The role of institutions for collaboration in setting a competitive cluster ecosystem: the case of the French omega-3 cluster

Fernando G. Alberti*, Jessica D. Giusti and Emanuele Pizzurno

Institute for Entrepreneurship and Competitiveness,
LIUC – Università Cattaneo,
corso Matteotti, 22, 21053 Castellanza, Italy
Email: falberti@liuc.it
Email: jgiusti@liuc.it
Email: epizzurno@liuc.it
*Corresponding author

Abstract: Clusters are increasingly seen as change agents able to influence entrepreneurship, innovation and competitiveness of regions and countries. The dynamic development of clusters, and hence their competitiveness, depends on the quality of their entrepreneurial ecosystems. Institutions for collaboration (IFCs) are expected to be central to the formation and the development over time of a strong cluster ecosystem. Nevertheless, cluster literature lacks in-depth studies on this topic. Thus, the goal of our research is to contribute in the broad debate on the role of IFCs in the competitiveness of a cluster, specifically offering an in-depth understanding of the role of IFCs in the formation and development of a cluster ecosystem. The discussion builds on the in-depth case study analysis of the French omega-3 agrifood cluster with a focus on the role played by an IFC, namely Bleu-Blanc-Coeur.

Keywords: institution for collaboration; IFCs; ecosystem; competitiveness; agrifood; cluster.

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Biographical notes: Fernando G. Alberti is the Director of the Institute for Entrepreneurship and Competitiveness and an Associate Professor of Strategic Entrepreneurship in the School of Business and Management at the LIUC Università Cattaneo. He is a Visiting Professor of Entrepreneurship at the University of Applied Sciences of Southern Switzerland and an affiliate faculty member in the MOC program at Harvard Business School. He has studied in the London School of Economics at the Babson College and in the Jönköping International Business School. He received his PhD in Small Business Economics from LIUC. He is a former Industrial Strategist for UNIDO and the World Bank. He has published in the areas of entrepreneurship, innovation and family firms.

Jessica D. Giusti is a Senior Researcher at the Institute for Entrepreneurship and Competitiveness and a PhD candidate in Business Administration at the School of Business and Management from the LIUC Università Cattaneo where she developed most of her academic activities and where she teaches creative and cultural entrepreneurship and entrepreneurship and regional competitiveness. She is also an affiliate faculty member in the MOC program at the Harvard Business School. Her major research and teaching topics concern tourism clusters, cluster management and governance and creative and cultural entrepreneurship.

Emanuele Pizzurno is the Deputy Director of the Institute for Entrepreneurship and Competitiveness and an Assistant Professor of Management in the School of Industrial Engineering of LIUC Università Cattaneo where he developed most of his academic activities; he is also a Coordinator of the Energy Management course. He is a Research Fellow and a Professor in the Scuola Mattei at the Eni Corporate University and in the Department of Management and Industrial Engineering at the Politecnico di Milano. His major research and teaching topics concern innovation and technology management and the organisation of R&D; he has also long studied environmental strategies and management. On these issues, he is the author of several scientific publications.

1 Introduction

Clusters are increasingly seen as change agents able to influence entrepreneurship, innovation and competitiveness of regions and countries. Regional competitiveness is expected to improve through clusters, given that they contribute to innovative processes, facilitating relations with other institutions, better enabling the consumer needs, canalising knowledge and information needed for development (Porter, 2010; Delgado et al., 2010).

Scholars and policy makers have largely given attention to the understanding of the formation and development of competitive clusters (Porter, 2000, 2008; Porter and Ketels, 2009; Ketels, 2011; Alberti et al., 2014). The dynamic development of clusters, and hence their competitiveness, depends on the quality of their entrepreneurial ecosystems (Isenberg, 2010; Harrison and Leitch, 2010). Paralleling what Isenberg (2010) suggested for entrepreneurial ecosystems, the strength of a cluster ecosystem may depend on a conducive culture enabling policies and leadership, the availability of appropriate finance, the quality of human capital, venture-friendly markets for products, and a range of institutional and infrastructural supports.

Institutions for collaboration (IFCs) – i.e., formal or informal actors promoting the formation and development of clusters amongst actors involved (Porter and Emmons, 2003) – are expected to be central to the formation and the development over time of a strong cluster ecosystem. Prior literature on IFCs (e.g., Porter and Emmons, 2003; Waxel, 2009; Mikkola and Mahlamäki, 2011) has recognised different kind of IFCs as one of the main categories of cluster actors. IFCs are considered a constitutive part of the cluster model, since its initial conceptualisations (Porter, 2000). Ketels et al. (2012) suggest that IFCs are particularly apt to increase the competitiveness and the development of clusters

by bringing different types of actors together: for instance, they may connect business with academia, education with industry, large firms with small firms and so on. IFCs are expected to do this by providing activities and arenas where common issues can be discussed and acted on jointly. Likewise, practitioners believe IFCs do play a key role in setting up and supporting a strong and competitive cluster (Ketels et al., 2012).

Nevertheless, despite the key role attributed to IFCs in clusters and the increasing resources invested in IFCs worldwide, the literature on IFCs is scanty, with very little empirical research, no in-depth case studies, and poor theorising on the role of IFCs in the formation and development of clusters and cluster entrepreneurial ecosystems. Anecdotic evidence reports that competitive clusters do rely on IFCs as brokers of knowledge and network builders. Nevertheless, cluster literature lacks in-depth studies on this topic.

Thus, the goal of our research is to contribute in the broad debate on the role of IFCs in the competitiveness of a cluster, specifically offering an in-depth understanding of the role of IFCs in the formation and development of a cluster ecosystem. The research question guiding our study is: 'which is the role of IFCs in the formation and development of a cluster entrepreneurial ecosystem?' Since this topic has been widely overlooked in literature, it demands further empirical evidence and conceptual insights.

The discussion builds on the in-depth case study of the French omega-3 agrifood cluster. A case study approach (Yin, 2003) requires that several methods and empirical sources contribute to offer a holistic understanding of the phenomenon of interest. The overall research design is longitudinal, and it covers the formation and development of the omega-3 cluster and the role played by a specific IFC – namely Bleu-Blanc-Coeur – in it. To collect data on the formation and development of the cluster and the role played by such IFC, we conducted archival research of available data, mainly based on documentary sources, including previous studies, industry archives (of industry associations and institutions), press archives of local and industry newspapers and magazines, websites, official press releases, and public reports. We also collected primary data from cluster actors (firms, government, business associations, service providers, universities, etc.) through interviews. We checked for triangulation of different data sources in order to obtain more robust evidence.

The purpose of this study was to determine the role played by IFCs in launching, supporting and developing a competitive cluster, through the lenses of a cluster entrepreneurial ecosystem. The empirical results of this study suggest several points of discussion. More precisely, the study uncovers the complex role of IFCs required at different levels of a cluster ecosystem to support its formation and development, and thus enhance the competitiveness of a cluster. Our findings illuminate regional policy-makers understand the role of IFCs in the formation and development of clusters. The paper concludes with contributions and suggestions for further research.

The structure of the paper is as follows. The Section 2 of this article will review the literature concerning cluster formation and development and the role attributed so far to IFCs, with the conceptual lenses of cluster entrepreneurial ecosystems. The Section 3 of this article will discuss research methods used (research design, data collection and data analysis). The Section 4 will present the analyses conducted on the case study of the French omega-3 cluster, where theoretical insights are derived from data and discussed. The Section 5 concludes by discussing the contributions and future development of the present study, together with directions for further research.

2 Theoretical background

2.1 Cluster formation and development

Scholars and policy makers have largely given attention to clusters (Porter, 2000, 2008; Porter and Ketels, 2009; Ketels, 2011). Porter (2000) defines a cluster as "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities". Clusters encompass also other entities that are important for their competitiveness, such as suppliers of specialised inputs, service providers, specialised infrastructure, and institutions (public or private), such as universities, training providers or trade associations.

The topic of cluster formation and development is a top priority in the agenda of many regional development agencies and national governments (Porter, 2010), since they are increasingly seen as change agents able to influence entrepreneurship, innovation and competitiveness of regions (Porter, 2000; Mytelka and Farinelli, 2000; Sölvell et al., 2003; Alberti and Giusti, 2012; Alberti et al., 2014).

As pointed out by Feldman (2001) clusters formation is a process that relies on the co-evolution of technology, business models and local supporting institutions. Likewise, clusters development much depends on the actual capacity of clusters to activate a critical mass of collaborations among heterogeneous actors (firms, capital providers, research organisations, local government, etc.) so that knowledge can flow and innovation flourishes (Malmberg and Maskell, 2002).

Companies located in clusters can benefit greatly from external economies, collaborations, and exchange of knowledge between organisations (Unido, 2001; Karaev et al., 2007; Capó-Vicedo et al., 2008). Social capital elements, such as values, norms, attitudes, trust and networks facilitate coordination and collaboration among cluster firms (Melander and Nordqvist, 2001). There is increasing evidence in literature (e.g., Alberti et al., 2011), linking social capital with knowledge exchanges among cluster firms, which in turn may facilitate innovation and hence competitiveness.

Besides the external economies that naturally emerge in clusters, companies may benefit greatly from local supporting institutions oriented towards satisfying specific needs of the cluster participants (Karaev et al., 2007) as well as through planned joint actions, which are enabled by cooperation and collaboration among firms (Carpinetti and Lima, 2013). As a matter of fact, the benefits of the typical cluster external economies may be extended if firms act together through joint actions that stimulate them to collaborate for the common good (Bititci et al., 2004).

However, joint actions require some sort of coordination, whose role is to intermediate the interests of companies and coordinate the execution of activities related to the joint action (Schmitz and Nadvi, 1999; Sölvell et al., 2003; Gerolamo et al., 2008). We are referring to those intermediary institutions that are a constitutive part of the cluster model, since its initial conceptualisations (Porter, 2000). To this regard, Porter and Emmons (2003) argue that such intermediary organisations may have a significant effect on competitiveness. They call them 'institutions for collaboration' (IFCs).

IFCs may promote the cluster formation through cluster initiatives (i.e. top-down development of cluster cooperation) both internally and externally, and perform a series of cluster actions for enhancing the competitiveness of a cluster along its development. There is large consensus in cluster theory and amongst cluster operators that IFCs play a

key role in the formation and development of a cluster and in the enhancement of its competitiveness over time in several ways.

2.2 IFCs in competitive clusters

Prior literature on IFCs (e.g., Porter and Emmons, 2003; Waxel, 2009; Mikkola and Mahlamäki, 2011) has acknowledged several kinds of IFCs, for example: industry associations, professional associations, chambers of commerce, technology transfer organisations (Chiesa et al., 2008b), quality centres, specialised service providers, training centres, non-profit think tanks, university alumni associations, and others. IFCs can be defined as formal or informal actors promoting the formation and development of clusters amongst actors involved (Porter and Emmons, 2003) and their role may vary considerably. IFCs do not participate directly in the supply chain, but are fundamental for the cluster activities (Porter, 2008). In some cases, IFCs may just be oriented to particular and specific needs of the cluster participants, while in others they may be at large local supporting institutions for the competitiveness of clusters (Karaev et al., 2007). These institutions may assume a variety of forms: private organisations, public agencies, industry associations or PPPs (public-private partnerships) (Widdus, 2005). The form of local IFCs is also influenced by cultural issues, business specificities, economic settings and the existing social capital in the cluster.

Several terms can be found in literature to refer to these supporting institutions, apart from IFCs (Sölvell et al., 2003, 2008): cluster initiatives (Sölvell et al., 2003; Ketels and Sölvell, 2006), cluster organisations (Ketels et al., 2012), cluster associations (Aragon et al., 2012; Aranguren et al., 2013; Valdaliso et al., 2011), industry associations (e.g., Cooke, 2002; Giuliani, 2005; ITD, 2009), regional development agencies (Peck and McGuinness, 2003; Seliger et al., 2008) or institutional thickening (Andriani et al., 2005). In this paper we refer to local supporting institutions in clusters as IFCs.

In spite of that, there seems to be consensus in literature that regardless of the way IFCs are named, conceived or come about in a cluster, they play a critical role in fostering networks formation, managing and facilitating interactions and the sharing of knowledge, as well as in providing a cognitive framework for transforming information into useful knowledge (Audretsch and Lehmann, 2006; Steiner and Ploder, 2008). As already stated above, such institutions are particularly vital for the coordination of joint actions (Seliger et al., 2008), and diffusion of specific knowledge inside the cluster. To this regard, Porter and Emmons (2003, p.1) state that: “at the most general level, IFCs affect productivity and competitiveness by playing a variety of intermediary roles in local, regional, national and even international markets, such as performing collective activities (e.g., training or information collection), facilitating relationships, and setting standards”. Schmitz and Nadvi (1999) contend that local agencies should mediate conflicts of interest that may arise between companies within the cluster. The role of IFCs may differentiate a mere agglomeration of companies from a cluster that aims to improve its competitiveness through joint actions and network formation (Gerolamo et al., 2008).

Pioneer case studies of IFCs (Porter and Emmons, 2003) have focused on the Centre Suisse d’Electroniqueet de Microtechnique (CSEM) and the AsociacionCombiana de IndustriasPlastica (Acoplasticos). Some authors have reported on cases of such institutions, such as Sölvell et al. (2003), Gerolamo et al. (2008), Valdaliso et al. (2011) and Aranguren et al. (2013). The European cluster observatory lists today some 1400

cluster organisations of this kind and the global cluster initiative survey collected data in 2012 from 254 cluster organisations in Europe, statistically confirming the key role of IFCs for clusters formation and development. Despite the prevalence and variety of IFCs, some descriptive case studies and worldwide inventories, as already signalled by Porter and Emmons (2003) ten years ago, there is still little research on the authentic role and impact of these institutions in cluster formation and development.

Sölvell et al. (2003) argue that after a cluster's formation, the cluster tends to accumulate resources and commitment of its members, which may culminate in the establishment of local IFCs. According to Sölvell et al. (2003) IFCs typically are formal institutions maintained with fees paid by local firms that seek to balance the individual interests of the different actors involved in the cluster. IFCs may act upon the quality of life, education, infrastructure (transportation, energy, and communication), tax regulation, export strategy, quality standards, research and training, and so forth (Sölvell et al., 2008; ITD, 2009).

Nevertheless, IFCs do not only emerge as a consequence of cluster development, but they can also play a key role in clusters formation. Through leadership, strategic view, activating networks and channelling resources they contribute to the increased efficiency of cluster and thus they could accelerate its growth and competitiveness (Waxell and Malmberg, 2007; Ketels et al., 2006). In this way, IFCs may foster, activate or govern a cluster initiative. Cluster initiatives can be defined as "collaborative actions by groups of companies, research and educational institutions, government agencies and others, to improve the competitiveness of a specific cluster [... for example] by raising the awareness of companies within a cluster and creating more effective platforms for interaction [... or providing] a platform for a better dialogue between the private and the public sector when making decisions about how to improve the cluster-specific business environment" [Ketels and Memedovic, (2008), p.384]. IFCs promoting cluster initiatives (Sölvell et al., 2003) are expected to be central to the formation and the development over time of a competitive cluster. More precisely, for a cluster to arise there should be a number of companies and other actors specialising in one or few related industries, but a cluster achieves its inner dynamics only if the interrelations among companies reach a critical mass. To this regard, IFCs may be crucial in setting proper rules of the game and in fostering the achievement of that critical mass of relations.

This introduces a dynamic view of clusters, that quite recently in literature has contributed to the affirmation of the so-called 'life cycle perspective' of clusters (Enright, 2003; Dalum et al., 2005; Alberti, 2006; Martin and Sunley, 2011; Elola et al., 2012). According to this view, clusters follow cyclical development patterns, passing through a number of stages. This means that clustering is a dynamic process that can be either totally spontaneous or corroborated by the intervention of IFCs at different stages of development, from a cluster inception to its decline.

Increased efficiency and productivity of cluster companies coupled with increased networking among themselves and with other specialised assets and suppliers are expected to reinforce the cluster social capital and, hence, close interactions are expected to favour knowledge exchanges and spillovers and, thus, innovation (Alberti and Pizzurno, 2013) and the formation of new businesses which expand and strengthen the cluster itself. Such virtuous cycle characterises a competitive cluster. Competitive clusters are particularly beneficial places for innovation and entrepreneurship and practitioners believe IFCs do play a key role in setting up and supporting a strong and competitive ecosystem (Sölvell et al., 2003; Ketels et al., 2006; Viaschka, 2012).

2.3 Cluster entrepreneurial ecosystems

The formation and development of clusters, and consequently their competitiveness, depends on the quality of their entrepreneurial ecosystems (Isenberg, 2010; Harrison and Leitch, 2010).

Strong and competitive entrepreneurial ecosystems are expected to be characterised by:

1 more market and technological opportunities (Chiesa et al., 2008a, 2008b)

2 joint R&D activities

3 easier access to information on the market and on technological advances (Chiesa et al., 2007)

4 human capital development

5 greater access to scarce resources and skills

6 increase in production capacity and operational flexibility

7 opportunities to ensure complementarities of activities, more efficient roles and joint activities

8 creation of an atmosphere of mutual trust

9 increase in the speed action and in market responses (Kowalski and Marcinkowski, 2012).

The concept of the entrepreneurial ecosystem has emerged as a benchmark for designing and implementing entrepreneurship policies in regions and clusters. Most definitions agree that ecosystems consist of a set of different interconnected actors within a specific area, which includes at least the following building blocks: universities and R&D institutions, qualified human resources, formal and informal networks, governments, angel investors and venture capitalists, professional service providers, and an enterprising culture which connects all of these factors in an open and dynamic way (Cohen, 2006; Isenberg, 2010; Neck et al., 2004; West and Bamford, 2005).

Entrepreneurial ecosystems include a wide variety of collaborative and competitive firms, knowledge institutions, investors, service providers, international organisations, cluster organisations and many more. Ecosystems reflect the specialisation that takes place in clusters and are nurtured by entrepreneurial initiatives and business opportunities. This implies that entrepreneurial ecosystems are the result of the very specific and idiosyncratic way in which these factors are locally available and combined and, therefore, different factors are at play in different cluster contexts (Isenberg, 2010; West and Bamford, 2005).

According to what Isenberg (2010) suggested an entrepreneurial ecosystems general framework, the strength of a cluster entrepreneurial ecosystem may be influenced by a conducive culture, enabling policies and leadership, the availability of appropriate finance, the quality of human capital, venture-friendly markets for products, and a range of institutional and infrastructural supports.

In brief, reference scholars are converging on the concept of entrepreneurial ecosystems made up of three key factors:

1 the existence of a critical mass of entrepreneurs, firms, and specialised institutions in a particular field

2 the development of a dense network of relationships among these actors

3 a favourable culture that ties all the above-mentioned components together.

In Table 1, we report all most cited factors at the base of an entrepreneurial ecosystem.

Table 1 Factors affecting the quality of entrepreneurial ecosystem

Entrepreneurial ecosystem factors		*Reference literature*
1	Market opportunities and information	Kowalski and Marcinkowski (2012), Suresh and Ramraj (2012) and Isenberg (2010)
2	Technology opportunities and information, joint R&D	Kowalski and Marcinkowski (2012), Suresh and Ramraj (2012), Chiesa et al. (2007) and (2008a) and West and Bamford (2005)
3	Human capital development	Kowalski and Marcinkowski (2012) and Isenberg (2010)
4	Complementarities, networks and joint activities	Kowalski and Marcinkowski (2012), Suresh and Ramraj (2012), Cohen (2006), West and Bamford (2005) and Neck et al. (2004)
5	Physical infrastructure	Cohen (2006), West and Bamford (2005) and Neck et al. (2004)
6	Culture	Isenberg (2010), Cohen (2006), West and Bamford (2005) and Neck et al. (2004)
7	Enabling and supporting policies and institutions	Suresh and Ramraj (2012), Isenberg (2010), Cohen (2006), West and Bamford (2005) and Neck et al. (2004)
8	Financial resources	Suresh and Ramraj (2012), Isenberg (2010) and West and Bamford (2005)

For a strong and competitive cluster entrepreneurial ecosystem the mere existence of institutions constitutes a necessary but insufficient condition. In fact, IFCs are expected to have an active role in the formation and development of a cluster entrepreneurial ecosystem in several ways (Sölvell et al., 2003; Kantis et al., 2004; Teigland et al., 2006; Teigland and Lindqvist, 2007; Waxel, 2009; Mikkola and Mahlamäki, 2011; Kowalski and Marcinkowski, 2012; Laur et al., 2012; Galliè et al., 2012; Ketels et al., 2012). In particular, Kantis et al. (2004) suggest that IFCs may play a key role along the life cycle of a cluster, fostering its entrepreneurial ecosystem in several areas:

1 cultural context

2 social structure

3 economic conditions

4 educational system

5 R&D institutions

6 networks and social capital

7 productive structure and dynamics

8 factor markets

9 policies and regulations.

Finally, the cluster initiative greenbook suggests that IFCs may be active in joint marketing activities, training, developing of technical standards, coordinating joint R&D projects, promoting commercialisation of academic research, supply chain development, improving the regulatory environment, and lobbying for better infrastructure or foreign direct investment (FDI) incentives (Sölvell et al., 2003). In Table 2, we offer a comprehensive overview of prior literature discussing the possible actions an IFC may take vis-à-vis the already mentioned factors at the base of an entrepreneurial ecosystem.

Table 2 IFCs actions supporting the entrepreneurial ecosystem factors

Entrepreneurial ecosystem factors	*Institutions for collaboration*	
	IFCs actions	*Literature references*
1 Market opportunities and information	Join marketing Improve visibility Promoting collaborations between firms and global markets	Ketels et al. (2012), Teigland et al. (2006), Kantis et al. (2004), Porter and Emmons (2003) and Sölvell et al. (2003)
2 Technology opportunities and information, joint R&D	Joint R&D projects Promoting commercialisation of academic research To strengthen the regional innovation system Promoting collaborations between firms and research institutions	Gallié et al. (2012), Ketels et al. (2012), Teigland et al. (2006) Kantis et al. (2004) and Sölvell et al. (2003)
3 Human capital development	Training Attracting students to science Empowering entrepreneurship and leadership Promoting collaborations between firms and educational institutions	Ketels et al. (2012), Teigland et al. (2006), Kantis et al. (2004), Porter and Emmons (2003) and Sölvell et al. (2003)
4 Complementarities, networks and joint activities	Supply chain development Sharing of knowledge Facilitating relationships Promoting collaborations between firms	Ketels et al. (2012), Gerolamo et al. (2008), Seliger et al. (2008) and Audretsch and Lehmann (2006) Kantis et al. (2004), Porter and Emmons (2003) and Sölvell et al. (2003)

Table 2 IFCs actions supporting the entrepreneurial ecosystem factors (continued)

Entrepreneurial ecosystem factors	*Institutions for collaboration*	
	IFCs actions	*Literature references*
5 Physical infrastructure	Development of incubators Supporting and lobbying infrastructures development	Teigland et al. (2006) and Sölvell et al. (2003)
6 Culture		Sölvell et al. (2003) and Kantis et al. (2004)
7 Enabling and supporting policies and institutions	Development of rules and scientific and technical standards Lobbying Tax regulations and incentives	ITD (2009), Sölvell et al. (2003) and Kantis et al. (2004)
8 Financial resources	Attracting FDIs Promoting collaborations between firms and financial institutions	Ketels et al. (2012), Teigland et al. (2006) and Sölvell et al. (2003)

Thus, the goal of our research is to contribute in the broad debate on the role of IFCs in the competitiveness of a cluster, specifically offering an in-depth understanding of the role of IFCs in the formation and development of a cluster ecosystem.

3 Methodology

The research design of this study relies on a case study approach (Yin, 2003), according to which several methods and empirical sources contribute to offer a holistic understanding of the phenomenon of interest (Eisenhardt, 1989). The overall design of the research is longitudinal, and it covers the formation and development of the French omega-3 cluster from 2001 till 2013 and the role played by a specific IFC – namely Bleu-Blanc-Coeur – in it. Due to the richness and great availability of information about the case, our study primarily relied on the use of secondary data (Reddy and Agrawal, 2012). To collect data on the formation and development of the cluster and the role played by such IFC, we conducted archival research of available data, mainly based on documentary sources, including previous studies, industry archives (of industry associations and institutions), press archives of local and industry newspapers and magazines, websites, official press releases, and public reports. Secondary data was collected and analysed to convene the requirements of the research objectives of this paper.

We also collected primary data from cluster actors (IFC representatives, firms, government, service providers, universities, etc.) through direct, phone, skype-administered and mail interviews. In total we interviewed fifteen cluster experts/operators and transcribed texts corroborated previously collected secondary data. We checked for triangulation of different data sources in order to obtain more robust evidence (Jick, 1979).

The aim of processing data was twofold:

1 showing the development of the cluster and its entrepreneurial ecosystem, from its birth up to nowadays

2 exploring the role of an IFC in the process of cluster entrepreneurial ecosystem formation and development.

The underlying logic of data analysis was primarily grounded theory building, which involves inducting insights from field-based case data (Miles and Huberman, 1984). Grounded theory building was chosen because of the aim to generate novel insights into a rarely explored phenomenon, even if with the theoretical pre-understanding coming from the 'entrepreneurial ecosystem' framework. We organised and classified empirical data both chronologically (to track the life cycle of the cluster) and thematically (around the main categories offered by the 'entrepreneurial ecosystem' view).

4 The case of the French omega-3 cluster

Following the stream of the new conception of competitiveness based on clusters, in 2005 the French government adopted a competitiveness clusters policy with the aim of giving official accreditation to the competitive clusters operating in the country (France Clusters, 2003). The role of the government has been fundamental since it has always been acting as a supporting player for the development of the different clusters. The first step towards this direction, after the attribution of official accreditation of clusters, was the provision of dedicated funds; the second one consisted in granting tax exemptions to businesses developing cooperative innovative projects with and for the clusters (Les Pôles de Compétitivité, 2013).

4.1 The agrifood industry in France

The French agrifood sector is the European leader in that industry (French Embassy in the US, 2013) with a production that represents the 19% of the European agricultural goods; indeed the French agrifood industry transforms about 70% of the French agricultural production (Ministère de l'agriculture de l'agroalimentaireet de la foret, 2013). Some popular products like wine and dairy products are outstanding to this respect and they make France well known all over the world. The agrifood industry has always been one of the major engines of France (Humphrey, 2006), contributing significantly to its economic performances: it registered in 2010 revenues for €143.6 billion Euro, overcoming the automotive industry in the ranking of the best performing industry and employing 477,000 workers, making it the largest employer in France right after the mechanical engineering sector (Ministère de l'agriculture de l'agroalimentaireet de la foret, 2013), and over the 10% of the added value in the entire French industry (French Embassy in the US, 2013). One of the reasons why the French food industry is performing so well is that it is grounded on great assets which are transformed in a valuable production, that is well known worldwide for its high quality and amazing taste, like the diary products (among the others cheese and butter) and wine.

Within the competitive French agrifood sector, in 2000 the scientific research on the health benefits connected to omega-3 fatty acids pushed to a re-organisation of French

agrifood operators at large, from vegetal producers to animal feeders, from stock-breeders to farming producers, processors and distributors. What came out from several researches was that the fat composition of dairy products and meat itself is highly dependent on the fat composition of the diet of the animals. Thus, the basic idea – starting from a more serious consideration of the nutritional value of food – was to focus on the vegetal sources of omega-3 (for example the one contained in the flax, that is the richest existing plant in omega-3) to feed animals, so to positively affect the entire 'nutritional chain' improving health for animals as well, indirectly, for the final consumers. The entire process of clustering of producers, farmers, processors, distributors, research centres, certification operators, etc., was promoted and fostered by one IFC, i.e., the association Bleu-Blanc-Coeur.

The experience of the French omega-3 cluster constitutes a benchmark amongst French clusters, not only because it revolves around one of the most important sectors for France – i.e., the agrifood industry – but also because it allows us learn how a key IFC – the association Bleu-Blanc-Coeur – played a role in the formation, development, and hence competitiveness of the entire cluster.

4.2 Omega-3 and flax cultivation

Omega-3 fatty acids (also called ω−3 fatty acids or n−3 fatty acids) refer to a group of three fats called ALA (found in plant oils), EPA, and DHA (both commonly found in marine oils). These acids, abbreviated to ALA (alpha-linolenic acid) could be found in flaxseeds, flaxseed oil (the most concentrated source of ALA in nature), canola (rapeseed) oil, soybeans, soybean oil, and other plants.

Omega-3 are very helpful for the functioning of the human organism, but the body itself is unable to produce them and has difficulties in assimilating ALA from vegetables; so, the best way to intake them, is directly from meat disguised as EPA and DHA (eïcosapentaenoic acid and docosahexaenoic acid). In nature we can find omega-3, apart from the vegetable sources mentioned above, in cold water fish meat such as salmon, mackerel, halibut, sardines, tuna, and herring. Fortunately birds and ruminants (whose meat does not contain high levels of omega-3) are able to turn ALA into EPA and DHA: when an herbivorous animal eats grass or algae it concentrates ALAs in its own tissues and makes its own enzymes, specific to the animal kingdom, work on them. omega-3 are necessary for human health and play a crucial role in brain functions, normal growth and development and can also reduce the risk of heart diseases, cancer, and arthritis. Unfortunately researches on consumers have shown that the actual the intake of omega-3 in the average human diet is equivalent to a third of the recommended amount. These same researches have also shown that between 50% and 75% of the actual intake is provided by terrestrial animals, with a special place reserved for dairy products that alone provide nearly 50% of the total intake.

Flax (Berglund, 2002) is one of the first crops domesticated by man: it is an annual plant that has a distinct main stem with numerous branches at the top that produce flowers. The required conditions to cultivate flax are fertile, fine textured and clay soils, moderate summer temperatures and sufficient, but not excessive, rainfalls. Flax is cultivated principally for its fibre and oil, which are exploited in a huge number of industries. Since many thousand years, flax has been employed as food for animals in many areas all around the world and it is a much appreciated feed for livestock, due to its high protein content. Despite the poor employment, flax is considered a safe and unique

fibre to feed animals: fibres are easy to digest, such as other fibrous materials, and do not create indigestible balls in the stomach of animals. Flax used to feed animals is called linseed cake or linseed meal and corresponds to the flaxseed without oil. In fact, linseed meal derives from the fine residual ground (known as cake, chips, or flakes), which remains after the oil extraction.

4.3 The diamond model of omega-3 cluster

The diamond model (Porter, 2008) depicts the competitiveness position of the omega-3 cluster (as in Table 3). More in detail, hereafter are described the components of the model.

1 *Factor conditions*

As far as the factor conditions are concerned, the further positive points are many and are: the good climate and a fertile soil, that are fundamental in order to conduct businesses in the agrifood sector (which is stimulated also by a well developed agricultural industry, where many firms operate, enforcing cluster competitiveness) and the long tradition in flax cultivation, that enables the presence of a trained and expert workforce. Despite some difficulties in assessing financing, resources can be raised having access to subsidies and financial aids provided by the government and by operating in the Paris stock exchange, which is one of the most vital all over the world.

2 *Demand conditions*

The demand conditions are highly positively affected by:

- the new attention to diet and healthy lifestyle
- the sophisticated demand for dairy products (that has a really long tradition in France)
- the strict regulations that set precise standards to be respected in the production and procession of milk
- the necessity of facing diseases, like obesity and diabetes, that represent a major concern for the French government
- the presence and the enforcement of research studies, pushed and incentivised by the French government, which is the only one in Europe allowing tests on living animals
- reserved shelves present in supermarkets that enable direct promotion and differentiation from the product range available at retail stores.

Table 3 The French omega-3 cluster competitiveness assessment through the diamond model

Factor conditions	*Demand conditions*	*Related and supporting industries*	*Context for firm strategy and rivalry*
• Developed agricultural industry • Efficient physical infrastructures • Scientific and technological infrastructures • Natural endowment (fertile soils for flex cultivation) • Good climate • Long tradition in flax cultivation (humane resources) • Investments in textile sector (linen) • Trained work force • Vitality of Paris stock exchange market • Ease in doing business in France (no minimum capital requirement to start a business) • Nuclear energy • Inefficient bureaucracy • Difficulty in assessing financing	• New attention on diet and health • Very sophisticated demand for dairy products • Need to face diabetes and obesity • Strict milk quality standards due to the large consumption of not pasteurised milk products • Need to come back to traditional healthy food (due to the increasing and recent epidemic of obesity, because of the junk food, which has replace the of traditional healthy French cuisine in French eating habits) • Department stores: dedicated shelves for BCC products (CSR/shared value) • France is the only European state that allows to conduct research on living animals • Introduction of experimental cow-sheds	• R&D (supported also by Government) • Universities and Research Centers (CERN and INRA) • Limited exportations	• IFC: common brand (BBC product: Filière nutrition, omega-3 natureles, Association Bleu-Blanc Coeur) • Open standards within the association • Open French market • FDI: 33.9 billion$ • Tendency to protectionism in the agricultural sector • Strictly regulated and inflexible labour market • Non tariff barriers due to the inefficient bureaucracy

3 *Related and supporting industries*

Regarding related and supporting industries positive aspects lie in the quality and quantity of displayed education and in the enforcement of the research and development field. Major concern is represented by the limitation in exports due to the yet low reputation of these improved products in terms of nutritional composition. Government investment in R&D in food industry, through

a tax credit and financial aids

b investment program on creation of cohorts

c the French national food program (PNNS)

d the national health and nutrition program

e agreement signed within the industry sector to promote more physical activity and a better diet.

4 *Context for firm strategy and rivalry*

Positive aspects in the context for firms, strategy and rivalry are mainly related to the activity of BBC that, operating as an IFC, enhances and stimulates competition besides promoting the activity of the cluster, creating standards for the entire value chain, increasing the international profile of the territory and attracting good amounts of foreign direct investments. Negative points are represented by the general tendency, that, it is to be said, is shared by most European countries, to protect the agricultural sector and the high costs (non tariffs barriers) to be borne because of the inefficient bureaucracy, in addition the inflexibility of labour markets.

The IFC BBC has played a role in the overall cluster competitiveness and still can contribute in solving weak areas in the cluster diamond as well bridging gaps in the cluster (Sölvell and Williams, 2013). So far, BBC has played a dramatic role in setting a conducive culture, enabling policies and exerting leadership over the cluster, increase and administer the availability of appropriate finance, raising the quality of human capital, favouring venture-friendly markets for products, and proposing a range of institutional and infrastructural supports. Following the suggestion of Kantis et al. (2004) BBC has played a key role along the life cycle of the omega-3 cluster, fostering its entrepreneurial ecosystem in several areas:

1 cultural context

2 social structure

3 economic conditions

4 educational system

5 R&D institutions

6 networks and social capital

7 productive structure and dynamics

8 factor markets

9 policies and regulations.

4.4 Bleu-Blanc-Coer: an IFC in the omega-3 cluster

The association Bleu-Blanc-Coeur (BBC) was created in 2000, as published on the Journal Officiel n. 609 the 19th August 2000 in the annex 1 (Bleu-Blanc-Coeur, 2013). BBC has been operating in France as an IFC devoted to give birth to the omega-3 cluster and promote its development over time. BBC is an international association that involves many firms that freely decide to join and operates in the attempt of spreading the acknowledgment of omega-3 benefits trying to set shared quality and production standards (to be applied along the entire value chain), the mission of the association has always been to promote a more healthy diet based on products that have an improved nutritional composition in terms of fat, in particular the attention is focused on those firms that use vegetal sources (for example the one contained in the flax, that is the richest existing plant in omega-3) rich in omega-3 to feed animals.

Nowadays the adherents are 350 firms divided in seven 'collèges' (+1 international) including all the actors of the value chain, from the flax producers to the final consumers, who are included in the activities of the association, on the base of an equal shared responsibility (Bleu-Blanc-Coeur, 2013). The seven collèges are the following: the vegetal producers, the animal feeder, stock-breeder, farming producers, the processors, the distributors and the consumers.

4.5 The formation and development of the omega-3 cluster

The omega-3 cluster is a relatively new one, as its birth can be traced back to 2001, right after the creation of the association BBC settled in 2000. As an IFC, BBC was specifically conceived to give birth to the above mentioned cluster and promote its development over time.

The omega-3 cluster exists mainly because of the intervention of the IFC, named BBC, that – starting from the existence of a critical mass of entrepreneurs, firms, and specialised institutions in the French agrifood business – has:

1 set rules and standards

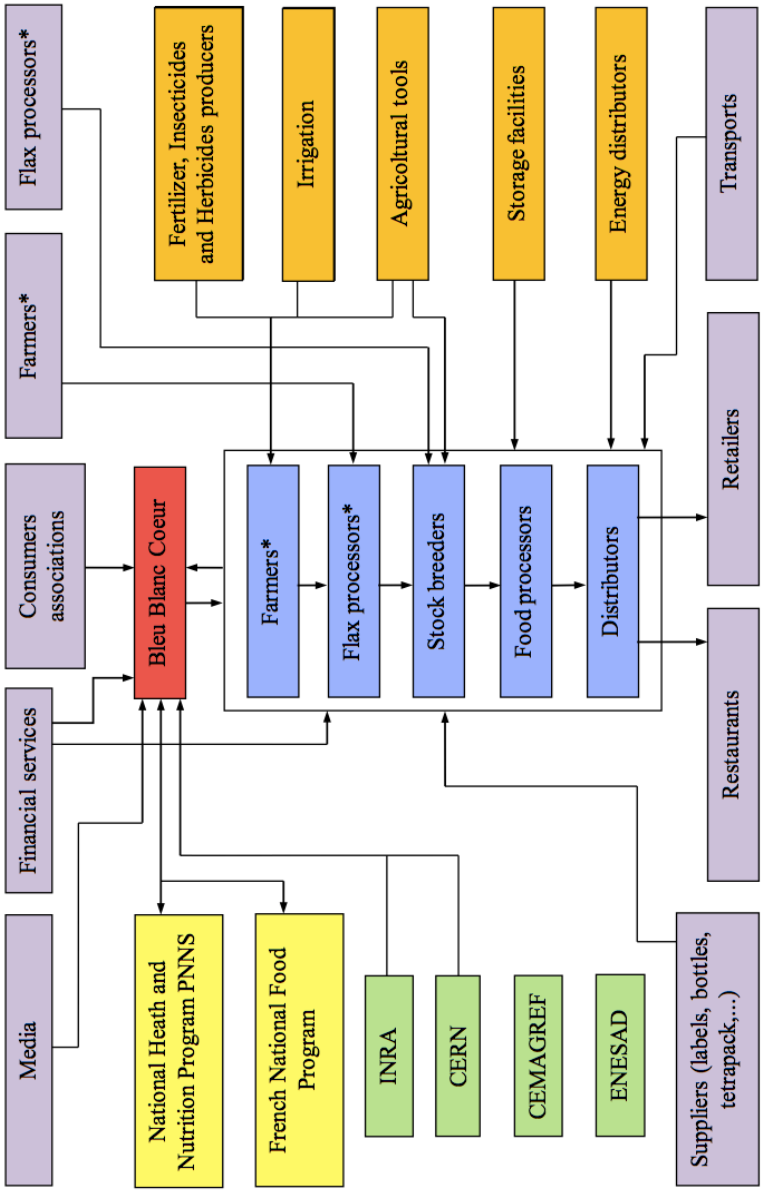
2 injected competencies, information and knowledge

3 promoted certifications in order to create a favourable culture for the cluster to develop and strengthen.

This promoted the incremental development of a denser network of relationships among agrifood actors concerned with the entire process of cultivating, feeding, breeding, processing and distributing healthier products.

The association represents the heart of the cluster: it acts as a stimulus for the entire ensemble of the players, grounding on the founding of research centres, like INRA and CERN, with whom BBC entertains strict and dual relationships. Important support is given also by other institutions and educational centres, like CEMAGREF (Centre d'Étude du MachinismeAgricole et du Génie Rural des Eaux et Forêts) and ENESAD (Établissement National d'EnseignementSupérieurAgronomique de Dijon). BBC also favoured the setting of efficient infrastructures, which - despite the distance among the associated firms – enabled the formation of a network of specialised operators and, thus, the formation and development of the cluster.

Figure 1 The French omega-3 cluster map (see online version for colours)



The main industry specialisation of the omega-3 cluster is agrifood whose core activities range from the farmers to the distributors. A fundamental role in such kind of productions is represented by actors supplying quality inputs. The government has always given a crucial contribution, since it has indeed recognised the activity made by the association BBC involving it in two national programs concerned with nutrition and food processing/consumption. The cluster is also composed by many related and supporting industries:

1 farmers and flax processors, that help completing the phases done by actors involved in core activities

2 retailers, that distribute the products to final consumers

3 suppliers, who are in charge of providing packaging and all necessary physical stuff to sell the product

4 transportation

5 financial services, that support the activities granting loans and other credit line

6 media, that are the mean through which the association BBC communicates and promotes its activities (further promotion is made directly in schools or at retailers, in order to establish a more immediate link with perspective customers).

4.6 The role of Bleu-Blanc-Coeur in the formation and development of the cluster ecosystem

BCC played a key role in several areas. Hereafter every single area of action is described and remarked in order to point out the main effects and best practices of a proactive IFC in the creation and development of a competitive cluster. According to a consolidate stream of literature (Refer to Tables 1 and 2), those activities can be grouped into eight different areas of actions:

1 market opportunities and information

2 technology opportunities and information, joint R&D

3 human capital development

4 complementarities, networks and joint activities

5 physical infrastructure

6 culture

7 enabling and supporting policies and institutions

8 financial resources.

4.6.1 Market opportunities and information

Original feature of the BBC has to be found in the provision of a logo, which can be used by all the adherents along the value chain of the cluster. BBC products are identifiable by their logo (that is applicable only if the production follows the rules established in the BBC statement) which proofs their origin and attests the methods through which these goods are produced, demonstrating their improved nutritional composition. The products labelled by the logo are:

1 vegetable products

2 cows, goats and muttons dairy products

3 beef, lamb, calf, rabbit, pork and fowl meat

4 eggs

5 fish.

The goods labelled BBC could be either produced by really well known brand, like Danone, Matines, Michon, Entremont to quote some, or produced by SMEs, that aim at making the production valuable in order to gain market share or enter in a niche of a new market. The logo can furthermore be used by retailers, which wish to promote the BBC menu, sponsoring the new healthy diet mode. Advertising is arranged in concert by firms and the association, which is in charge and responsible for corroborating, in compliance with the established shared rules. The promotion is realised by a marketing commission that is made by the adherent firms and consists in cartoons, pedagogical documents and tools, like leaflets, indicating tips on possible menus remembering the nutritional principles. These advertising is done to get people aware of the activity of the association and to demonstrate the impact of the production mode on the quality of food. Furthermore, the recipes of final products are attested by a 'qualification council', a subset of the association BBC composed of nutritionists. They ensure that all ingredients, necessary to produce the final output, are chosen based on their nutritional composition. The government is not involved in the dynamics of the cluster but it operates in order to enhance its development and growth through the inclusion of BBC activities in the framework of the Programme National Nutrition et Santé (PNNS)[1].

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem literature would call *Market opportunities and information* for the cluster. However a new IFC action emerges: the creation of a common logo

4.6.2 Technology opportunities and information, joint R&D

R&D and scientific researches (as already stated above, scientific researches shown that the fat composition of dairy products and meat itself highly depends on the fat composition of the diet of the animals) have been the main force in the formation of the omega-3 cluster.

Afterwards, a continuous research and development was essential to sustain and improve new and already existing products. BBC plays a pivotal role in coordinating, supporting and sustaining the scientific research, with several programs involving Universities, research centres, national institutions and several companies. The output is freely shared among the associated partners. Moreover, the development and the researches, that involve the BBC products, affect the production rules of the cluster; these are so relevant that justify the willingness of all actors of the agrifood value chain of committing themselves to respect the established standards set by the association.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem' literature would call *technology opportunities and information, joint R&D* for the cluster. However a new IFC action emerges: promoting and sharing scientific research

4.6.3 Human capital development

All the actions promoted and supported by BCC contributed markedly in the overall qualification of all the operators in the cluster, in terms of knowledge, availability of specialised information and technological and market skills. Jointly with the development of all actions a comprehensive training program, as well as several topic-specific seminars and workshops have been built as educational program available to the human resources of the organisations belonging to the cluster. Schools, Universities and corporate training centres are fully engaged into this program, playing a major role also in the design of training paths.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem' literature would call *quality human capital* for the cluster.

4.6.4 Complementarities, networks and joint activities

The association has been created in 2000 and the products started being sold in 2001, since then the offered goods have increased a lot, allowing the creation of entire menus composed by ad hoc products. The progresses made can be measured through the evolution of sales and, in order to keep on this good path, the association has improved the relationships with farmers, sellers, cooperatives, restaurants, canteens and other actors of the value chain to encourage the consumption and the diffusion of their products.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem' literature would call *complementarities, networks and joint activities* for the cluster.

4.6.5 Physical infrastructure

None of the actions of BBC are intended to develop or support the physical infrastructure of the cluster.

4.6.6 Culture

The strength in offering a more valuable product in the attempt of satisfying the increasing needs of customers and their augmented attention to health and diet has to be continuously reinforced with the spread of nutritional culture oriented on health and correct diet. This is explaining an important feature that is worth underlying is the BBC commitment in the diffusion of the nutritional information to the consumers, exploiting the logo of the PNNS; in this way a better visibility and consideration among consumers can be reached because of the partnership with a governmental entity. To achieve this goal BBC commits itself in allocating the 10% of the budget assigned for communication to the diffusion of the nutritional information suggested by the PNNS.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem literature would call *culture* for the cluster.

4.6.7 Enabling and supporting policies and institutions

The active role of the association BBC consisted also in the publication of several rules based on researches and studies that the adherents have to respect. These rules are approved by the scientist council and the board of directors which has the additional task of controlling them. An important role is played by the French government that has certified the value and the reliability of the researches, made and incentivised by BBC. Moreover the government has recognised the positive effects that the application of these rules has on final consumers' health, improving the quality of the products present in their diet. We are referring to the fact that the application of these rules provides an improvement of the composition of nutritional value in the food lowering the fats that are bad for our health decreasing the risk of contracting diabetes that nowadays is the first cause of death in France making it becoming a concern for the sovereign state too. These rules are also exploited as effective marketing tools by cluster companies.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem' literature would call an *enabling policies and leadership* for the cluster.

4.6.8 Financial resources

BBC is actively involved even in the search, aggregation and investment of financial resources for its cluster. As far as the budget is concerned, it is computed and forecasted on the basis of former sales; last year, for example, the allocation of the budget of BBC was divided as it follows:

1 meat (pork, bovine, fowls, lamb, rabbit and calf)

2 dairy products

3 eggs

4 flour trade and bread-making.

The better developed and advanced diet among the ones involved in BBC, in terms of nutritional findings and application, is the one serving meat and dairy products, but the hope is that in the future the existing gap between different diets will shrink.

- This area of intervention by BBC resembles what the 'entrepreneurship ecosystem' framework would call an *availability of appropriate finance* for the cluster.

5 Discussion and conclusions

Despite the growing interest and increasing resources invested in IFCs worldwide and the increasing concerns for having competitive clusters with robust entrepreneurial ecosystems, our literature review (Sölvell et al., 2003; Kantis et al., 2004; Teigland et al., 2006; Teigland and Lindqvist, 2007; Waxel, 2009; Mikkola and Mahlamäki, 2011; Kowalski and Marcinkowski, 2012; Laur et al., 2012; Galliè et al., 2012; Ketels et al., 2012) revealed that prior evidence on IFCs is almost exclusively practitioners-driven and prevailingly focuses on mapping them worldwide (Sölvell et al., 2003; Ketels et al., 2006; Viaschka, 2012; Sölvell and Williams, 2013). Surprisingly little empirical research has investigated in-depth the actual role of IFCs in the formation and development of

clusters, especially with reference to the role the play or might play with regard to competitive cluster entrepreneurial ecosystems.

With the aim of contributing in the broad debate on the role of IFCs in the competitiveness of a cluster, specifically offering an in-depth understanding of the role of IFCs in the formation and development of a cluster ecosystem, in this paper we relied on an in-depth case study – namely the case of the French omega-3 cluster – to explore the role of IFCs in the formation and development of a cluster entrepreneurial ecosystem.

Our findings shed new light on how an IFC can foster a cluster formation and its subsequent development, enhancing the competitiveness of its entrepreneurial ecosystem in several ways that assured a fertile ground for the birth and survival of successful companies.

The analysis of the omega-3 cluster gives some useful insights, enriching the existing literature of IFCs.

First, as clearly emerged by the case study analysis, the reached level of competitiveness is substantially affected by all the aforementioned actions by the IFC that contributes to the creation of the proper entrepreneurial ecosystem. Those actions suggest several features of the approach to the creation of such ecosystem:

1 complexity
   - multi-level (national, regional, cluster, firm-level)
   - multi-actors (large and small firms, associations, institutions, universities, etc.)

2 coordination
   - actions should be harmoniously adjusted taking into consideration all interactions with other measures in place

3 tailor-made
   - even showing commonalities with existing literature, the priority and the content of the actions should be strictly related to the specific case.

Second, the relevance of the factors is confirmed as, among them, seven have been object of several and specific actions of the IFC (refer to Table 4). Only the factor related to infrastructures has been neglected in the case. The reason is cluster and country-specific, as the requirements in this field have been already fulfilled. Two new actions are suggested by our case study analysis: first the creation of a specific cluster logo and, second, the implementation of a common open database of R&D and scientific researches outputs. Regarding the first one, the creation and diffusion of a cluster logo by the association BBC highlights the importance of cluster branding and reminds to the vast stream of literature on the country of origin effect applied to clusters (Bertoli and Resciniti, 2012) as well as those best practices of clusters that – through their branding – have been able to initiate a process of identity construction and identification, conducive to a more robust cluster cohesion and, thus, competitiveness (Alberti and Giusti, 2012). As far as the second new action is concerned, the open availability of R&D and scientific research outputs to the entire cluster is a kind of industrial common (Pisano and Shih, 2012) that may boost the innovative capacity of cluster firms (Baptista, 2001) and open up to a new stream of research that crosses open innovation practices with cluster arrangements.

Table 4 The actions of BBC in the omega-3 case

Entrepreneurial ecosystem factors		*Institutions for collaboration*		
		IFCs actions		*Omega-3 case*
1	Market opportunities and information	Join marketing Improve visibility Promoting collaborations between firms and global markets	√	Joint marketing campaigns to improve the knowledge about the quality and benefits of omega-3 *New action: creation of a specific cluster logo*
2	Technology opportunities and information, joint R&D	Joint R&D projects Promoting commercialisation of academic research To strengthen the regional innovation system Promoting collaborations between Firms and research institutions	√	The BBC push and creates occasions to start new R&D projects involving the participants of the cluster. *New action: common open database of R&D and scientific researches outputs*
3	Human capital development	Training Attracting students to science Empowering entrepreneurship and leadership Promoting collaborations between firms and educational institutions	√	Development by BBC of a comprehensive training program, plus topic-specific seminars and workshops. In all educational programs schools, universities and corporate training centres are fully engaged.
4	Complementarities, networks and joint activities	Supply chain development Sharing of knowledge Facilitating relationships Promoting collaborations between firms	√	BBC has promoted strong the relationships with farmers, sellers, cooperatives, restaurants, canteens and other actors of the value chain.
5	Physical infrastructure	Development of incubators Supporting and lobbying infrastructures development	×	–

Table 4 The actions of BBC in the omega-3 case (continued)

Entrepreneurial ecosystem factors		*Institutions for collaboration*		
		IFCs actions		*Omega-3 case*
6	Culture		√	To reinforce the attention to health and diet BBC continuously spreads issues of nutritional culture oriented on health and correct diet and nutritional information to the consumers, joining also the National Nutrition Program.
7	Enabling and supporting policies and institutions	Development of rules and scientific and technical standards Lobbying Tax regulations and incentives	√	BBC played an active role in the drawing up and publication of several rules based on researches and studies that the adherents have to respect. Those rules have been certified by the French government.
8	Financial resources	Attracting FDIs Promoting collaborations between firms and financial institutions	√	BBC is active also on the search of financial resources to support all organisations and projects within the cluster.

Third, the omega-3 case study suggests even managerial implications, especially for cluster managers and practitioners involved at large in IFCs for the launch and development of cluster initiatives. A detailed list of specific actions emerges and they constitute a benchmark for other IFCs or cluster managers to support the development and the competitiveness of new or already existing clusters.

The present paper has some limitations. First of all, the analysis focuses on just one cluster (one industry in a specific location), cross-clusters analyses may illuminate better our findings, eliminating industry and geographical biases. Second, the paper focuses only on one IFC in the cluster – implying that such cluster actor is the most prominent cluster organisation (or association) in affecting the cluster initiative, whilst new insights may derive from either focusing on the plurality of IFCs operating in a cluster or on the investigation of inter-IFC interactions and mutual reinforcements.

Future studies on the role of IFCs in the formation and development of entrepreneurial ecosystem may go more in-depth analysing different areas of intervention with a fine-grain. Moreover, what has been observed in the omega-3 cluster shows clear commonalities with the gaps and bridges reported by Sölvell and Williams (2013). The authors have in fact showed how, in 12 Swedish clusters, IFCs can be bridges builders between all cluster actors (large and small firms, universities, capital providers and public organisations), where five internal gaps and two external gaps can undermine cooperation and thus the full potential of being part of a cluster. These gaps fits perfectly into six out of eight of the entrepreneurial ecosystem factors reported in this paper and remark, from two literature perspectives, commonalities in the role of IFCs vis-à-vis the enforcement of a cluster ecosystem that may deserve further investigation. Further, that role of IFCs in bridging gaps, setting up a favourable entrepreneurial ecosystem and, thus, weaving the network of the cluster may benefit from future studies aimed at investigating the role of IFCs in enhancing the social capital of the cluster through the lenses of social network

analysis. Finally, future studies may consider how the role of IFCs in the setting of competitive entrepreneurial ecosystems vary along the cluster life-cycle, highlighting specific roles and activities for specific life-cycle phases (Martin and Sunley, 2011; Elola et al., 2012).

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Notes

1 PNNS is the national program for health and diet and has two main objectives that are the reduction of the total mean lipidic contribution of products below the 35% of the food requirements and the reduction of about 20% of the problems related to obesity and excess of weights among adults and making prevention providing information to schools in order to reduce the diffusion of these problems among children.