From ecosystem to community. Combining entrepreneurship and university engagement in an open innovation perspective

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Abstract: The paper provides a new perspective for the analysis of academic entrepreneurship dynamics in an evolving open innovation context. Starting from an overview of the innovation (eco) systems approach and a focus on university engagement, we propose a paradigm shift towards the conceptualisation of an innovation community (IC) within and around higher education institutions (HEIs) boundaries. The main goal of the study is to show that the concept of IC can be applied to a knowledge-intensive hub, where open innovation (OI) processes successfully enhance knowledge flows in the context of advanced education programs and spin-off firm creation and management. Our research is explorative in nature and structured around a multiple case study methodology. The outcomes confirm that the IC view can acquire a theoretical relevance when referring to OI contexts involving public, private and institutional sectors. Practical implications include a further framework for both technology transfer operators and institutions.

Keywords: innovation ecosystems; university engagement; innovation community; academic entrepreneurship; technology transfer; open innovation.

1 Introduction

The concept of engagement within universities mainly regards the trend according to which universities themselves are rethinking their role and responsibilities, by developing further interests and purposes, such as: engaging in learning beyond the campus walls, finding out useful functions beyond the academic community and providing services for the benefit of society. Likewise, higher education policy makers are seeking to cope with national governments and agencies with specific, direct and sometimes conflicting expectations towards the activities universities are implementing, in terms of contributions to innovation, skills, the arts, cities and regions (Goddard and Kempton, 2016).

The key aspect of a community is that it refers to people working and collaborating for mutual benefit. Therefore, a first concern is why we talk about ecosystems when we are referring to interactions amongst human beings? Additionally, the engagement among actors operating in a specific knowledge intensive context can be better understood when describing such context as a community where stakeholders act in a virtuous way sharing knowledge and practices for the sake and growth of the community itself. Thirdly, the use
of the term community helps to include the concept of neighbours, sharing and helping each other for a common interest, rather than the more aggressive behaviours associated within an ecosystem. Speaking in terms of innovation community (IC) instead of (eco) systems helps to narrow the scope for open innovation (OI) dynamics within a knowledge intensive context in more rigorous terms. Indeed, knowledge flows enabled by OI processes operate as effective variables useful to increase the performance of a community in terms of innovation and technology advancement.

The study analyses examples of OI practices implemented in the knowledge-intensive hub of the Federico II University hosted in San Giovanni a Teduccio, a peripheral suburb in the East area of the city of Naples (Italy) in which innovation, technology and knowledge transfer processes occur. It will herein be referred to as the San Giovanni Hub (SGH) or the hub. Within the SGH, spin-off firms are being created at an increasing pace, together with new forms of advanced education and training programs in partnership with global companies, such as Apple, Deloitte, Cisco and more recently Accenture and Capgemini.

The nature of our study is explorative for two reasons. On the one hand, the SGH represents a unique example of a knowledge intensive hub in which a multifaceted set of stakeholders interacts on multiple levels, shifting from research, business, academic entrepreneurship to higher education programs and public engagement, as well as various combinations of the above. On the other hand, very little research has addressed evolving dynamics of OI processes in such a complex context as the SGH, for which the attribution of the term IC could be more suitable than the term ecosystem. Therefore, our study would contribute to arouse interest for the debate on the evolving paradigm and application of OI practices in enhancing academic entrepreneurship mechanisms.

Our research unfolds through the analysis of three case studies focusing on three actors of the SGH, namely: the 5G Academy (established by Capgemini); the Hackademy (established by Accenture) and BeyondShape S.R.L., a recently funded spin-off run by a Federico II academic and located in the hub.

Drawing from examination of the interviews carried out on the topic of the SGH’s contribution to the performance of both academies and the spin-off, we state that the value created in such a context can be better addressed to the embeddedness in an IC, rather than in an innovation (eco) system.

The paper structure is described as follows. Section 2 provides a review of the theoretical background, with a specific focus on the holistic view on innovation and entrepreneurial ecosystems, the relevance of the engagement for a higher education institution, the evolving patterns of OI and the introduction to the concept of IC. Section 3 addresses the research method based on a multiple case study methodology supported by semi-structured interviews. Section 4 focuses on the rationale underpinning the study and the description of the SGH case. Section 5 is dedicated to the discussion, in which we underline both practical and theoretical implications of the adoption of the IC view. The conclusions also includes a hint to the limitations of our study as well as suggestions for future research trajectories.

2 Theoretical background

Universities have different attitudes and behaviours towards the enhancement of innovation resulting from internal research and/or research carried out in collaboration
with businesses. This is especially true to the extent that there are different attitudes taken by national governments in terms of measures to stimulate the country’s economic and social growth based on the creation of innovative opportunities arising from university-industry interactions.

Issues related to entrepreneurial universities and the connections between institutions-innovation-industry have been largely debated (Perkmann et al., 2013; Schofield, 2013, Rybnicek and Königsgruber, 2019). The involvement of academic researchers in the commercialisation of research results (also stated as academics’ attitudes towards a business concept) can range between two relative opposite points:

1. be totally opposed to transitioning to the business world and then focusing on exploration
2. be oriented to founding and/or managing a spin-off to enable exploitation.

Between these two extremes, researchers operate in a grey area characterised by consulting, seeking partnerships and/or various commercial opportunities. Beyond the operational behaviours there are the intentions, more or less latent, to be entrepreneurial that, unconsciously or not, are present among academic researchers.

In the following paragraphs, we have summarised some of the theoretical systems useful to understand the theoretical framework of our study.

2.1 Shifting to a holistic view: innovation and entrepreneurial ecosystems

A popular recent trend in the entrepreneurship and innovation policy is represented by the ‘holistic’ approach to entrepreneurship and innovation (Autio et al., 2014). Previous studies in the last two decades have focused on national (Nelson, 1993; Edquist, 1997) or alternatively regional (Cooke, 2001) systems settings that influence innovation. Notwithstanding the level of analysis, systems of innovation represent a combination of socioeconomic, political, institutional and organisational factors affecting innovation activities and business growth (North, 1990; Edquist, 1997).

Since a holistic approach to entrepreneurship has become a new step in the European entrepreneurship policy (Audretsch and Belitski, 2017), the focus has been shifted on the role of the entrepreneurial ecosystem and the processes describing the ways in which it is developed, adapted and sustained. More specifically, the holistic approach posits research-based entrepreneurial activity as an individual behaviour of entrepreneurs embedded within a local context (Szerb et al., 2013) rather than an activity performed in isolation (Wright and Stigliani, 2012).

According to this framework, the systems approach to innovation is extended to embrace new firm formation as an important reflection of entrepreneurship and innovation. Thus, entrepreneurship itself needs to be closely linked with the local (regional) innovation systems, which includes regions, innovation networks, learning and interaction (Cooke, 2001) and the context in which decisions are taken (Acs and Szerb, 2010; Szerb, et al. 2013).

Such systemic and holistic approaches to regional systems of entrepreneurship may differ depending on the type of structure. On one hand, it can be industry-specific (e.g., IT cluster in reading, UK; mobile cluster in Helsinki, Finland) or include several industries (e.g., Silicon Valley; London Roundabout). For these reasons, systems of
entrepreneurship (or ecosystems) are defined as institutional and organisational together with other systemic factors that interact and influence identification and commercialisation of entrepreneurial opportunities. Systems of entrepreneurship are geographically bounded, as is the case for Austin in Texas, Cambridge and Oxford in England, the Boston area in Massachusetts and Aalto in Finland, that serve as examples of cities with thriving entrepreneurial ecosystems. Additionally, regulation, institutions and norms, infrastructure, city amenities, access to finance and demand of goods and services may vary largely between regions and cities where potential innovation and knowledge reside (Audretsch, 2014). The entrepreneurial ecosystem framework determines the subjects eligible to become entrepreneurs, the way in which an individual’s perception can support entrepreneurial decision-making in the area and how various domain effect entrepreneurial action and outcomes of the ecosystem (Autio et al., 2014).

2.2 Scope and features of the stakeholder engagement within a higher education institution

The theoretical focus of our research draws from the distinctive characteristics of the University Engagement concept that highlights the transition from the entrepreneurial ecosystem to the novel attitude of higher education institutions (HEIs) in actively ‘engaging’ with the social context in which they are embedded. This concept reflects a transposition of the quadruple helix (QH) approach, in which the Society is the fourth category (helix) incorporated in the model (alongside the institutions, the university and the government). Hence, the reference to the university ‘engagement’ helps to overcome the vision of the university as an entity based on purely entrepreneurial principles. Acting as key institutions of the society, universities cannot but contemplate a relationship with the other institutions and communities sharing the same location, particularly those involved in the production and diffusion of knowledge, as well as public bodies such as local administrative authorities responsible for the local citizenship.

A primary consequence of the recent evolution undergone by HEIs affects their very role and related responsibilities, along with a broader range of interests and purposes. When considered as public institutions, universities are now engaged in playing a pivotal function in the economic and social development of the community in which they are embedded, at both a local and national level.

These dynamics require institutional transformation within universities and dialogue between different parts of national governments and international institutions. In such a diverse context, the Engaged University model can be suitable to capture the mutually beneficial engagement between the community, the regional or national level and the university.

Positing that “public support for universities is based on the effort to educate citizens in general, to share knowledge, to distribute it as widely as possible in accord with publicly articulated purposes” [Calhoun, (2006), p.20] leadership and management of universities should seek to mobilise the work of the academy for public benefit. To do so, a shift towards more effective university business models is needed, as provided by the University Engagement view. In fact, when analysing current business models of HEIs, some observations can arise. Firstly, the entrepreneurial university model is characterised by a strengthened centralised control, an enhanced diversified funding base and a stimulated academic core (Clark, 1998). Secondly, in line with the triple helix model,
universities, business and government act with semi-autonomous centres that interface with the external environment supported by specialised internal units (e.g., technology transfer offices) and external intermediaries, such as technology and innovation centres (Etzkowitz et al., 2008).

Since both models underplay the role of humanities, place-based communities and civil society and because the way innovation takes place is changing, a new model imprinted on the university engagement is needed.

Indeed, the QH model attributes emphasis on broad cooperation in innovation, thus it represents a shift towards systemic, open and user-centric innovation policy. “An era of linear, top-down, expert driven development, production and services is giving way to different forms and levels of coproduction with consumers, customers and citizens’ [Arnkil et al., (2010), p.2].

In order to promote a dialogue between universities and policymakers that are responsible for the territorial development, the notion of the university as an ‘anchor’ institution can be helpful. “Anchor institutions might be characterised as not just in the place but of the place” [Goddard et al., (2013), p.7].

In fact, universities can be defined as large locally embedded institutions, typically non-governmental public sector, cultural or other civic institutions that are of significant importance to the economy and the wider community life of the cities in which they are based. They generate positive externalities and relationships that can support or ‘anchor’ wider economic activity in the locality. Anchor institutions do not have a democratic mandate and their primary missions do not involve regeneration or local economic development. Nonetheless, their scale, local rootedness and community links are such that they can play a key role in local development and economic growth representing the “sticky capital around which economic growth strategies can be built” [Goddard et al., (2013), p.308].

By hosting non-commercial activities that cannot be supported by the local private sector, universities can contribute to the adaptive capacity of the local economy, particularly in respect with SMEs (Galati et al., 2020). In terms of gaining from OI activities, SMEs have several limitations (lack of resources for R&D, unstructured innovation processes and insufficient capabilities) but they are usually less bureaucratic and so have a fast reaction capability (Rippa et al., 2016). However, this potential is “tensioned against the immediate opportunities of working with the best companies regardless of location and the (low) level of absorptive capacity of local businesses” [Goddard et al., (2013), p.11].

2.3 On OI evolving patterns

The process towards OI practices draws from the rising need for companies to search for new ways to increase the efficiency and effectiveness of their innovation processes, both by resorting to new technologies and ideas outside of the firm and through cooperation with suppliers and competitors to create customer value. Additionally, the further development or out-licensing of ideas and technologies not fitting the strategy of the company has contributed to change the ‘closed innovation’ paradigm.

Since OI can be described as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively” [Chesbrough, (2003), p.1], the involvement of other parties when developing new products and technologies can provide consistent value added.
Also, the business model has a pivotal role for it determines to a large extent how and when external knowledge is required and used by describing how value can be created from innovations and which elements have to be collected internally or externally.

Following the Chesbrough and Crowther (2006) classification, OI can be considered to have a bidimensional pattern. On the one hand, we can distinguish an inbound OI with reference to the acquisition and transfer of external technologies, ideas and knowledge into the firm through, for example, R&D contracts, university collaborations, in-licensing, mergers and acquisitions. On the other hand, outbound OI occurs in the transfer of technology, ideas and knowledge to external firms and their commercial exploitation by means of licensing, joint ventures, spinouts, etc.

Such twofold dimension of OI enables firms to grasp the benefits and rewards of their innovative ideas from the conception. Subsequently, Enkel et al. (2009) argue that a third dimension to OI can be added and referred to as the ‘coupled process’. Following this approach, firms are able to set up a coupled process by combining inbound activities (the use of externally available knowledge and resources to supplement their internal R&D capabilities) with outbound activities (e.g., the use of out-licensing) with the purpose of co-developing, commercialising and co-capitalising innovation.

Moving from the assumption that OI enhances the merging of internal and external ideas as well as internal and external strategies to advance the development of new technologies (Chesbrough, 2003), a more recent revision of the OI paradigm has clarified some of its core aspects and interpretations (Chesbrough and Bogers, 2014). More specifically, the OI discourse on the interaction among industry, society and regional innovation systems has been enriched with thorough insights concerning the levels of analysis and research objects for OI research [Bogers et al., (2016), pp.11–12].

A relevant aspect that emerges from this revision is about the nature – pecuniary or non-pecuniary – of the mechanisms supporting the technological flows crossing the firm boundaries. The new concept ponders openness as the way in which knowledge flows across permeable organisational boundaries. In fact, the openness not (only) concerns the way in which value is created within the network but also the way in which the involved organisations take such value over. This concept broadens the inclusive scope of the application of OI to universities, non-profit organisations and even government agencies. Indeed, in wider terms, the network (or the community) represents a form of collaboration that involves the hybridisation between profit and non-profit actors.

Another fundamental element falling within the discussion about OI regards the concept of absorptive (and desorptive) capacity (Dell’Anno and Del Giudice, 2015). It is known that absorptive capacity theory was initially defined as ‘the ability of a firm to recognise the value of new, external information, assimilate it and apply it to commercial ends’ [Cohen and Levinthal, (1990), p.128]. Cohen and Levinthal (1990) consider investments in internal R&D facilities and capabilities as core factors in the acquisition and use of external knowledge and technology. Subsequently, this has been enriched by the formalisation of four distinct dimensions of a firm’s absorptive capacity, namely: acquisition, assimilation, transformation and exploitation (Zahra and George, 2002). The most relevant component of a firm’s absorptive capacity stands in the development of its internal R&D assets, in terms of capital and human resources. The main arguments for such a statement reside in the fact that internal R&D engenders an impact on technological advancement, innovation and new product development, by accessing and using external knowledge and technology. Thus, an innovative firm needs to engage in continuous learning by ‘absorbing’ information flows, knowledge and ideas from the
external environment making remote collaboration more effective and likely to be a source of ‘distant’ technology.

Leading literature draws many opportunities for future research on OI (Bogers et al., 2016). Very recently, Silva et al. (2020) presents an integrated framework of three innovation streams: public policies (PPs), OI and science parks (SPs). They contemplate the assumed role for public agents of using OI strategies for the development of innovative ecosystems.

2.4 Developing an IC

Although the concept of ‘ecosystem’ is commonly used both in literature and in practice to describe specific innovation dynamics (Edquist, 1997; Oh et al., 2016), our study perspective welcomes the adoption of the term ‘community’ (Hockaday, 2020).

We suggest that the concept of IC can integrate or overlap with the definition of Innovation ecosystem (IE). The first proposition grounding such statement is that the positive performance of a system derives from all the actors involved working jointly, similarly to neighbours in a community working together to achieve a common goal.

The second proposition to be verified by our analysis concerns the fact that referring solely in terms of ecosystems dynamics implies win-lose effects. Indeed, natural ecosystems logic often require that one member sets out to dominate or overcome others whereas a ‘community’ better conveys a joint effort of people involved and committed to collaborate (Hockaday, 2020). Our work appraises the academic environment as a valuable example of an IE that can be referred to also in terms of IC.

The location of high-performing HEIs within successful innovation systems (or communities) confirms the recognition of HEIs as anchor institutions within such systems. The acknowledgement of this phenomenon enhances the consideration of HEIs as a vital part of an IC, for which a diverse set of elements can be detected. To this end, the quadruple-Helix approach (Leydesdorff, 2012; Etzkowitz et al., 2008) can provide grounds for an effective classification of the categories pondered in this study, namely: University; Industry, business and finance; government; society and foundations, charities and not-for-profits. By adopting this view, HEIs and their technology (or knowledge) transfer offices (TTOs) are called upon to develop links with actors from outside the academic context in a very wide range of organisations, on a local, city, state, national and international basis. The effort of TTOs working across their universities is meant to facilitate those links and to coordinate them for a twofold purpose: on one hand, TTOs pursue their business goals, on the other hand, they serve the broader engagement and third mission aims of their respective universities.

Several elements are required within a HEI to contribute to its development, such as leadership and resources drawn from both inside the organisation and outside its boundaries. Where these external elements are present, the university is adequately endowed to interact and collaborate (Etzkowitz, 2002). The scenario depicted so far enables HEIs to play a facilitator role in building the overall IC and becoming the centre of the IC and acquiring leadership in some cases (Hockaday, 2020).

Technology transfer mechanisms involve connecting the university’s research activities with users of these research results outside the university. The more research is produced within a HEI and the higher quality of the research, the more opportunities can be caught to make connections. Following this view, the reference to the concept of boundary objects (Carlile, 2002; Gal et al., 2004; Kimble et al., 2010) can also provide
arguments to highlight the relevance of an IC perspective (Crescenzi and Gagliardi, 2018).

<table>
<thead>
<tr>
<th>TT and KT mechanisms</th>
<th>Definition</th>
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<tr>
<td>Sponsored research/ consultancy/ contract research</td>
<td>An agreement by which the university receives funding for conducting a research project.</td>
</tr>
<tr>
<td>Licenses</td>
<td>Legal rights to use a specific piece of university intellectual property.</td>
</tr>
<tr>
<td>hiring of students</td>
<td>Recruitment of students from the university, especially those working on sponsored projects.</td>
</tr>
<tr>
<td>Academic spin-off firms</td>
<td>A new entity that is formed around the faculty research or a university license.</td>
</tr>
<tr>
<td>Networks</td>
<td>Contacts established in a formal or informal way that lead to other knowledge transfer activities.</td>
</tr>
<tr>
<td>Collaborative research</td>
<td>Research in partnership with other HEIs or research centres.</td>
</tr>
<tr>
<td>Other measures</td>
<td>Physical migration of students to industry. Publications as a measure of research output.</td>
</tr>
</tbody>
</table>

Source: Authors’ elaboration drawing from the patterns provided by [Bercovitz and Feldmann (2006, p.185)].

In order to build its reputation and to attract top quality researchers to join the university faculty, HEIs require the research to be of high quality and also be relevant to the challenges faced by its community at the local, national and international levels. For the pursuit of this goal, an HEI has to put in place a clear set of policies and procedures to ensure the equal and fair treatment of all staff and students. Moreover, it needs an incentive and rewards structure for the sharing of success, together with a well-resourced TTO to support researchers interested in connecting with business. In fact, building connections with companies that have an interest in university collaborations represents a very challenging task and requires active management. Since HEIs are not able to create businesses of their own, they have to rely on a wide range of networking activities to help connecting with the private sector. Additionally, such networks can use the HEIs convening influence to bring businesses together.

Among others, Bercovitz and Feldmann (2006) have summarised some of the pivotal technology transfer mechanisms to be enhanced within a HEI. In Table 1 we provide an adaptation of such classification, in order to clarify the most efficient knowledge and technology transfer mechanisms within the university domain.

However, the university needs access to money and management for the creation and growth of successful businesses. Most academics involved in businesses starting out from universities are not entrepreneurs or effective business managers. Individuals coming from an academic background need to collaborate with other professionals who are entrepreneurs and effective business managers for the new businesses to be successful. It is very easy to start a business; it is very difficult to make a successful business.
3 Research method

The present study is explorative in nature and adopts a multiple case study methodology. The main aim of an exploratory research study is to identify the boundaries of the environment in which the problems, opportunities or situations of interest are likely to reside and to identify the salient factors or variables that might be found there and be of relevance to the research (Myers, 2013).

In the case study strategy of inquiry, the researcher explores in depth a program, an event, an activity, a process, or one or more individuals. The selected case (cases) is (are) bounded by time and activity and detailed information is gathered by means of diverse data collection procedures (Stake, 1995).

The case study is a qualitative approach to research which is suitable for the exploration or description of a phenomenon within its context using a variety of data sources. Such a method allows studying phenomena involving individuals or organisations, interventions, relationships, communities or programs (Yin, 2009) and supports the deconstruction and the subsequent reconstruction of those phenomena. The case study represents a valid method to help understand complex phenomena, especially when the attempt is to contribute to theory building following a replication logic (Eisenhardt and Graebner, 2007).

According to Yin (2009) a case study design should be adopted when:
1 the study should provide an answer to the ‘how’ and ‘why’ questions
2 the behaviour of those involved in the study cannot be manipulated
3 contextual conditions need to be covered because they are relevant to the phenomenon under study
4 the boundaries between the phenomenon and context are not clear.

In this work, the SGH represents the main unit of analysis, in which specific phenomena are analysed in three distinctive cases.

The case study is described through several methods of data collection, such as: interviews, observations, document review, questionnaires and/or surveys. The methods of analysis generally vary and depend on data collection methods and cases but need to be systematic and rigorous. Accordingly, triangulation is highly valued and commonly employed to provide a thorough understanding of the object of the study (Yin, 2009). It is the most useful (and appropriate) research design for those projects that are addressing a subject about which there are high levels of uncertainty and ignorance about the subject and when the problem is not very well understood (i.e., very little existing research on the subject matter). Such research is usually characterised by a high degree of flexibility and lacks a formal structure; thus, case studies are an appropriate tool for exploratory research such as the present one.

Semi-structured interviews have been performed with the managing directors of the two most recent academies partnering with the SGH, namely the 5G Academy (by Capgemini) and the HackAcademy (by Accenture) and a partner of BeyondShape S.R.L., a recently funded spin-off run by a Federico II Academic and settled in the hub.

The question-set conceived and implemented in the present study is structured as a questionnaire with a scaling technique, i.e., a set of procedures developed to measure complex and not directly observable concepts. The only way to register these concepts is
to use a coherent and organic set of indicators, also setting up inter-subjective criteria to control the actual overlap between indicators and concept and completeness of the procedure. Therefore, a scale is a coherent set of elements appraised as indicators of a more general concept (Corbetta, 2003). The technique of scales is used above all in the measurement of attitudes, where the unit of analysis is the individual, the general concept is an attitude (underlying beliefs not directly detectable) and the specific concepts are opinions (empirically detectable expression of an attitude).

The type of scale used in our survey is a five-point Likert scale (from strongly agree/extremely relevant/extremely effective to strongly disagree/not at all relevant/not at all effective).

Drawing from the grounded theory approach of qualitative research (Corbin and Strauss, 1990) responses have been analysed following a selective coding which allows the building of a story that connects the categories, ending with a discursive set of theoretical propositions.

Each questionnaire is structured in three sections. The first section is dedicated to the background description of either the spin-off firm and the two academies and their core business and mission.

The second section is centred on the level and intensity of the interplay between academy and industry in supporting academic entrepreneurship. Each respondent attributed a rating on the specific statements of the questionnaire concerning the efficacy of the technology transfer activities performed by the HEI to which the SGH belongs.

Table 2 Thematic areas for the semi-structured interviews

<table>
<thead>
<tr>
<th>Thematic areas</th>
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<tr>
<td>1. OI mechanisms related to knowledge transfer and exchange</td>
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<tr>
<td>2. Stakeholder engagement and IC perspective</td>
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<tr>
<td>3. Technology and knowledge transfer (TT and KT)</td>
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<tr>
<td>4. Third mission</td>
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<td>5. SWOT analysis applied to the hub</td>
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<tr>
<td>6. University governance choices</td>
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</table>

The third and last section of the interview mainly regards the opinions and beliefs on the engagement with the SGH and the relevance of the ‘IC’. The questions of this section follow a set of six thematic areas, as described in Table 2.

Due to the diverse nature of the chosen cases, the first two sections of the questionnaire present a slightly different set of questions to be suitable to capture the role and engagement of the selected academic spin-off and the two academies. However, all questionnaires share the third section, which is specifically focused on the engagement with the SGH and the relevance of the ‘IC’. The contents of this section contribute to underline the role of university engagement and draw the value of the conceptualisation.

The question set is reported in the following table.

In performing the interviews, all respondents frequently provided further comments or insights apart from the answers required by the questions set, leading the interview itself to acquire some of the patterns of an in-depth inquiry.
Table 3  Statements of the Likert scale questions set

<table>
<thead>
<tr>
<th>Question statements</th>
<th>Spin-off</th>
<th>Academies</th>
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<tbody>
<tr>
<td>B.1 I believe in the fundamental importance of the collaboration between academy and industry and I strive to set connections and activities for the sake of scientific advancement.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>B.2 I believe in the importance of the collaboration between academy and industry and I strive to set connections with industrial activities for the commercial application and exploitation.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>B.3 The nature of the research activities run by a university are a key factor to start a spin-off process.</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>B.4 University support is essential for the development and implementation of a spin-off process</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>B.5 A consolidated incentive mechanism is fundamental to stimulate scientists to participate in a spin-off process</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>B.6 Communication and consolidated linkages among university departments are extremely important to favour a spin-off process</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.1.1 How would you rate the relevance of OI within the SGH for the development of your company?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.1.2 According to the concept of knowledge defined as “facts, information and skills acquired through experience or education; the theoretical or practical understanding of a subject” (The Oxford Dictionary), how much do you agree/disagree with the following statement: “San Giovanni Hub is a place where knowledge is generated, concentrated and shared within and beyond its physical borders”?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.1.3 Do you agree with the fact that the SGH facilitate the transfer of knowledge – i.e., conveying notions, facts and skills from an individual or group of people to other individuals or groups of people – in an OI mode?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.2 According to your professional experience, how much do you agree with the definition of the SGH as an ‘IC’?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.3.1 How would you rate the engagement of the SGH in terms of “activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments” (Molas-Gallart and Castro-Martinez, 2007)?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.3.2 How much do you agree with the fact that the SGH stakeholders set can fall within the concept of IC?</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>C.6.1 How would you rate the Role of the TTO in enhancing and/or facilitating academic entrepreneurship, academies and OI practices?</td>
<td>✓ ✓</td>
<td></td>
</tr>
</tbody>
</table>

4  Rationale underpinning the SGH community

The SGH represents a university engagement model and we support the argument according to which it can be referred to as an IC since it is characterised by the location
of a knowledge intensive hub involving innovation, technology and knowledge transfer processes (Angrisani and Dell’Anno, 2019).

The SGH is an example of an urban upgrading process implemented by means of local, national and EU policies acting in a synergetic way. The hub is located in a former industrial area dismissed for nearly 20 years. Thanks to successful policy choices, the site has been replaced by a knowledge-intensive hub hosting, respectively: a university campus, research centres and laboratories, firms and a hybrid form of advanced education programs in partnership with global-scale companies (Angrisani and Dell’Anno, 2020).

### Table 4 Why the SGH? Comparison of main patterns and features

| Taxonomy of production/business/entrepreneurial/innovation ecosystems options | Main features and characteristics |
| --- | --- | --- | --- | --- | --- |
| | Industrial production activities | Knowledge production activities | Presence of firms | Presence of research centre | Presence of higher education institutions | Presence of company–university joint educational programs |
| Science parks | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Clusters | ✓ | ✓ | ✓ | ✓ | |
| Industrial districts | ✓ | ✓ | ✓ | | |
| ‘SGH-like’ model | ✓ | ✓ | ✓ | ✓ | ✓ | |

Source: Authors’ elaboration drawing from the taxonomy provided by [Oh et al. (2016, p.3)].

The SGH is an attractor on a global and local scale: both local and (especially) international firms have decided to invest in the hub on different levels of involvement. It presents additional characteristics to industrial districts or SPs because the former have a territorial and industrial nature focused on the demand side (the market). The SGH embodies a reversed perspective since it intersects the supply side, made up by producers of knowledge in terms of basic or applied research, IP, spin-off firms, collaborative research, contract research and Academies funded by global economic organisations – Apple, Deloitte, Cisco, TIM, FS (national train company), Accenture, Capgemini. The Hub reflects synergy efforts and coordination in terms of national and local government policies. Indeed, following the IE taxonomy discussed in Oh et al. (2016), we sought to provide a synthesis of the SGH main characteristics, in comparison with those of other prominent IEs ‘types’ as depicted in Table 4.

In an IC as diverse as the SGH, linkages among actors vary according to the purposes and projects to be implemented within the community, the most important thing is the existence of linkages, i.e., a relationship built on a plan tailored to the systems of actors interested in the hub. In fact, the ability to attract investments and create value in term of economic returns depends on the existence and strength of these linkages. First, it is necessary to leverage elements of differentiation and subsequently, a linkage can be envisaged, or added, since the implementation of new projects requires a thorough knowledge of such linkages.

Using a multiple case study analysis on some of the newcomer stakeholders interacting with the SGH, we have investigated their perception of the knowledge flows
in terms of OI and facilitation of both innovation and academic entrepreneurship processes.

Our main assumption is grounded on the fact that the SGH can be ontologically defined as an OI community, in so that knowledge flows occur among a diverse set of stakeholders and domains, thus allowing knowledge spillovers and value creation (Huhtelin and Nenonen, 2015; Vargo et al., 2008) in terms of technological innovation practices advancements.

Our study considers examples of OI practices implemented in the SGH which represents the unit of analysis since it conveys innovation, technology and knowledge transfer processes. Indeed, the SGH hosts an increasing number of spin-off firms and innovative advanced education and training programs in partnership with world-scale companies, such as Apple, Deloitte, Cisco, Accenture and Capgemini.

4.1 Case 1: BeyondShape S.R.L.

BeyondShape S.R.L. is a biomedical company founded in and operational since 2019. Its core business is advanced 3D body scanning technology and customised data processing solutions for medical diagnosis, monitoring and treatment. The share capital is divided between the top management (chairman, CEO and R&D manager) and the rest of the staff. The staff consists of two post-docs, three PhD students, one professional also working in a firm, one architect and one associate professor of virtual prototyping who is the founder and chairman of the spin-off. The latter accepted to be interviewed for the study.

The most relevant answers provided by the respondent depict the following scenario:

- I strongly believe in the fundamental importance of the collaboration between academy and industry and I strive to set connections and activities for the sake of scientific advancement.
- I strongly agree with the fact that the nature of the research activities run by a university is a key factor to start a spin-off process.
- I strongly agree with the fact that university support is essential for the development and implementation of a spin-off process and that a consolidated incentive mechanism is fundamental to stimulate scientists to participate in a spin-off process.
- I strongly agree with the fact that communication and consolidated linkages among university departments are extremely important to favour a spin-off process.
- OI within the SGH for the development of my company is extremely relevant thanks to the open mind-set of the university governance in allowing and facilitating the lab implementation of new ideas.
- I strongly agree with the fact that the SGH is a place where knowledge is generated, concentrated and shared within and beyond its physical borders.
- I strongly agree with the fact that the SGH facilitates the transfer of knowledge in an OI mode.
- I strongly agree with the definition of the SGH as an ‘IC’.
I would rate engagement of the SGH as moderately relevant in terms of activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments.

I agree with the fact that the SGH stakeholders set can fall within the concept of an IC.

According to my opinion, the main results implemented by the SGH in terms of innovation impact are the following:
- contact research
- consultancy
- education and training
- dissemination within the academic community (scientific conferences, meeting, contest, etc.)
- dissemination for the non-academic community (cultural events for the citizenship, open days, etc.).

According to my experience, the critical issues and the benefits of operating within the SGH are the following:
- S location, interdisciplinary and experiential education
- W location, hub facilities and staff growth
- O international relevance (and visibility)
- T competition of similar multidisciplinary hubs.

I rate the role of the TTO to be moderately effective in enhancing and/or facilitating academic entrepreneurship, academies and OI practices.

### 4.2 Case 2: the Hackademy

Accenture Cybersecurity Hackademy aims to provide training on security issues related to network security, cloud infrastructures, IoT ecosystems, monitoring techniques and ‘offensive security’.

The training course adopts an experiential approach based on practical challenges (CBL – challenge based learning), integrating face-to-face training, autonomous learning and group-based teaching.

For students who have successfully completed the educational path, Accenture offers a six-month internship period at one of the Italian offices and/or an employment contract based on the results achieved.

The Hackademy is aimed at graduates, university students and graduates and took place from March to September 2020 at the SGH.

Participation in the Hackademy is free of charge. Furthermore, the first five participants classified in the admission ranking list will be paid a scholarship for the duration of the course.

The respondent is the managing director of the Hackademy and associate professor of security networks.
The most relevant answers provided by the respondent depict the following scenario:

- I strongly agree with the fact that the nature of the research activities run by a university is a key factor to start a spin-off process.
- I strongly agree with the fact that university support is essential for the development and implementation of a spin-off process and that a consolidated incentive mechanism is fundamental to stimulate scientists to participate in a spin-off process.
- I strongly agree with the fact that communication and consolidated linkages among university departments are extremely important to favour a spin-off process.
- I believe that OI within the SGH for the development of the academy is extremely relevant.
- I strongly agree with the fact that the SGH is a place where knowledge is generated, concentrated and shared within and beyond its physical borders.
- I strongly agree with the fact that the SGH facilitates the transfer of knowledge in an OI mode.
- I strongly agree with the definition of the SGH as an ‘IC’.
- I would rate engagement of the SGH as moderately relevant in terms of activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments.
- I strongly agree with the fact that the SGH stakeholders set can fall within the concept of IC.

According to my opinion, the main results implemented by the SGH in terms of innovation impact are the following:

- contract research
- spin-off firms
- sponsored research
- education and training.

According to my experience, the critical issues and the benefits of operating within the SGH are the following:

S location
W location
O attraction effect from big companies
T reduced public funding, growing/unfair competition from other HEIs.

I rate the role of the TTO to be not at all effective in enhancing and/or facilitating academic entrepreneurship, academies and OI practices.
4.3 Case 3: the 5G Academy

Capgemini 5G Academy is the first 5G training program and digital transformation in collaboration with the University of Naples Federico II, TIM (Telecom Italia) and PTC (Parametric Technology Corporation). Started in January 2020, the program also includes two months of field projects supported by business case development partners. Participants also have the opportunity to be hired within transformation consulting, Capgemini’s business unit in Italy dedicated to digital. The respondent is the Academy Managing Director and Capgemini Future of Technology Director.

The most relevant answers provided by the respondent depict the following scenario:

- I agree with the fact that the nature of the research activities run by a university is a key factor to start a spin-off process.
- I strongly agree with the fact that university support is essential for the development and implementation of a spin-off process and that a consolidated incentive mechanism is fundamental to stimulate scientists to participate in a spin-off process.
- I strongly agree with the fact that communication and consolidated linkages among university departments are extremely important to favour a spin-off process.
- I believe that OI within the SGH for the development of the academy is very relevant. Indeed, the mission of the academy is the creation of an IE through OI practices.
- I agree with the fact that the SGH is a place where knowledge is generated, concentrated and shared within and beyond its physical borders.
- I do not agree nor disagree with the fact that the SGH facilitates the transfer of knowledge in an OI mode.
- I agree with the definition of the SGH as an ‘IC’. I believe that the hub can potentially be an effective IC since it merges different backgrounds and capabilities.
- I would rate engagement of the SGH as moderately relevant in terms of activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments.
- I agree with the fact that the SGH stakeholders set can fall within the concept of IC.

According to my opinion, the main results implemented by the SGH in terms of innovation impact are the following:

- contract research
- sponsored research
- education and training
- dissemination within the academic community (scientific conferences, meeting, contest, etc.) is one of the objectives of the academy.

According to my experience the critical issues and the benefits of operating within the SGH are the following:
5 Discussion

Through the responses to the questionnaires, the three interviewees had the chance to better elaborate their beliefs and perception about OI and entrepreneurial dynamics verified in the SGH, since respondents’ beliefs and perception were mostly latent and unexpressed. Such effect has raised the respondents’ awareness of the linkages and knowledge flows within the SGH. Therefore, all interviewees have welcomed the definition of the SGH as an IC since such phrase explicitly conveys their implicit conception of the SGH environment and processes.

One of the final and more articulated questions regards the SWOT analysis applied to the SGH, in order to enable the respondents to draw the critical issues and the benefits of operating within the SGH. To this end, the interviewees were asked to select from among the choices suggested by the list included in Table 5 and eventually add further items according to their personal judgement.

The SWOT analysis performed in the present study encompasses a double purpose:

1. To detect the SGH’s limits, potentials, growth opportunities and threats to its development or even survival

2. To investigate in which ways and to what extent the SGH effectively creates value.

The analysis has underlined overlapping choices, especially in detecting the location of the hub as a strength and weakness at the same time.

Positing a holistic approach on innovation and the entrepreneurial ecosystems, the analysis has tried to combine this view with the main characteristics of stakeholder engagement within a higher education institution knowledge-intensive hub. These elements have helped frame the multiple case studies methodology by appraising examples of efficient forms on innovation and knowledge transfer mechanisms enhanced by OI practices. In this context, the conceptualisation of the IC has found a fertile filed of application, since the SGH has shown features related to it.
Table 5  SWOT analysis applied to the SGH

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
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<tbody>
<tr>
<td>Location; expertise in research and teaching; research</td>
<td>Location; understaffing at many levels inadequate resources, including</td>
<td>Economic and social development of the urban area hosting the Hub; relations and</td>
<td>Reduced public funding; growing competition of similar; multidisciplinary hubs; lack of</td>
</tr>
<tr>
<td>research comprehensive; quality and growth</td>
<td>physical, financial and human resources; inadequate capital funds; underdeveloped</td>
<td>partnerships with local employers – in the private, non-profit and public</td>
<td>attractiveness growing/unfair competition from other HEIs.</td>
</tr>
<tr>
<td>logistical accessibility; interdisciplinary and experiential education;</td>
<td>campus life and facilities.</td>
<td>sectors; international relevance (and visibility); collaboration and</td>
<td></td>
</tr>
<tr>
<td>service provider to the university and the larger community in terms of</td>
<td></td>
<td>synergies with the local government; exploitation of the positive innovation</td>
<td></td>
</tr>
<tr>
<td>facilities (labs and physical spaces).</td>
<td></td>
<td>trends within the Naples area; attraction effect from big companies.</td>
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<td></td>
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Furthermore, the results of the empirical research have revealed themselves to be consistent with a recent review collecting diverse perspectives on OI including users, networks and communities with a special focus on ‘open service dynamics’ (Randhawa et al., 2016).

Thus, the outcomes of the exploratory case studies described in this paper support our argument stating that the concept of IC applied to a knowledge-intensive hub can explain the successful performance of OI in enhancing knowledge flows in the examined context, i.e., advanced education programs and spin-off firm creation and management.

6 Conclusions

As shown above, the word ‘community’ specifically refers to the interaction between human beings where knowledge flows are attributable to OI dynamics originally activated within the hub. Conversely, the ecosystem conceptualisation can be used to describe any system, even those in which human presence is not necessarily contemplated, nor are OI practices. Thus, the concept of IC applied to a knowledge-intensive hub can explain the successful performance of OI in enhancing knowledge flows in the context of advanced education programs and spin-off firm creation and management.

Considering one of the expected results of the study, the San Giovanni knowledge-intensive hub can be described as an IC.

Hence, one theoretical implication brought forward is the fact that the concept of IC can acquire theoretical relevance when referring to OI contexts involving public, private and institutional sectors. Regarding useful implications for practitioners, our research designs a further framework for technology transfer operators as well as for institutions at both a local and national level to promote academic entrepreneurship in OI contexts.
However, the present research also discloses several limits, mostly concerning the qualitative nature of the study which needs to be enhanced with a quantitative analysis on a broader scale. The latter process would gather systematic data on the evolution of such an IC in terms of OI and technology transfer. To this end, the qualitative analysis should suggest a proper set of KPIs for an IC. Given these premises, possible new research trajectories can focus on the definition of these indicators to help in understanding the scope and function of an OI community such as the one described in this study.

References


From ecosystem to community


