work, type of organization (private for-profit or public not-for-profit), and role within the organization. Then, it dealt with the factors that represent entrepreneurship in the agri-food sector and the related tools to promote it with specific emphasis on the EU-context, which were identified in Phase 1. The twenty items (which indexed the five factors to be implemented to support entrepreneurship) were specified on a 7-point Likert-like scale. The questionnaire was distributed in a paper-based version to the 68 meeting participants and answers were then transcribed into an electronic file. No missing values were recorded. The data collected via the individual-level questionnaires were evaluated using exploratory (EFA) and confirmatory factor

[4] The meeting was held on 4th March 2013 in Munich (Germany).
[5] The meeting was held on 16th April 2013 in Bertinoro (Italy).

analysis (CFA) (please refer to section 4.3 for more detailed information). The data were then analyzed in real-time; the descriptive statistics of the raw, unrefined, data were projected in the plenary session of the Foodbest meeting and used as a starting point for some small-group discussions[6] during the afternoon (some comments/remarks by the participants have been used to clarify and explain some of the obtained empirical results in the discussion session; please refer to section 5).

The process of item fine-tuning from the initial literature analysis to the focus group and the survey is graphically summarized in Figure 2. Table 1 exhibits the five domains, the twenty items included in the final scale, and their sources.

Insert Figure 2 and Table 1 about here

After the process of refinement, we tested for intergroup comparisons according to the participants' country of origin and organizational affiliation (for-profit and not-for-profit). Results of the ANOVA and *t*-tests are presented in section 4.4.

4. Findings

4.1 Phase 1: Literature review outcomes

Five factors (i.e., people, money, technology, network, infrastructure) and sixteen tools emerged from our *ex-ante* literature review. These are presented in Table 1 and characterized below.

[6] Participants have been divided into ten groups, which gathered for ten round table discussions.

4.1.1 People

The importance of human capital, and, in particular, of education and training, has been shown to positively affect entrepreneurial performance (Oosterbeek et al., 2010; Unger et al., 2011). Education and training are especially important in low- and medium-technological industries, such as agri-food, because they can improve the level of human capital in the firm and equip personnel with hybrid qualifications (Santamaría et al., 2009). In addition, an appropriate level of human capital can change perceptions about entrepreneurial opportunities and thus can foster development in the long run (e.g., Arenius and Minniti, 2005; North and Smallbone, 2006). In the context of agri-food, because companies are SMEs, they can expect limited availability of resources. Therefore, the skills of the founding and management team and of the employees are very important. Because of the traditional sector in which companies operate, it is important to continually update workers' knowledge and competences.

With regard to the tools available to policymakers to target the "people" factor, in addition to general education, studies have shown that business and entrepreneurship education and training have a positive effect on entrepreneurship-related human capital assets (i.e., entrepreneurial knowledge and skill, positive perceptions of entrepreneurship, and intentions to start a business) and on entrepreneurship outcomes (i.e., nascent and start-up behaviors, financial success) (for a review, see Martin et al., 2013). As a result, policymakers are now promoting entrepreneurship education in school curricula both in Europe and the United States (Kuratko, 2005; European Commission, 2006). Academic courses about entrepreneurship generally offer a broader theoretical understanding of issues, such as identifying opportunities, decision-making in complex contexts, and causation and

effectuation (e.g., DeTienne and Chandler, 2004; Lee at al., 2005). Universities, together with companies, can also use additional instruments to raise awareness of the opportunities for venture creation, such as the use of short courses and "boot-camps" intended for academics, students, and the employees of technology companies who wish to start their own business or to commercialize the results of their research (Kirby, 2006; Clarysse et al., 2009).

Policymakers might also take steps to stimulate intrapreneurship (i.e., entrepreneurship within existing companies) (Fini and Toschi, 2015). Corporate entrepreneurship training programs could be used to train employees of incumbent companies in such areas as creativity, business planning, and corporate entrepreneurship (Kuratko and Montagno, 1989; Kuratko et al., 2001). This type of action might be especially relevant in the agri-food sector because a number of studies have shown that the entrepreneurial success of companies depends on intra-organizational interactions, support, and guidance (e.g., Kilpatrick and Johns, 2003; Lans et al., 2008).

Accordingly, four tools seem to characterize the people domain to promote entrepreneurship in the agri-food sector: namely, the establishment of (i) EU-start-up bootcamps, (ii) corporate training programs in entrepreneurship, (iii) undergraduate and (iv) graduate programs in entrepreneurship.

4.1.2 Money

The availability of financial capital is particularly relevant for SMEs (Beck et al., 2005), such as those that dominate the agri-food sector. Entrepreneurs need financial means for three main purposes: to diversify or spread the start-up risk, to accumulate start-up capital, and to finance growth and expansion (Fogel, 2001). Entrepreneurs can rely on several sources to secure the financial resources for developing

entrepreneurship and innovation. First, they can be financed by venture capital, which oftentimes provides not only direct financial support but also managerial support. The venture capital (VC) industry is normally linked to the local territory (e.g., Powell et al., 2002), representing a key environmental asset for the establishment of new companies, employment, and aggregate income (Samila and Sorenson, 2011). Venture capitalists have, for example, actively supported the development of the European biotech agri-food companies (e.g., Cooke, 2001; Lemarié et al., 2001). Second, financial support can derive from business angels (BA), individuals who provide direct funding (seed and pre-seed capital) and hands-on management to early-stage businesses (Aernoudt, 2004). Third, besides VC and BA, entrepreneurs can rely on other private equity firms, which can invest in the private equity of entrepreneurial companies through several strategies (Moskowitz and Vissing-Jørgensen, 2002). As an example, private equity companies have recently increased their investments in the food retail sector (Burch and Lawrence, 2013) and in farmland (Fairbairn, 2014). Fourth, a recent valuable alternative to seeking external funds for entrepreneurs has been found in crowdfunding (i.e., financing from large audiences—the "crowd"—as part of which each individual contributes a small amount (Belleflamme et al., 2013)). Crowdfunding in the agri-food sector can be seen as a tool to support the establishment and management of new agri-food businesses, such as farms or restaurants, or the launch of new products (e.g., Dilworth and McGregor, 2014; Yoo and Choe, 2014). Lastly, proof of concept can be seen as a feasible means to finance innovation: for example, through seed funding, ignition grants, or innovation grants (Gulbranson and Audretsch, 2008). In terms of the agri-food sector in particular, the use of proof of concept is exemplified in the development of clinical immunology (e.g., vaccines for livestock, Ho et al., 2009), biotechnology (e.g., testing veterinary

drug residues in food, Connolly et al., 2007), information management technology (e.g., Verloop et al., 2009), etc.

According to our *ex-ante* review of the literature, the tools available to policymakers to endow potential agri-food entrepreneurs with financial resources are the following: (i) private equity, (ii) corporate venture capital, (iii) crowd funding, (iv) business angel capital, and (v) proof-of-concept funding.

4.1.3 Networks

Networking is particularly important for entrepreneurs in order to obtain four kinds of support for business activity: (i) support and motivation; (ii) examples and role models; (iii) expert opinions and counseling; and (iv) access to opportunities, information, and resources (Manning et al., 1989). We are not focusing on the interactions and networks that emerge from the existence of companies in the same or related sectors and in the same territory, which would naturally promote formal and informal exchange of ideas and knowledge (e.g., Deeds et al., 1998; Bianchi, 2001; Blundel, 2002; O'Reilly and Haines, 2004; Lamprinopoulou and Tregear, 2011). Rather, we focus on those networks that can be mobilized and have an impact at the policy level. In particular, we refer to those forms of networking related to bargaining and allying with other entrepreneurs and actors to change the governance structures and legislation through collective actions and lobbying activities (e.g., Fligstein, 1996; Rao et al., 2000). Such networking activities in the agri-food sector are particularly important not only in terms of business profitability and socio-economic impact (e.g., Lamprinopoulou et al., 2006; Vakoufaris et al., 2007), but also because business choices and behaviors are closely interrelated to safety, security, and sustainability issues. We can take as examples the hot debates about the quality of food products (e.g., Devitt et al., 2013), the use of drones in agriculture (e.g., Freeman

and Freeland, 2014) or the use of genetically modified organisms (GMOs) in agricultural supply chains (e.g., Lang, 2013).

In addition, policymakers can mobilize forms of networking that transcend local, national boundaries and promote the establishment of entrepreneurial activities abroad. The internationalization of SMEs can be encouraged by initiatives aimed at sustaining contacts with foreign partners (e.g., Wilkinson, 2006). Studies in the agri-food industry have shown that networking with international customers, buyer groups, and other supply-chain partners (e.g., Bertolini and Giovannetti, 2006; Lans et al., 2008; Craviotti, 2012) can foster entrepreneurial undertakings.

In sum, the literature review highlighted the following tools to develop networks available for agri-food entrepreneurs: (i) Events to foster and lobby for changes in legislation; (ii) Initiatives to support internationalization of business.

4.1.4 Technology

As highlighted above, the agri-food industry is a relatively mature and low-tech industry, displaying low levels of R&D investments (Costa and Jongen, 2006). Developing technologies is a costly activity that requires scientific departments or laboratories, and is difficult to carry out entirely in-house, especially by SMEs (Braun and Hadwiger, 2011). In the food sector, innovation can be particularly complex, time-consuming, and risky (Sarkar and Costa, 2008) because of consumers' cultural resistances, concerns for health and safety, and particular food needs (Sarkar and Costa, 2008; Alsos et al., 2011). The development of entrepreneurship in this sector should therefore be backed by the creation and adoption of innovative technologies and the reception of technological advances (e.g., biotechnology, nanotechnology, and preservation technology) (Sarkar and Costa, 2008).

In this vein, it is increasingly important to acknowledge the role of technology transfer, which is defined as the transfer of technological knowledge between donating and receiving entities. Traditional technology transfer activities take place between universities/big-science laboratories and industry through dissemination, licensing, and networking with outreach activities (Vuola and Hameri, 2006). Technology transfer in the agri-food sector is particularly influenced by university size and the intermediation of TTOs, academic research performance, and geographical proximity between universities and food businesses (Muscio and Nardone, 2012). Another way to support entrepreneurship is through scouting and matchmaking between companies and technological intellectual property or technological opportunities. When this happens between universities/big-science and industry, the goal is to establish mutually beneficial cooperation through third-party matchmaking (Vuola and Hameri, 2006). In particular, a successful matching process includes: industrial scouting to find applicable new technologies in an industry; assessing business development needs and establishing a mutually beneficial relationship; identifying functional specifications for big-science instruments; and matching of needs, motivation, people, and timing (Vuola and Hameri, 2006). Matchmaking can also take place within the industrial sector, between firms. For example, at the company level, incumbent companies can implement activities of corporate venture capital into start-ups that present interesting technological opportunities to be acquired by existing business units (Napp and Minshall, 2011).

According to our literature review, the tools to sustain Technology in agri-food entrepreneurship are focused on cross-national high-potential scouting and match-making between intellectual property or entrepreneurial opportunities and either (i) researchers, or (ii) company people.

4.1.5 Infrastructures

Entrepreneurs need non-financial support services from the local environment, especially in the early stages of business; both tangible and intangible infrastructures play very important roles. Our review of the literature identified two specific sets of assets related to tangible infrastructures that are necessary for developing entrepreneurship and innovation: first, research and development (R&D) facilities. One of the most innovative ways to organize R&D takes the form of shared facilities or laboratories, where two or more organizations (e.g., firm-university; firm-firm) share the same facility to work on the same research topics (Howells, 2008). Second, incubation facilities, where entrepreneurs receive office accommodations and "services such as hands-on management, access to finance, legal advice, operational know-how and access to new markets" (Aernoudt, 2004, p. 127). Incubation facilities are therefore fundamental for entrepreneurs, especially in areas where other infrastructures are not well developed or where physical facilities are costly (Fogel, 2001).

In terms of intangible infrastructure, because knowledge has become one of the most relevant assets for business development, the local environment should provide entrepreneurs with the opportunity to share technological or managerial knowledge. Investments in knowledge sharing through national and international cooperation enhance agri-food productivity (e.g., North and Smallbone, 2006; Straete, 2008), not only within OECD countries, but also in developing countries (e.g., Brooks, 2014).

Technological knowledge can be exchanged, for example, through the market for ideas (e.g., Gans and Stern, 2003), or through dedicated platforms (e.g., Parr-Vasquez et al., 2011). In the agri-food sector, the adoption of new technologies can be stimulated by diffuse information given, for example, through extension services

(e.g., Chatzimichael et al., 2014) or innovation brokers (Batterink et al., 2010). Managerial knowledge can be shared through the establishment of structures offering mentoring, counseling, and interactions among different professionals (Knudson et al., 2005).

To summarize, our literature review highlighted access to EU infrastructures as relevant tools in the Infrastructure domain to share (i) technological-related issues; (ii) management-related issues; and (iii) research and development capacities.

4.2 Phase 1: Focus group outcomes

The discussion in the focus group confirmed that the items identified in the literature analysis are valuable tools for impacting the domains. However, the experts suggested to reformulate some of the existing items as well as to add some new ones with regard to the Network, Technology, and Infrastructure factors (see Table 1).

For Network, they suggested to unpack the initiatives aimed at supporting international entrepreneurship of agri-food companies into two separate items: "Initiatives focused on BRICS countries (Brazil, Russia, India and China)" and "Initiatives focused on overseas countries (excluding BRICS)". They also suggested adding one more item: "networking activities to share cultural differences in food perceptions and consumptions," which was not highlighted by the literature review. For Technology, the focus group proposed adding "cross-border scouting and match making between intellectual property/entrepreneurial opportunities and students, recognizing the potential for university-industry collaborations." Finally, with regard to the Infrastructure domain, the focus group suggested adding one item related to the pooling of technologies across national borders.

Phase 1 concluded with the identification of twenty items, clustered into five conceptual domains. In the next section, we illustrate the results of Phase 2 of the empirical analysis.

4.3 Phase 2: Scale development and testing

4.3.1 Descriptive statistics

The survey was tested on a sample of individuals working for private for-profit and public not-for-profit organizations, all of whom were knowledgeable of the agri-food industry. We collected 68 complete questionnaires, one of which was discarded because the correlation between the items was equal to 1. The final group of respondents (N = 67) comprised 43 (64%) males. Respondents belonged to two different professional groups: 54 (81%) worked in not-for-profit research organizations (e.g., professors, researchers, or administrative/technical staff), and 13 (19%) were managers or employees in for-profit companies operating in the food industry. Respondents came from different European countries, which have been clustered into three geographic areas: 18 (27%) were from Northern Europe (Ireland, United Kingdom, Denmark, and Sweden); 26 (39%) were from Central Europe (France, Belgium, Germany, and The Netherlands); and 23 (34%) were from Southern Europe (Spain and Italy).

4.3.2 Exploratory factor analysis (EFA)

We started the analysis by using an exploratory factor approach. The Kaiser-Meyer-Olkin measure of sampling adequacy level was above .6, and the Bartlett's test of sphericity was significant, indicating that a factor analysis was appropriate. We analyzed the data using a principal axis factor analysis as suggested by Hinkin (1998)

because our main goal was to identify the latent dimensions underlying the original items (Hair, Black, Babin, & Anderson, 2010, p. 107); principal component analysis, by contrast, mixes common, specific, and random error variances (Ford, MacCallum, & Tait, 1986; Rummel, 1988). As reported in Table 2, five factors emerged from the analysis (which is also consistent with the literature review performed in phase 1). Table 2 presents the rotated factor loadings and the explained variance of the extracted factors (which exceeded the cut-off point of 50%).

Insert Table 2 about here

We used an equamax rotation in order to achieve a simple factor structure (Bryant & Yarnold, 1995, pp. 132–133), and we compared the results with an oblique rotation. As Tabachnick and Fidell (2007, p. 646) suggest, in running a factor analysis with direct oblimin rotation, the correlations between factors should be less than ±0.32 to avoid a 10% or more overlap in the variance among factors. Our test reported .19 as the maximum level, confirming the possibility of maintaining an orthogonal rotation.

We adopted a conservative approach by eliminating three items (*Money1, Money3, and Infrastructure1*) that failed to reach the minimum loading of .50 (Hair et al., 2010). We also checked for the presence of indicators with high loadings on multiple latent variables (Chin, 1998). We thus eliminated *People2* because its loading on Network was higher than the loading on People. Our data also met the more conservative criteria applied by Flatten et al. (2011), which suggest dropping indicators with factor loadings "less than .1 higher than the cross loading." The exploratory factor analysis resulted in a 16-item scale.

The internal reliability of the five constructs was assessed estimating Cronbach's alpha (Hinkin, 1998), which in no case was lower than .7 (Nunnally & Bernstein, 1994) (see Table 2). We then move to the confirmatory part of the study.

4.3.3 Confirmatory Factor Analysis (CFA)

Although still not universally accepted, CFA has been employed to enhance confidence in the structure and psychometric properties of a new measure (Gerbing & Anderson, 1988; MacKenzie, Podsakoff, & Podsakoff, 2011; Noar, 2003). The quality of the factor structure can be tested by assessing its goodness-of-fit compared to rival models (Hinkin, 1995): (i) a null model as part of which all items load on a separate factor, (ii) a single common factor model, (iii) an uncorrelated factor model, (iv) a correlated factor model, and (v) a hierarchical model (Noar, 2003). Moreover, because the correlated factors and the hierarchical model are not nested, it is not possible to compare them using a χ^2 statistic (Worthington & Whittaker, 2006). Therefore, we compared the four models considering three fit indexes: the *χ^2 /degrees of freedom Ratio*, the *Comparative Fit Index* and the *Root Mean Square Error of Approximation*. The simple χ^2 statistic is influenced by sample size; however, a χ^2 /degree of freedom ratio of 2/1 exhibits a good fit (Kline, 2011; Noar, 2003). The Comparative Fit Index is an incremental fit index referring to the null model. A value higher than .90 is considered to be a good fit (Hair et al., 2010; Hinkin, 1998; Noar, 2003). Finally, the Root Mean Square Error of Approximation (RMSEA) evaluates how well a model fits a population, not just a sample used for estimation. Some authors consider a RMSEA lower than .06 to be a good fit (MacKenzie et al., 2011; Noar, 2003) whereas others suggest considering it within a range from .03 to .08

(Chen, Curran, Bollen, Kirby, & Paxton, 2008; Hair et al., 2010). Table 3 reports the goodness of fit indexes of the four estimated models.

Insert Table 3 about here

As expected, the one-factor model reports poor fit-indexes whereas both the correlated factor and hierarchical models show good values of CFI and RMSEA. The retention of the correlated factor model suggests that five different constructs were measured, and Figure 2 reports the factor loadings, variances, and covariances of the model. All factor loadings were significant ($p < .001$).

Insert Figure 2 about here

The hierarchical was proven to be viable, and its fit parameters confirmed the possibility of retaining a summated scale. Nevertheless, another test on a different sample should be carried out to further assess the factor reliability and the validity of the scale (Flatten et al., 2011; Worthington & Whittaker, 2006).

4.3.4 Perceived importance of factors supporting entrepreneurship in agri-food

We finally evaluated the specific importance of the factors by computing factor scores as linear combination of the items (DiStefano and Zhu, 2006). Then, we compared the means of the factors by assessing the significance of the difference with *t*-tests as reported in Table 4.

Insert Table 4 about here

Our data show a relative predominance of Money (as opposed to the other factors), followed by People and Technology; Network and Infrastructure seem to play minor roles in creating the proper conditions for agri-food entrepreneurship. We find no evidence of differences between People and Technology, whereas we find that Infrastructure has a significantly lower impact as opposed to People, Technology, and Network.

4.4 Phase 2: Between-group comparisons

We finally explored differences in the perceptions of the factors that could promote entrepreneurship in agri-food, comparing the respondents according to organizational affiliation and country of work.

Concerning organizational affiliation, we found that individuals working for for-profit companies place greater value on Network, Technology, and Infrastructure factors rather than those who work in the not-for-profit sector. These latter give more importance to Money factors (partially sig.), as shown in Table 5.

Insert Table 5 about here

We computed an ANOVA for the Geographic Areas (Northern vs. Central vs. Southern Europe). Table 6 shows the results. Because the ANOVA was partially significant with regard to Technology and Money, we ran post-hoc comparisons using Least Significant Difference Tests.

Insert Table 6 about here

The analyses indicated a significant difference in the mean values of Technology between Central and Southern countries (mean difference: -.73; sig.: 0.05), and a significant difference in the mean values of Money between Northern and Southern countries (mean difference: .61; sig.: 0.05). Further analyses carried out with boostrapping techniques confirmed these results[7].

5. Discussion

In this paper, we shed light on which factors policymakers should target to sustain entrepreneurship in the agri-food industry. To do this, we developed, tested, and validated a scale, accounting for specificities of the agri-food industrial context. The developed scale converged on five factors (People, Money, Network, Technology, and Infrastructure), which are key to promoting entrepreneurship in the agri-food industry. These five factors are, however, not equally important in sustaining entrepreneurship in agri-food. Our findings show that Money, People, and Technology are the factors perceived as most important; Network and Infrastructure emerged as the least important ones. We also highlighted that some variance can be found in the perception of these factors' effectiveness among the participants of the Foodbest consortium. Below, we discuss these findings also in light of some relevant insights from the round table discussions following the descriptive statistics presentation during the plenary session of the 2013 Foodbest meeting in Bertinoro.

[7] The complete results of the post-hoc comparisons are available upon request.

Our empirical analyses show that the three most important factors for promoting entrepreneurship in agri-food are Money, People, and Technology.

With regard to the Money factor, our results highlighted that venture capital (Money2), business angels (Money4), and proof of concept (Money5) should be promoted by policies targeting entrepreneurial development in the agri-food sector. By contrast, crowd-funding (Money3) and private equity funds (Money1) did not reach significant loadings, and were consequently disregarded. Previous studies and the round table discussions carried out by our respondents can illuminate some of these findings. First, attracting VC and business angel funding is considered pivotal to the growth of new companies (Sapienza et al., 1996; Samila and Sorenson, 2011), also allowing for public–private funding systems (Table Group n. 5). Presenting attractive ventures to VCs has been described as a potential core activity for the KIC, aiming for faster funding processes in an industry considered less attractive because of a temporally longer return on investment (Table Group n. 5 and n. 10). Second, proof of concept was important to reaching entrepreneurial outcomes, specifically because of its role in financing innovation (Gulbranson and Audretsch, 2008) and pilot plants (Table Group n. 5). Third, although crowd-funding did not emerge as a significant item in our scale, its relevance and effectiveness as an alternative and innovative source of financing was debated in the table group discussions (Table Groups n. 3 and n. 5). We might explain this discrepancy in light of the fact that crowd-funding regulation is still lagging in Europe[8] (Röthler and Wenzlaff, 2011); therefore, a culture of crowd-funding should be promoted (at least in the short run) by the crowd itself rather than by policymakers. Furthermore, crowd-funding projects might not be encouraged by the fact that, in the agri-food industry, the time-to-market

[8] Italy was, in fact, the first European country to adopt an ad-hoc regulation on equity crowd-funding, in 2013 (Il Sole 24 Ore, 2013).

of innovations is longer than in other sectors (Table Group n. 10). Lastly, agro-investment funds appear to be dedicated to established companies rather than to start-ups (Table Group n. 9), as exemplified by the food retail sector (Burch and Lawrence, 2013) and farmland (Fairbairn, 2014).

As for the factor People, in line with other studies (see Martin et al., 2013), our research confirmed that human capital should be considered key to fostering entrepreneurship in the agri-food industry. As indexed by the factor loadings, our study highlights that policymakers should continue to emphasize the role of university education at both the undergraduate (People3) and graduate (People4) levels. The organization of start-up boot camps (People1) can be seen as complementary whereas corporate training programs (People2) are not perceived as a means through which entrepreneurship could be effectively promoted (this item was indeed not included in the final scale).

The insights retrieved via the round-table discussion were also informative in this regard. In particular, they highlighted that the most important competencies and skills to be developed should be marketing, team management, and technical and regulatory knowledge. In addition, participants pointed to the importance of soft skills, of a willingness to take risk, and of the ability to develop a good balance between managerial and technical skills. As for the former, as the Group n. 10 participants stated, "*not a detailed knowledge of all the food chain as a whole, but a mind 'integrating' technical solutions and visions, by means of putting together experts different in the sub-sectors.*" The significant loading of the items on the factor People was thus consistent with conversations on how academic courses with a specific focus on entrepreneurship may foster entrepreneurial mindsets, providing the impetus for entrepreneurship (Ireland et al., 2003; DeTienne and Chandler, 2004; Lee

et al., 2005). Conversely, the caution against the promotion of corporate-level education programs could be explained, as highlighted by one of the table group discussions, by the fact that "intrapreneurship" is to be seen as "*a cultural aspect of the company that challenges for new ideas and gives opportunity to develop such ideas*" (Group n. 9), rather than something to be fuelled from outside the company (e.g., by academic institutions). In fact, a company's management might not be willing to sustain entrepreneurship-related initiatives that might potentially originate future competitors in the industry (see for example Phan et al. (2009) for a positioning paper on the opportunities and threats for corporate entrepreneurship).

Technology is also key for promoting entrepreneurship in the food sector. Scouting activities focused on identifying and matching promising technological developments from researchers (Technology1), companies (Technologies2), and students (Technology3) were found to be particularly relevant as a means for policymakers to sustain entrepreneurship. As highlighted by our respondents, the role of public–private consortia (such as Foodbest) should be to orchestrate the dialogue between public and private players and between new and established companies (Table Group n. 5), thus sharing and mitigating the innovation risks in a mature industry. Public–private platforms should support scouting and selection activities "*activating communication and providing services to negotiate legal agreements with VCs and concentrate entrepreneurial activities in the seed labs*" (Group n. 5). Scouting of new technologies allows companies to propose innovative solutions to fill the gaps in the food value systems, combining technologies spurring from different domains (Group n. 10). Finally, as mentioned by our respondents, the creation of new food products can be implemented by applying technologies found in neighboring sectors, such as biotechnology and pharmaceuticals (see also Sarkar and Costa, 2008).

However, as pointed out by Group n. 2, the commercialization of such new products could not rely on traditional distribution channels; therefore, new logistic and ICT solutions should also be put in place to support their diffusion.

The Foodbest consortium's participants found Network and Infrastructure to be the least important factors. For Network, all four identified items were found to be positively and significantly correlated to the latent construct. As expected, organizing events and initiatives to lobby legislation changes (Network1) was considered a critical factor. In fact, the complexity of food-related legislation and its fragmentation across European countries can hinder the development of entrepreneurial initiatives (European Commission, 2007). In addition to lobbying activities aimed at simplifying the regulation body, respondents proposed the definition of "*a sort of 'grace' period for all bureaucratic duties, to let you develop your idea*" (Group n. 9). Networking activities to share cultural differences (Network2) were also noted as important within the agri-food industry for at least two reasons. First, being a mature industry, cultural change is rare and slow. Second, food products have high cultural content, depending on regional and local food habits (European Commission, 2009). Networking events were considered a way to "*mobilize the industry, increasing mobility among companies and facilitating knowledge sharing*" (Group n. 10). Networking initiatives focusing on BRICS (Network3) and non-BRICS countries (Network4) were also mentioned because internationalization is key for the European agri-food industry (European Commission, 2009; FoodDrink Europe, 2012). In this regard, public support for developing international networks may help entrepreneurs, especially those operating in small- and medium-sized businesses, to better seize new market opportunities, obtaining more regulatory and fiscal knowledge as well as a holistic view of the chain (Group n. 9).

Finally, for the Infrastructure factor, items related to accessing EU-wide networks to exchange technical knowledge (Infrastructure2) and managerial knowledge (Infrastructure4) exhibited significant factor loadings. These infrastructures, in fact, would support, within the EU context: (i) the dissemination and socialization of some complex regulatory issues (e.g., national legislation and harmonization of food regulation in the EU) (Groups n. 3 and n. 9), as well as (ii) an effective management of IP-related issues (Groups n. 5 and n. 9). Moreover, given the high-level of investments required to develop and market new products, access to shared R&D facilities was considered critical (Infrastructure3) because it offers "*the possibility to rapidly carry on the proof of concept phase*" (Group n. 5). Finally, the pooling of technologies (Infrastructure1) did not result in a significant loading on the corresponding latent factor; thus, it was disregarded in the final scale. In fact, as emerged during the round table discussion, IPR protection was still seen as being more important than sharing technologies and open innovation, as exemplified by respondents highlighting the "protective" and characterizing role of IP both towards big companies (Group n. 9), and spin-offs and start-ups (Group n. 5). The open innovation paradigm (Chesbrough, 2003) is therefore not yet core to the agri-food industry.

Our empirical analyses also spotted some differences in the perception of some factors' effectiveness based on respondents' type of organizational affiliation and geographic area of origin. First, Networking activities, Technology, and Infrastructure were more appreciated by people affiliated with companies than people from the public sector, as exhibited by the between-group comparisons. This could possibly be attributed to the fact that people who work for for-profit firms may be less exposed to stimuli from the academic environment, being more limited to day-to-day operating

routines, being not part of a wide infrastructure and generally less immersed in lobbying activities, and without the same access to technologies (e.g., Ring and Perry, 1985; Boyne, 2002). Hence, company members had more favorable evaluations of opportunities to be exposed to novelty and participating in networking events, and to be involved in the access to complex infrastructures and technologies. By contrast, Money was perceived as being more important by respondents from the not-for-profit sector. We can explain this with the observation that public personnel are generally less trained in searching and being evaluated for funding (Boyne, 2002) and depend on external allocation of budgets, which have been severely hit by the spending reviews in European countries.

Second, a comparison between Northern, Central, and Southern European countries highlighted differences in the perceived importance of the Money factor, which is considered as being more important in Northern countries than in Southern ones. We explain this with the consideration that capital markets are less developed in Southern Europe, especially concerning equity capital (VCs and business angels) (Bottazzi and Da Rin, 2002). In fact, VCs have been found to be supportive in the development of European biotech agri-food companies in Central and Northern Europe (e.g., Cooke, 2001; Lemarié et al., 2001). By contrast, countries from Southern Europe perceive as more important the Technology factor than Central Europe countries. This can be explained by the fact that Southern countries, despite being characterized by a food culture and an agricultural system oriented towards tradition, artisanal production and affiliations to "terroir" (Parrot et al., 2002), are pushed towards the adoption of more efficient and conventional production modes, implying the use of new technologies (e.g. Ménard and Valceschini, 2005; Sonnino and Marsden, 2006; Defrancesco et al., 2008; Manos and Manikas, 2010).

6. Conclusions

The contemporary view of entrepreneurship as a "driver of growth in a global economy" (OECD, 2011, p. 9) has compelled policymakers in Europe to place special emphasis on the promotion of entrepreneurship[9]. This new engagement in policy-making necessitates proper design and fine-tuning of policies able to account for contextual specificities (Goetz and Freshwater, 2001; Verheul et al., 2002).

Surprisingly scant attention has been devoted to mature, low- and medium-technology industries, which represent the largest part of manufacturing industries globally (Kaloudis et al., 2005). In these industries, entrepreneurship might be driven by different factors and unfold following different patterns when compared to those occurring in high-tech sectors. It then follows that focusing only on high-tech industries would provide a biased understanding of the entrepreneurial process, thus resulting in ineffective policies unable to promote entrepreneurship across all of the different domains.

In this paper, we have tackled the issue of understanding the most important factors that policymakers can mobilize to sustain entrepreneurship in a specific low-tech and mature industry: i.e., the agri-food sector. This is one of the most relevant worldwide industries, having to meet human health and environmental sustainability requirements in a growingly globalized economy (European Commission, 2007; ETP Food for Life, 2012). The idiosyncrasies of the agri-food industry affect the way in which entrepreneurship can be effectively sustained and promoted by private and public stakeholders within it (European Commission, 2009). On the one side, this industry is characterized by maturity, fragmentation, low levels of ICT and R&D

[9] For some examples, see the *European Charter for Small Enterprises* (2000); the *Green Paper: Entrepreneurship in Europe* (2003); the *Action Plan: the European Agenda for Entrepreneurship* (2004); the *Small Business Act for Europe* (2008); and the *Europe 2020 strategy*.

expenditures, and high, strict levels of regulation. On the other side, in the last few decades, both policy liberalization and demand-side changes have caused some significant changes within the agri-food sector, increasing complexity along the agri-food chain (Goodman, 1997) and generating new management and commercialization models (Robinson et al., 2011), new forms of innovation (Messeni Petruzzelli and Savino, 2012), and new business models (Svejenova et al., 2010). By emphasizing individual agency, organizational design, knowledge, and institutional change (Gilbert et al., 2004), entrepreneurship has been seen as a crucial tool to sustaining employment and growth in this important economic sector.

This paper, by bringing together the literature on the determinants of entrepreneurship and the research focusing on innovative behaviors within the agri-food sector, contributes to the theoretical understanding on how policy and structural mechanisms can foster entrepreneurship in agri-food. In line with previous studies, we support the view that "entrepreneurship policies tend to be based on a handful of policy tools" (Minniti, 2008, p. 782), but that their use needs to be diversified according to the context in which these tools are intended to effect change.

Our study is relevant for policymakers because it highlights five factors to be stimulated in order to foster entrepreneurship in the agri-food industry. In line with current policy orientations, we point out the pivotal role played by human capital in sustaining entrepreneurship and economic growth in a knowledge-based society (e.g., de la Fuente & Ciccone, 2002). Policies should incentivize investments in human capital especially in low-tech industries such as the agri-food. Specifically, echoing the findings by Lazear (2004), we call for continuous education investments aimed at the development of transversal entrepreneurial competencies, rather than just technical abilities.

Moreover, our study suggests that differences in the perceived importance of factors should also be considered by policymakers to design the best support mechanisms for entrepreneurship. In fact, we showed that the five factors can be perceived as ranging from more important (i.e., Money, People, and Technology) to less important (i.e., Network and Infrastructure) for sustaining entrepreneurship in the agri-food sector. In particular, the access to funding, human capital development initiatives, and the availability of technological resources are key to effectively stimulate entrepreneurship in the European area.

Our effort has also managerial implications for entrepreneurs and managers involved in agri-food businesses. First, we acknowledge the importance of the continuous human capital development. To this aim, practitioners should search and exploit existing training opportunities targeted at developing transversal entrepreneurial competencies (see Mitchelmore & Rowley, 2010), rather just emphasizing technical aspects. By strengthening their human capital, agri-food firms may foster the adoption of advanced-technologies, borrowed from some high-tech neighboring sectors, thus representing profitable opportunities for financial investors.

Second, we find systematic group-differences in relation to the most important factors fostering entrepreneurship in agri-food industry. This suggests that entrepreneurs and managers should be aware that operating in private or public institutional context (Fini & Lacetera, 2010), as well as in different geographical areas, may influence individuals' entrepreneurial perceptions and cognitions (e.g., Kor, Mahoney, & Michael, 2007). Consequently, entrepreneurs and managers should develop capabilities to identify and leverage on these differences, especially if working within public-private partnerships or lobbying organizations, or with organizations and people from different countries.

All this notwithstanding, we acknowledge that our study suffers from several limitations. First, it builds on a specific context of a single European public–private consortium set up to lobby for the future participation in an EU-funded program. We thus acknowledge that the characteristics of the consortium and of the participants could hinder the generalizability of our results (even if the Consortium were designed to be representative across the EU-countries and organizations). However, we also think that the setting offered an intriguing context for an explorative investigation of the perceptions of relevant and diversified (e.g., in terms of geographical coverage; organizational affiliation) actors. Second, given the limited number of respondents, both the factor analyses and the between-group comparison could report less sharp results than a larger sample could allow.

Considering both these limitations, we hope that future research would investigate how policies can sustain entrepreneurship by highlighting the importance of contextual idiosyncrasies. In this paper, we have focused on defining the factors and tools that can promote entrepreneurship in the agri-food industry. Because we could not draw any comparison with other industries, we invite scholars to build on this study to investigate any difference in the perceptions of policy factors and tools to sustain entrepreneurship in other industrial contexts. We especially wish that this could be brought forward in the agri-food sector and in other low-tech, mature industries (Kaloudis et al., 2005; Santamaría et al., 2009), given the skewed interest of management scholars towards high-tech industries (e.g., Knudson et al., 2005; Hirsch-Kreinsen et al., 2006; Alsos et al., 2011). In this paper, we focused on a very specific European setting. We suggest that future studies draw on larger samples in different institutional environments and geographical contexts. Additionally, we see possible avenues for future research in the identification and measurement of the antecedents

and the outcomes of different supply-side or demand-side entrepreneurship policies and of their implementation processes. Building on our work, future researchers could develop models of entrepreneurial processes in the agri-food sector by testing how the identified factors effectively drive and stimulate entrepreneurial undertakings by companies and the outcomes of these undertakings. Cross-national studies to account for the different impact of policies in different contexts would also make for a significant contribution to the literature. Moreover, studies could explore how the implementations of policies differ for public vs. private stakeholders, following our exploratory findings on the differences between professionals affiliated with not-for-profit research centers and for-profit companies.

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FIGURES AND TABLES

Figure 1. Research design

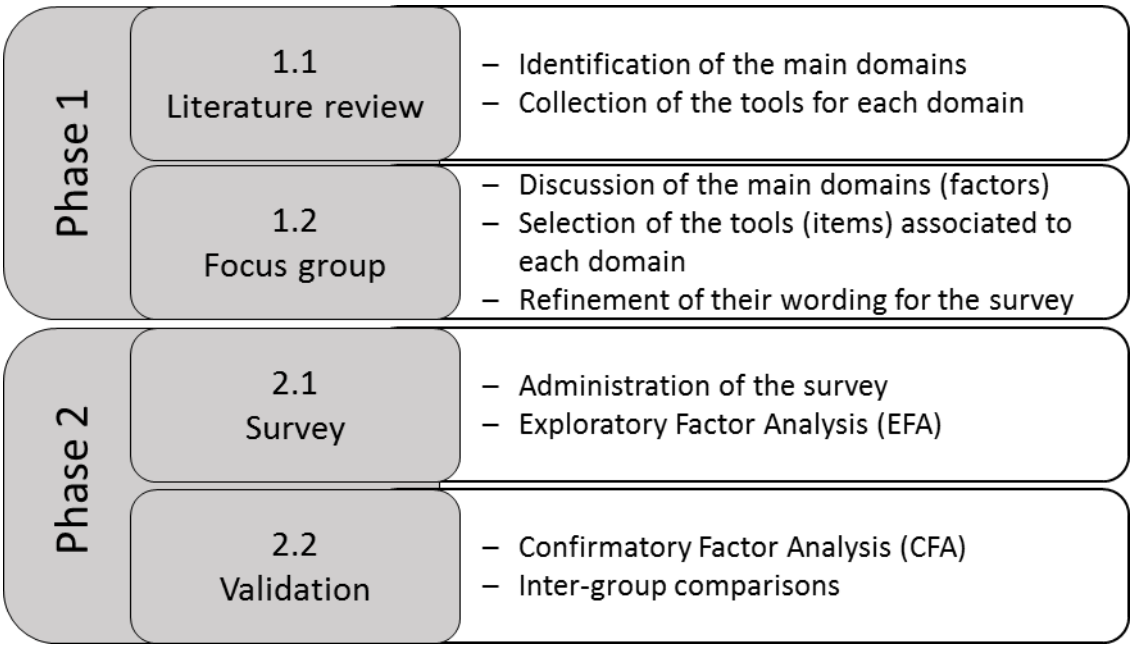


Figure 2. Items' refinement process

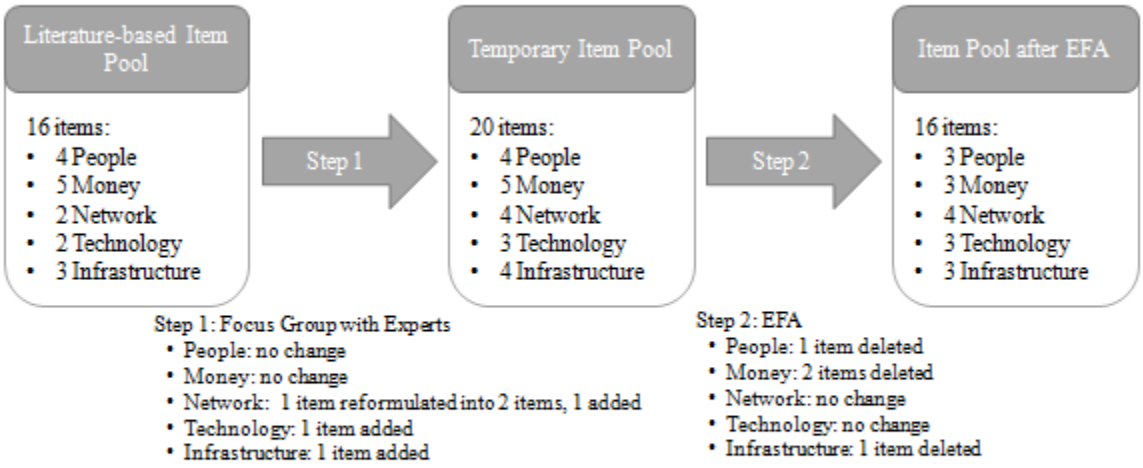
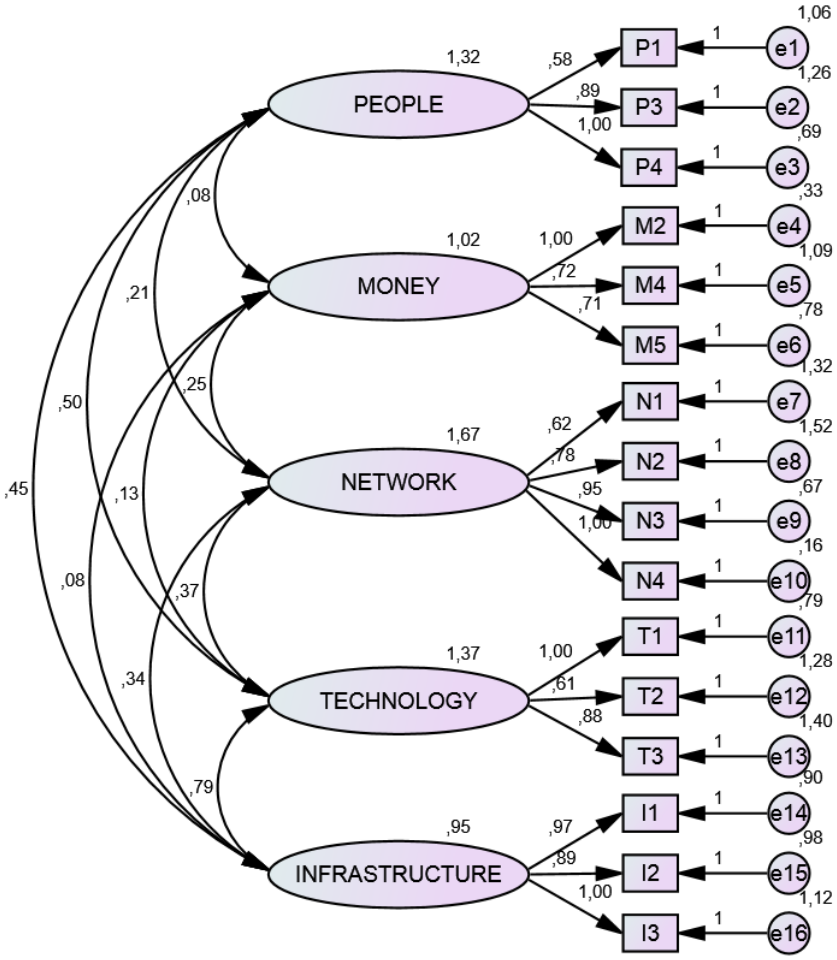


Figure 3. Factor model, with factor loadings, variances and covariances.



N=67; $\chi^2(93) = 118$, p = .043; $\chi^2/df=1.27$; RMSEA = .063; CFI = .926

Table 1. Item-pool and sources (temporary item pool after the focus group)

Domain	Item	Item code	Reference or source
People	Establishment of EU-start-up boot-camps	People1	Kirby, 2006; Clarysse et al., 2009
	Establishment of corporate training programs in entrepreneurship	People2	Kuratko and Montagno, 1989; Kuratko et al., 2001
	Establishment of undergraduate programs in entrepreneurship	People3	Knudson et al., 2005; Verheul et al., 2002; DeTienne and Chandler, 2004; Lee et al., 2005
	Establishment of master programs in entrepreneurship	People4	Knudson et al., 2005; Lee et al., 2005
Money	Private equity in food	Money1	Moskowitz and Vissing-Jørgensen, 2002
	Corporate Venture Capital in food	Money2	Fiet, 1995; Cuervo, 2005; Fogel, 2001
	Crowd-funding in food	Money3	Belleflamme et al., 2013
	Business Angels in food	Money4	Cuervo, 2005; Fiet, 1995
	Proof of concepts in food	Money5	Gulbranson and Audretsch, 2008
Network	Events to foster and lobby for change in the legislation	Network1	Fligstein, 1996; Rao et al., 2000
	Events to share cultural differences	Network2	Focus group
	Initiatives focused on BRICS countries (Brazil, Russia, India and China)	Network3	Wilkinson, 2006; Focus group
	Initiatives focused on overseas countries (exluding BRICS)	Network4	Wilkinson, 2006; Focus group
Technology	Cross-national high potential scouting and match making between intellectual property/entrepreneurial opportunities and researchers	Technology1	Vuola and Hameri, 2006
	Cross-national high potential scouting and match making between intellectual property/entrepreneurial opportunities and company people	Technology2	Napp and Minshall, 2011
	Cross-national high potential scouting and match making between intellectual property/entrepreneurial opportunities and students	Technology3	Focus group
Infrastructure	Pooling technologies across national borders	Infrastructure1	Focus group
	Access to EU-wide infrastructures to share tech-related issues in food	Infrastructure2	Grilo and Thurik, 2004
	Access to EU-shared research & development facilities	Infrastructure3	Howells, 2008
	Access to EU-wide infrastructures to share management-related issues in food	Infrastructure4	Knudson et al., 2005

Table 2. Factor loadings and cross loadings

	Mean	S.D.	Network	Technology	Infrastructure	Money	People	Remarks
Network1	5.04	1.41	**.570**	.205	.162	.154	.165	
Network2	4.13	1.60	**.711**	-.073	.226	.191	.016	
Network3	4.96	1.48	**.770**	.204	-.006	.018	.108	
Network4	4.85	1.36	**.856**	.148	.130	.091	-.023	
Money1	5.25	1.48	.138	.427	-.062	.203	.204	Eliminated due to low factor loading
Money2	5.10	1.35	-.056	**.894**	.069	.122	-.066	
Money3	4.88	1.58	.101	.327	.027	-.044	.105	Eliminated due to low factor loading
Money4	5.36	1.28	-.002	**.580**	.014	-.131	.050	
Money5	5.43	1.17	.219	**.616**	.158	.108	-.024	
Technology1	4.94	1.30	-.034	-.003	**.881**	.348	.071	
Technology2	5.34	1.29	.143	.105	**.750**	.067	.010	
Technology3	5.88	1.15	.268	.016	**.505**	.090	.312	
Infrastructure1	5.15	1.18	-.180	.183	.238	.448	.304	Eliminated due to low factor loading
Infrastructure2	4.57	1.35	.089	-.090	.201	**.622**	.231	
Infrastructure3	4.22	1.32	.045	.036	.137	**.712**	.096	
Infrastructure4	4.55	1.45	.231	.010	.301	**.544**	.109	
People1	5.60	1.23	-.224	.157	.239	.137	**.516**	
People2	5.25	1.28	.269	.032	.008	.352	.078	Eliminated due to low factor loading
People3	4.61	1.53	.211	-.033	.020	.106	**.731**	
People4	5.57	1.43	.068	.073	.053	.161	**.721**	
Initial eigenvalue			4.754	2.459	2.186	1.618	1.333	
Component (rotation sum of square loadings)			2.597	2.000	1.988	1.861	1.697	
Proportion of variance explained (%)			12.983	10.001	9.941	9.303	8.484	
Cumulative proportion of variance explained (%)			12.983	22.985	32.925	42.228	50.712	
Kaiser-Meyer-Olkin measure of sampling adequacy level							.660	
Cronbach's coefficient alpha			.833	.718	.701	.717	.766	

Table 3. Confirmatory Factor Analysis: model comparison

Models	χ^2	df	p-value	χ^2/df	CFI	RMSEA
Null	455	120	***	3.80	-	-
One factor	294	104	***	2.82	.435	.166
Uncorrelated factors	149	104	**	1.44	.865	.081
Correlated factors	118	93	*	1.27	.926	.063
Hierarchical	121	97	*	1.22	.928	.061

Note: CFI = Comparative Fit Index;
RMSEA = Root Mean Square Error of Approximation
*** = p<.001; ** = p<.01; * = p<.05

Table 4. Variable descriptive statistics and mean differences

	Mean	S.d.	Money	People	Technology	Network	Infrastructure
Money	5.55	.96	-	0.29	0.47	0.80	1.10
People	5.26	1.11		-	0.18*	0.51	0.81**
Technology	5.08	1.22			-	0.33**	0.63***
Network	4.75	1.20				-	0.30*
Infrastructure	4.45	1.10					-

*** = p<.001; ** = p<.01; * = p<.05

Table 5. Inter-group comparisons (non-for-profit vs. for-profit), with t-tests

	Non-for-profit		For-profit		Mean	t-test
	Mean	S.d.	Mean	S.d.	difference	sig.
People	5.24	1.19	5.33	.68	-0.09	.712
Network	4.61	1.28	5.31	.49	-0.70	**.003**
Technology	4.94	1.26	5.67	.78	-0.73	**.006**
Infrastructure	4.34	1.11	4.90	.95	-0.56	**.082**
Money	5.64	.97	5.15	.87	0.49	**.077**

Table 6. ANOVA on Geography (North, Central, and South European Countries)

	North		Central		South		Sig.
	Mean	S.d.	Mean	S.d.	Mean	S.d.	
People	5.43	.99	5.05	1.24	5.36	1.05	.474
Network	4.99	1.09	4.38	1.42	4.97	.92	.144
Technology	5.20	1.29	4.69	1.30	5.42	.96	**.097**
Infrastructure	4.54	.96	4.40	1.17	4.43	1.17	.918
Money	5.83	.90	5.65	.89	5.22	1.03	**.098**