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Abstract

The aim of this conceptual paper is to explore the business ecosystem concept in innovation policy context, and question whether it has something new to bring to the innovation policy field compared to previous theoretical discussions. A comparative study was conducted where three widely utilized policy approaches were examined together with the business ecosystem concept. The ecosystem concept differs from the three approaches, for example in its evolving around innovation, and its self-organizing and self-renewing nature. This paper sets a conceptual basis for further empirical research concerning the innovation policy implications of the business ecosystem concept.

Keywords: business ecosystem, innovation policy, cluster, innovation system, smart specialisation

1. Introduction

There are several different approaches and concepts that guide policy makers within the innovation policy field. These concepts and approaches are utilized in different ways. In policy discussions the use of these concepts is sometimes somewhat fuzzy and new concepts and approaches emerge before policy makers have really gained a deep understanding of the previous ones. If the different concepts are to be utilised in policy making, they should be clearly defined and differentiated from one another. The business ecosystem concept is one of the concepts that have lately become popular in policy discussions. The concept itself dates back to the early 1990s but innovation policy-wise it is still a fairly new concept. The question set for this study is: What is new about business ecosystems as a policy approach and how do they differ from the currently widely utilized innovation policy approaches?

The general economic situation in many European countries is challenging, to say the least, and regional differences in economic performance are increasing. This has forced policy makers to seek new ways to boost and support growth and development. At the same time it has been acknowledged that competition happens more and more in international ecosystems rather than in regional or national clusters and thus innovation policy needs to focus on nurturing evolving ecosystems (Moore, 1993; Hearn and Pace, 2006; Wallin and Laxell, 2013). Some suggestions of the policy implications of the business ecosystem theory have been presented (see e.g. Wessner, 2004; Mason and Brown, 2014; Clarysse et al. 2014) but more extensive research in this field is still needed.

The aim of this paper is to examine the currently widely practiced innovation policy approaches and bring to the discussion this latest business and innovation related concept, which has attracted a lot of attention in business and innovation literature: the business ecosystem concept. Business ecosystems are born and evolve around new innovations, which makes them relevant from innovation policy perspective. Business ecosystems have their roots in wider innovation ecosystems that include also the political, economic and technological environment. Compared to innovation ecosystems, business ecosystems include also the customer side that is often absent when discussing innovation ecosystems (Wright, 2014). Innovation policies can have an important effect on innovation ecosystems and therefore also on the creation of new innovations and new business ecosystems that e.g. create new jobs. Previous literature studies business ecosystems mainly from firm, technology, product or platform perspective. A policy driven ecosystem or a policy view on business ecosystems is quite new to the business ecosystem literature, which forms a research gap from government and policy making perspective. Our paper aims at narrowing down this gap. This paper provides a conceptual framework for comparison of innovation policy approaches and sets the basis for further empirical research. Our contribution to the previous literature is twofold. First, our research provides a new perspective on widely used policy approaches through comparative examination. Second, it adds to the discussion of business ecosystems by integrating it with theory on innovation policy and examining both its characteristics in a policy context and the challenges posed by this new approach.

The data used for this study consists of literature dealing with three innovation policy approaches, clusters, innovation systems, smart specialisation (SmSp), and the business ecosystem concept. Since the discussion around the first two of these concepts has been vast during the past decades, we concentrate on the early developments of these concepts. The SmSp concept is the 'youngest' of the policy concepts and thus the academic research related to it is not yet as extensive compared to the other three approaches. However, we found the SmSp concept relevant for this conceptual comparison especially in the European context, as the concept is strongly promoted the European Commission and widely applied in EU member countries. Our aim is to bring some more clarity to the ecosystem discussion at policy level in order to avoid the incoherent and mixed use of different concepts. Our literature based study creates a conceptual framework for comparison of different innovation policy approaches.

2. Methodology

This study utilized a qualitative literature review to create a theory-driven conceptual framework. The research material consisted of theory-focused literature of three policy approaches and the business ecosystem concept. The literature was gathered using web-based search tools such as Google Scholar and Web of Science. Literature review was chosen as the method for the basis of this concept analysis as it can be viewed as especially useful research method when the idea or approach is new and it is therefore particularly important to build upon the foundation that has been laid out in prior research (Savin-Baden & Major, 2013). A good literature review goes beyond summary and draws connections and conclusions, and also includes criticality (Savin-Baden & Major, 2013). The aim of literature reviews is usually to summarize existing literature by identifying patterns, themes and issues. By doing this they help to identify the conceptual content of a certain field and contribute to theory development (Seuring & Müller, 2008).

This study began by first defining the research problem and then gathering the research literature covering the studied innovation policy approaches. The literature material consisted of both theoretical and empirical research papers. The research process consisted of several rounds of literature search and analysis. The conceptual framework and its structure were outlined based on the first round and the framework, its

elements and the comparative analysis were elaborated and corrected based on the following rounds and during the iterative process of data analysis. The search and analysis process was continued until data saturation was reached.

3. Four approaches to innovation policy

The policy approaches analysed for this study, alongside the business ecosystem concept, are the cluster approach, innovation systems approach and the SmSp approach. These policy approaches were chosen for the analysis as they are all widely discussed and utilised approaches that have awoken attention among researchers and policy makers, some more recently than others.

3.1 Clusters

Cluster theory was introduced by Michael E. Porter in the early 1990s and clusters have since become both an extremely popular subject of study and tools for economic development purposes (Martin and Sunley, 2003). Cluster formation is based on the idea of localization economies, that is, that competitive advantages lie not inside companies but in the locations where business units are based (Porter, 2000). Localisation economies generally refer to economies that are developed due to geographical agglomerations of related activities (Maskell, 2001). The cluster approach offered a new alternative to the traditional sector-based approach by focusing on the linkages between different actors in the production of goods and services and in innovation activities (Roelandt and den Hertog, 1999). The discussion has come far from Porter's original cluster theorizing and though clusters are still an essential part of innovation policy, they are nowadays more often discussed in the context of wider policy subjects, such as regional innovation systems, rather than as the main policy target (Cooke, 2002). Clusters are viewed as an essential part of wider regional systems.

In their simplest form clusters are defined by Porter (1998a) as 'geographic concentrations of interconnected companies and institutions in a particular field'. Clusters are formed in order to benefit from the advantages offered by geographical proximity, such as knowledge spillovers, trust and better coordination (Porter, 1998a; Maskell, 2001). The close proximity of other firms in the same field help in the perception of emerging buyer needs and new innovation opportunities (Porter, 2000). Local clusters also provide better access to employees, suppliers, specialised information, institutions and public goods (Porter, 1998b). Cluster borders don't often fit with political boundaries; they may cross both city, regional and national borders (Porter, 1998a; Porter 1998b). Industrial borders are also rather vague since clusters can cross several industry boundaries.

Interaction between cluster firms is the driving force inside clusters (Padmore and Gibson, 1998). Though competition is of key importance, cluster firms also cooperate with other firms within the cluster in related industries and institutions, much of this cooperation being vertical relations (Porter, 1998a). Competition among cluster firms increases the productivity of cluster firms, drives the pace of innovation and stimulates the formation of new firms within the cluster (Porter, 1998a). Though competing and cooperating firms form the basis of clusters, clusters may also include governmental actors and other organisations, such as education and information providers, research organisations, technical support providers and customers (Porter, 1998b; Roelandt and den Hertog, 1999; Porter, 2000). Clusters are not restricted to single industries but can encompass several linked industries and organisations (Porter, 2000).

Cluster theory has generated a field of cluster policies aimed at supporting regional clusters and their development. Cluster policy differs from traditional industrial policy in regarding all clusters as having the potential to improve productivity and generate growth, instead of supporting a few desirable industries (Porter, 1998b). Governments have an important role, first and foremost in ensuring macroeconomic and political stability and, second, in ensuring the supply of qualified employees, infrastructure and economic information (Porter, 1998a; Roelandt and den Hertog, 1999; Porter, 2000). Policy actors also set the rules of competition and intellectual property rights, promote cluster formation and upgrading. Policy mechanisms should strive to remove obstacles hindering cluster growth, help companies to develop local network relationships with other firms and strengthen their local supply chain linkages (Porter, 2000; McDonald et al., 2007). Cluster policies should not be focused on supporting particular regional clusters but on the overall development of clusters with growth and innovation potential and with a potentially positive effect on regional economic development (Porter, 1998a). According to Porter (1998a; 2000), cluster initiatives should seek to pursue competitive advantage and local specialisation, which requires building on local assets and uniqueness. The cluster approach has been criticized for being too generic and vague in nature (see e.g. Martin and Sunley, 2003) but it has nevertheless been a highly promoted and utilized concept all over the world.

3.2 Innovation systems

The systems of innovation approach was designed to take into account all important factors shaping innovation activity (Edquist, 1997). The foundations of the innovation systems approach originate from the discussion on national systems of innovation by Christopher Freeman, Bengt-Åke Lundvall and Richard Nelson during the late 1980s and early 1990s, as well as from the literature on clusters and innovative milieus and the older related literature on industrial districts (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Edquist, 1997; Asheim et al., 2011a). The focus on national systems of innovation aimed at identifying the national actors and structures contributing to innovation and economic development. The regional dimension of innovation systems was first brought up by Philip Cooke, and he has also been the lead person developing the concept (see e.g. Cooke, 1992; Storper, 1997; Braczyk et al., 1998; Cooke, 1998; De La Mothe et al., 1998; Cooke, 2001a; Cooke, 2001b; Doloreux, 2002; Doloreux and Parto, 2005; Cooke, 2008). The system view takes the viewpoint that the innovation performance of organisations is dependent on the quality of the system and the subsystems they operate in (Smits and Kuhlmann, 2004).

Cooke and co-authors (1997) suggested a regional approach to complement the national and rather operational examinations. This regional approach embraces the view of the regional dimension of innovation and of systems of innovation having regional specificities that separate them from national systems (Cooke, 1998; Autio, 1998; Howells, 1999). The systems view of innovation has its basis in evolutionary and institutional economics (Edquist, 2007; Tödtling, 1998; Cooke et al., 2000; Doloreux, 2002). Cooke (1998) states that the regional innovation systems approach is an outcome of a partial overlap of science and regional studies and the national systems of innovation approach. He distinguishes between conceptual and operational systems, seeing a conceptual system as a logical abstraction and a theoretical construction, and an operational system as referring to a real phenomenon.

An innovation system can be regarded as a geographically bounded system of several innovation networks. Cooke and co-authors (1997) define the key organizational elements of a regional innovation system as firms, universities and other research organisations, technology-transfer agencies, skills-development organisations, consultants, funding organizations and non-firm organisations involved in

innovation. Autio (1998) divides regional innovation systems into two subsystems: the knowledge generation and diffusion subsystem that covers various (mainly public) institutions that are responsible for the production and diffusion of knowledge and skills, and the knowledge application and exploitation subsystem that consists of companies, their clients, suppliers, competitors and industrial partners. Several institutional elements are important for regional innovation systems, such as institutional learning, associative governance, proximity capital and interactive innovation processes (Cooke, 1998).

What are important in the systemic approach are the linkages between these main elements. These linkages can be defined as information and knowledge flows, investment funding, flows of authority, networks and clubs of partnerships (Cooke et al., 1997). The role of networks is strongly emphasized in the innovation systems concept (Cooke, 2001b). Asheim (1998) has distinguished between three types of regional innovation system, of which the regionally networked innovation system is regarded as the ideal type and also the most typical innovation system type of the Nordic countries (Asheim and Coenen, 2005).

National and international level institutions and policy instruments, as well as other innovation systems, are the main external forces influencing the systems (Autio, 1998). As the innovation systems approach emphasizes the role of networks and networking, it also notices the networks extending outside the system's geographical boundaries. But since the role of governance is of great importance in the (regional) innovation systems approach, its focus is on the geographical meso-level, even though the national and international linkages should not be ignored. The innovation systems approach emphasizes the importance of knowledge as the fundamental resource and learning as the most important process (Kautonen, 2006). An innovation system is considered a social system and innovations the results of social interaction between the innovation system's actors (Cooke, 1998; Doloreux and Parto, 2005). The system is formed by the aforementioned actors, their relationships and the processes related to producing, distributing and utilizing economically useful knowledge (Cooke, 1998).

The innovation systems concept can be regarded as an important tool for policy making (Cooke, 1998; Harmaakorpi, 2006). The concept has been used widely as a framework for innovation policies (Jauhiainen, 2009; Asheim et al., 2011a). Smits and Kuhlmann (2004) argue that, as traditional innovation policies were fighting against market failures, modern innovation policies also have to deal with system imperfections. In conclusion, innovation policies should be embedded in a broader socio-economic context, the overall policy domain should be broadened and management revised from having top-down steering to network steering (Cooke, 2001b; Smits and Kuhlmann, 2004). This system view is what encourages governments to take part in innovation system building and organizing. The cooperation between the public sector, firms and universities is one of the key functions of the innovation system and fostering this so-called Triple Helix cooperation is one of the policy objectives. The innovation system is very public in nature (with technology transfer bodies, science parks, an R&D driven focus and a focus on incremental and user-driven innovation) and it has been argued that it is not able to compete with the strong private system of, for example, the United States (Cooke, 2001a).

Asheim and his colleagues (2011b) emphasize the importance of the related variety and differentiated knowledge bases of a region in establishing effective regional innovation policies. They argue that policies must be based on the identification of regional related variety and knowledge bases and the use of them to construct regional advantage (see also Uotila et al., 2012). Fostering regional learning processes, organizational absorptive capacity, knowledge spillovers and trust building between actors are also at the core of regional innovation system focused policies (Cooke et al., 1997; Tura and Harmaakorpi, 2005; Uotila et al., 2006; Pihkala et al., 2007; Cooke, 2008; Kallio et al., 2010). Cooke (2008) argues that policies should help establish a regional innovation culture that is inclusive, open and transparent to all

actors and institutions. The regional innovation system can be used to create platform policies for developing regional innovation platforms (Pekkarinen and Harmaakorpi, 2006; Harmaakorpi et al., 2012). Policy tools and actions based on the innovation systems approach do not focus solely on traditional input–output relations but also on those social and institutional factors that have an effect on the economic development of the region (Kautonen, 2006).

Despite all the conceptual development of the systems of innovation concepts and its wide utilisation in national and regional innovation policies, the systems approach has received criticism for example for its little operational value, lack of substance, challenging implementation and lack of tools to measure the concept (Sharif, 2006; Godin, 2009).

3.3 Smart specialisation

Smart specialisation was first presented as an academic concept but was thereafter quickly developed for policy purposes. The concept was first presented by Foray and Van Ark (2007) and then further developed in 2008 by the members of the ‘Knowledge for Growth’ expert group (McCann and Ortega-Argilés, 2011). The SmSp concept originates from discussion concerning the productivity gap between Europe and the US (Foray and Van Ark, 2007; McCann and Ortega-Argilés, 2011). The original concept was entirely sectoral in its construct, but, recently, it has been applied to a regional context (Camagni and Capello, 2012; McCann and Ortega-Argilés, 2013). The concept has gained a lot of attention in policy arenas; it has been discussed in various publications and applied in regions all over Europe.

The SmSp approach is about creating a unified innovation strategy for a region; a strategy that is based on regional assets in order to ensure the targeted use of funding and investments by focusing on the fields with the most future innovation potential. The aim is not to blindly stick to existing clusters but to perform a thorough analysis by which new potential combinations, niches and cross cutting fields of expertise can be discovered. The SmSp approach is based on the concepts of embeddedness, relatedness and connectedness (Foray et al., 2012). Embeddedness refers to the importance of existing industries that can rely on the local workforce and existing networks of cooperation with regional actors, and that are in tune with the relevant socio-economic conditions. The principle of relatedness encourages actual diversification within a specialisation – more precisely diversification into related areas based on new technologies or processes. In addition to the principles of embeddedness and relatedness, the SmSp approach emphasizes the importance of linking existing knowledge bases to other actors outside the region and networking both nationally and internationally.

The design of a SmSp strategy consists of six steps, presented in detail in the RIS3 Guide (Foray et al., 2012). These steps include: an analysis of the regional context and innovation potential, ensuring participation, creating a future vision for the region, identifying priorities, and creating a suitable policy mix and monitoring and evaluation mechanisms. The SmSp concept emphasises the importance of a combination of top-down and bottom-up processes when formulating and choosing the fields of regional specialisation (Camagni and Capello, 2012). McCann and Ortega-Argilés (2013) refer to this as the process of ‘self-discovery’.

The SmSp concept is at the core of the new European growth strategy. It is the EU’s response to the need to better target structural funds and to the demand for a place-based policy approach. It is not meant to be a strategy for ‘picking winners’ but for targeting scarce R&D and innovation resources in the fields that have the most innovation potential and finding niches that relate to regional assets. Wintjes and Hollanders (2011) consider SmSp a combination of excellence-based and place-based policies. It embraces

innovation as a broad concept, including not only the manufacturing sector but also the design and creative industries, social and service innovation and practice-based innovation (Foray et al., 2012). The role of key enabling technologies, especially ICT, is emphasised. It also challenges regions to go beyond the traditional sectoral approach. Apart from a thorough strategy building process, policy-wise the SmSp approach means, for example, supporting the commercialization of research results, specialized training for the local labour force, joint branding and marketing programmes for cluster firms and policy support to take better advantage of open innovation (WOLFE, 2001). Defining a coherent policy mix for the strategy is one of the steps of a smart strategy building process, and thus there are no universal policy mixes but every region creates the right policy mix to match its overall strategy, goals and action plan.

3.4 Business ecosystems

Applying the ecosystem concept to a business context was first drafted and presented by James F. Moore in 1993. He stated that competition had changed from the traditional head-to-head situation and that this change should be examined in a new way. According to Moore (1993), firms should not be seen as a part of an industry but as a part of an ecosystem where companies cooperate, compete and co-evolve capabilities around a new innovation. He defines a business ecosystem as ‘a type of a business network, a collaboration to create a system of complementary capabilities and companies’ (Moore, 2006). Ecosystems can be regarded as value networks in which the value is co-created (Leviäkangas et al., 2014; Peppard and Rylander, 2006). Typically these network relationships are loose, which makes ecosystems adaptable as fruitless connections can be cut and new ones formed at a rather fast pace (Iansiti and Levien, 2004). Basically, a business ecosystem can be opened up to all possible contributors and participants and thus create an organizational form of ‘distributed creativity’. Moore (1993) has defined four different stages in the development of business ecosystems: birth, expansion, leadership and self-renewal or death. As in biological ecosystems, each member of the system shares the fate of the whole ecosystem (Moore, 1993; Moore, 2006; Iansiti and Levien, 2004).

The business ecosystem has a leader, or as Iansiti and Levien (2004) call it, a keystone organization, whose role is valued by the rest of the ecosystem members. The lead firm provides an open platform that offers solutions to other members and on which other firms can build and innovate in order to increase the customer value of the ecosystem products and services (Iansiti and Levien, 2004; Teece, 2007; Adner and Kapoor, 2010). Leadership enables ecosystem firms to invest in a shared future and common goals bind the ecosystem members together (Iansiti and Levien, 2004; Nambisan and Baron, 2013). From the perspective of an individual entrepreneur however, it is necessary to maintain the balance between an independent entrepreneur mindset and an ecosystem mindset since there might be conflicts between ecosystem’s and individual member’s success (Nambisan and Baron, 2013). It is crucial to be able to consider the whole business ecosystem when making strategic choices and decisions within an organization (Adner, 2006). Business ecosystems may also include bottlenecks to innovation in a particular location of the ecosystem, which poses challenges for value creation and ecosystem management (Adner and Kapoor, 2010).

Business ecosystems are first and foremost global. The role of a region is not visible in the literature concerning ecosystems. The national level perspective is the main way in which ecosystem discussion is connected to the geographical context. It is generally difficult to define the ecosystem boundaries, whether they are geographical or not. When mapping an ecosystem, one should try to identify the organisations whose futures are most closely intertwined and who share certain dependencies (Iansiti and Levien, 2004). Santos and Eisenhardt (2005) have sought to contribute to the solving of the organizational boundary

problem in business ecosystems by developing four conceptions of organizational boundaries (efficiency, power, competence and identity) by which the boundaries can be sketched. Ecosystems cross a variety of industries and contain several ecosystem domains (Iansiti and Levien, 2004). The ecosystem may share these domains with other ecosystems. Ecosystems may also consist of independent niches that can be developed within an ecosystem by specialized new ventures (Moore, 2006; Zahra and Nambisan, 2011). Rong et al. (2015) sum up the existin ecosystem literature as studying business ecosystems either as networks of interdependent stakeholders who evolve together and share the same fate, or as established value networks with fixed interconnected roles. The firs strand of research focuses on the roles that make up a business ecosystem and the second on how these roles interconnect. Rong et al. (2015) call for research that links these two research strands and views the business ecosystem as a process rather than taking a snapshot view of the ecosystem.

As the ecosystem approach is fairly new policy-wise, business ecosystem literature does not offer many suggestions for the policy implications of this approach. Moore (1993) notices the possible societal downside of ecosystem evolution and notes that we must find ways to help individuals within dying ecosystems to shift to new, emerging and more vital ecosystems. From the ecological perspective it is not desirable or wise to support failing ecosystems but rather to ensure that the competition among ecosystems is fierce and fair. It is fairly obvious that as ecosystems consist of several, often rather small, firms, policies should draw special attention to the role of small firms in innovation, economic growth and employment. Moore (2006) also stresses the importance of ecosystems being able to address new business domains. He argues that helping ecosystems (by for example, with financing) to address new ‘opportunity spaces’ is important for a society that hopes to attract entrepreneurs and be innovative. Wessner (2004) has listed some innovation ecosystem policy lessons from the United States. He advises focussing innovation programmes on the individual entrepreneur, basing government fund granting on a competitive basis, improving markets by encouraging private initiative, fostering a culture of innovation and matching policies to market realities. Also, according to Mason and Brown (2014) ecosystem-supporting policies should be a blend of top-down and bottom-up policies, wherein the involvement of major businesses is also important in the bottom-up initiatives. However, these suggestions seem quite general and do not offer anything particularly new to innovation policy discussion. Peltoniemi and Vuori (2004) state that if we follow the theory of ecosystems as complex, self-organising and self-sustaining systems, then no government interventions should be needed for them to survive in global markets.

4. A comparison of three innovation policy approaches and the business ecosystem concept

The business environment is in a fast disruption. Usefulness of the decades-old hegemonic concepts in business development such as clusters, value chains and core competences are challenged, but not yet buried. Internet economy has changed the economic environment remarkably: central terms of the new business logic are business and innovation ecosystems, development platforms, technology adjacencies, value networks and crowdsourcing. As business logics change, research and innovation must respond to this development and practices in them are challenged considerably in the near future.

All of the presented concepts are somewhat fuzzy policy-wise. All of them have varying emphasis related to agglomeration economies, specialization, networks and regions. The innovation system and the SmSp approach were originally developed more with policy targets in mind than was the case with the other two. This sets challenges to their comparison, as does the longer history of the cluster approach and the innovation systems approach compared to the other, more recent and less researched approaches. Table

I summarizes the stylized characteristics of the four examined approaches and works as a framework for future empirical research. Questions concerning ecosystem governance, the role of the public sector, policy objectives and key policy challenges are left open in the framework. These and several other issues are to be researched in the future.

When comparing and evaluating these policy approaches it should be borne in mind where these approaches originate from. Their origins might explain some of their distinctive and differential characteristics. The idea of clusters originates from economics, whereas the discussion on innovation systems originates from regional sciences and economic geography. The SmSp approach originates from discussion of the productivity gap between Europe and the US, and differences in R&D expenditure. As can be assumed from the name of the concept, the business ecosystem approach has its origins in the fields of biology and ecology, and from there the concept has been adapted to business and innovation literature. Since the origins of this concept are in such a different field to economics and business literature, some of the analogies may seem somewhat forced and lack theoretical basis. On the other hand, utilizing these analogies drawn from biology brings out in new ways to examine the importance of complexity and evolution in business, innovation and economic development.

The cluster characteristics presented and analysed here are drawn from the Porterian cluster definition and cluster theory. Porter's views have been criticized as defective and cluster theories and policies have since been shaped more in line with the innovation systems approach. This is why the later cluster and innovation systems literature are quite overlapping and it is sometimes hard to find distinctions between the two (see e.g. McDonald et al., 2007). The innovation systems approach can be considered to build on the cluster approach since, though as a whole it includes more than just cluster actors and emphasises the public sector and governance role, it also considers clusters as the best context for promoting localized learning and economic development, and clusters are an important component of an innovation system (Asheim et al., 2011a). The cluster approach is thus strongly integrated to the innovation systems approach. The innovation systems approach can be regarded as a more generic approach than the cluster approach, and thus it also provides a more comprehensive policy approach (Asheim et al., 2011a).

The cluster approach, as well as the ecosystem approach, takes into account the role of the public sector but the main focus is on the firms. The innovation systems approach includes a strong public system and it has thus been argued that it cannot compete with the strong private system, for example, that of the US (Cooke, 2001a). Cooke (2001a) also states that in Europe there is excessive reliance on public intervention and there is a need for stronger institutional and organizational innovation support from the private system, along with the evolution of the public innovation support systems. Is the ecosystem approach an attempt to answer to this challenge? This question can be better answered after researching in more detail the role of the public sector in a business ecosystem context.

Cluster birth and development is based on localisation economies where the advantages of scale are mainly the outcome of firms within the same field or industry locating in close proximity to each other (Capello, 2002). In innovation systems the advantage is again gained from the overall large scale of activities in a particular geographical area (urbanization economies) and the related variety of knowledge and expertise among organisations. For example, Asheim and Coenen (2005) argue that the cluster concept is a substantially narrower concept compared to the innovation systems concept. This is due to the cluster concept's strong sectoral focus, whereas the innovation systems concept can transcend multiple sectors. In the SmSp approach the economic advantage is achieved by focusing R&D investments in selected fields of specialisation. These strategic fields of expertise are chosen based on the concepts of regional embeddedness, relatedness and connectedness. The idea of relatedness is closely in line with the related

Table 1. The main characteristics of the analysed policy approaches and the business ecosystem concept

		Cluster	Innovation Systems	SmSp	Business Ecosystem
Structure	Scope	Certain industry and related businesses	Regional platforms	Specialised fields of know-how and complementary industries	Complementary industries, niches and firms
	Actors	Firms within certain industry and related fields	Firms, public and private organisations, NGOs	Firms, public and private organisations, NGOs, citizens	Ecosystem firms and organisations
	Networks	Local networks	Regional and national networks	Global networks	Global networks
Functions	Dynamics / driving force	Localisation economies	Urbanisation economies, related variety	R&D investments, embeddedness, relatedness, connectedness	Complementary assets, shared value creation
	Knowledge and innovation	Highly specialised knowledge, local knowledge spillovers	Regional knowledge spillovers, innovation as a social process	Highly specialised knowledge combined with KETs	Complementary and specialised knowledge pools, open innovation
	Cooperation	Cluster firms and related organisations	Triple Helix, subsystem cooperation	Quadruple Helix	Ecosystem firms and organizations, crowds
	Governance	Top-down	Top-down	Top-down & bottom-up	Lead firm, peer-to-peer
Policy	Public sector role	Education, training, infrastructure	Innovation systems governance, intermediation, education, training, infrastructure	Starting and managing of the strategy process, funder and cooperation partner	Removing the bottlenecks of evolution?
	Policy objective	Foster local cluster growth and competitiveness	Improve interfaces between research system and industry	Find unique, “hard-to-imitate”, complementary and cross-cutting fields of expertise	Nurture new entrepreneurship, assist in ecosystem transition, foster ecosystem renewal?

variety idea of the innovation systems approach. Business ecosystems again benefit from the complementary assets of different firms which all add value to the end product or service.

Clusters evolve around highly specialised knowledge and learning and innovating is based on local knowledge spillovers among cluster organisations. The innovation systems approach also emphasizes the importance of regional knowledge spillovers but in addition regards innovation first and foremost as a social process. The SmSp strategies are created based on highly specialised pools of knowledge combined with key enabling technologies (KETs). Innovation potential lies in the combination of regional assets, specialised high level knowledge and cross-cutting fields of expertise. Business ecosystems highlight the importance of complementary pools of specialised knowledge. New innovations arise from open innovation and co-creation processes where the ecosystem partners are free to utilize and build on the platform provided by the ecosystem leader.

Cooperation is one of the key elements of all of these examined approaches. Which cooperative partners are most valued varies. The cluster approach concentrates on the cooperative actions between cluster firms, though it also notices the advantages and possibilities of cooperation with public organisations. The innovation systems and SmSp approach consider the role of the public sector as a cooperative partner as a crucial element. The innovation systems approach has adopted the idea of the Triple Helix where firms, government and universities work in cooperation. The SmSp approach takes this concept a bit further, adding citizens as a fourth group of actors (the Quadruple Helix) and as a part of the strategy process. In business ecosystems cooperative partners can include any organisations that are connected to the value creation process and are an essential part of the ecosystem. Among other firms, this group of partners may also include various public organisations and end users for example, but the role of a specific group of actors is not emphasized.

Cluster policies as well as policies promoting regional innovation systems can be regarded as top-down governed policies where the public sector has a key role in nourishing development. The public sector can influence cluster development by building infrastructure according to cluster needs and providing education and training that matches cluster labour needs. Regional innovation systems are also top-down systems where regional strategic choices have a strong influence on the future of, for example, industrial clusters. The SmSp approach strives to combine top-down and bottom-up governance. In the strategy formation process both the lead role of the public sector and the bottom-up 'entrepreneurial discovery processes' are emphasized. In business ecosystems the role of the lead firm is emphasised and it can be seen as having a leadership role in the ecosystem, which resembles the top-down setting of clusters and innovation systems approaches. However, after forming the common strategy and setting the common goals, the governance of the ecosystem can be seen as more distributed, peer-to-peer type of governance within the network of firms and other ecosystem members.

The issues concerning the role of the public sector, as well as those related to the policy aspects, are still uncertain when it comes to business ecosystems. In the framework some suggestions are presented on the basis of the theoretical analysis. In the cluster approach the main role of the public sector is to provide training and education in order to secure the availability of skilled labour, to develop and maintain infrastructure and to set rules and regulations. The main policy objective is to foster local cluster growth and competitiveness, and that is also why old and declining industrial clusters are often regarded as a true challenge for policies. In the innovation systems approach the public sector role includes the aspects defined in the cluster approach but in addition the governance role that includes defining the regional innovation system and its development strategy, and the role of an intermediating body inside the system. The main policy objective is to foster networking and improve interfaces between subsystems, especially the research

system and the industry. Thus the main challenge is creating an appropriate innovation support structure, fostering networking, knowledge flows and learning. In SmSp the public sector role is essential when starting and carrying through the strategy process. The main object of the whole SmSp strategy process is to find unique, complementary and cross-cutting fields of expertise that are networked with related fields and 'hubs' outside regional borders. After the strategy process is carried through, the key policy challenge is to put this strategy into practice. As noted above, the policy implications of the business ecosystem concept are still rather scant. Some central elements of ecosystem perspective on innovation policy are depicted in Figure 1.

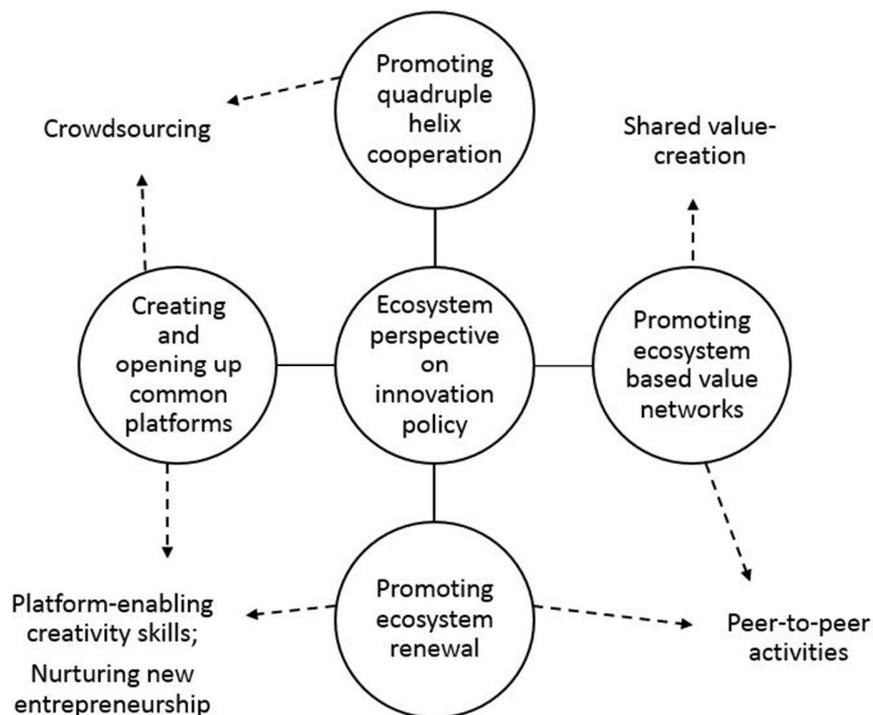


Figure 1. Central elements of ecosystem perspective on innovation policy

The policy elements presented in figure 1 were outlined based on the conceptual framework and its content presented in table 1. For example, as ecosystems eventually phase the self-renewal phase or death during its evolution cycle, it could policy-wise be smart to promote and support ecosystem renewal. Platform-enabling creativity skills, nurturing new entrepreneurship and peer-to-peer activities are examples of the policy tools and activities that could be created to promote ecosystem renewal. Another example is related to ecosystem platforms. As business ecosystems are often built around platforms that offer solutions to firms and on which other firms can build and innovate, fostering the creation and opening up of these platforms could be one ecosystem-nurturing policy objective. The two previously mentioned tools/actions, platform-enabling creativity skills and nurturing new entrepreneurship, as well as using crowdsourcing, could help in new platform creation. Crowdsourcing can also be used in promoting quadruple helix cooperation that can help build new cooperative interactions between ecosystem actors. Business

ecosystems are based on value networks. Promoting ecosystem based value networks instead of traditional value chains could help foster ecosystem growth. However, this requires for example more focus on shared value-creation and peer-to-peer activities inside the ecosystem.

The geographical scope of business ecosystems is still somewhat a question mark. Literature suggests that ecosystems are first and foremost global whereas for example clusters are mostly local or regional and innovation systems regional or national systems. However, innovation policies are often bound to administrative boundaries and therefore mostly national, regional or local by nature. Also, global business ecosystems have their basis in local knowledge and business ecosystems (Clarysse et al. 2014). The geographical scope of business ecosystems can be a fruitful theme for future research as well as its implications on innovation policies aiming at supporting business ecosystem development in its different development phases.

5. Discussion and conclusions

The conceptual evolution of regional innovation policies can be detected from the examined approaches, especially considering the cluster, innovation systems and SmSp approaches. What is the next 'big thing' in the innovation policy field? Competing new approaches set challenges for policy makers: How can one get a deeper understanding of these approaches in order to examine and evaluate their potential for policies?

On the basis of the comparison, the ecosystem approach seems to differ in many ways from the three other approaches under examination. It can be questioned whether it is appropriate and useful to bring yet another concept to the discussion and attempt to draw policy conclusions from it. However, based on the analysis, the business ecosystem approach seems to bring something new to the discussion since its structure and functions differ from the three other approaches. The economic landscape and the ways firms operate within it changes over time, and thus we also need new ways to examine this change and the actors involved in it. Cooke (2001a) makes a distinction between old and new economy. Old economy refers to more traditional manufacturing industries. New economy is characterized by decentralization, value abundance, maximizing network value and disruptive innovation (Cooke, 2001a). Examples of this new economy are ICT, bio- and nanotechnology and the media sector. Perhaps the latest theoretical approaches, especially the ecosystem approach, are more suitable for these 'new economy' sectors that differ from the more traditional sectors that still evolve around regional clusters rather than global ecosystems. The SmSp approach is strongly promoted by the European Union and thus it will probably be applied in some form all over Europe, but this does not mean that the ecosystem approach couldn't be, for example, applied within SmSp based policies. Instead of regarding different policy approaches as alternatives to each other, they can also supplement each other.

Our research provides a new perspective on widely used policy approaches through comparative examination. The aim of the study was also to contribute to the discussion on business ecosystems as well as regional innovation policies by integrating the business ecosystem concept with the theory of regional innovation and development policies and by comparing it to three widely utilized and researched policy approaches.

This paper is based on conceptual and theoretical examination. Empirical evidence on business and innovation ecosystem policies is not provided. Empirical studies of policies contributing to ecosystem evolution are needed and this is proposed as an important field for future research. Though this research perhaps sets more new questions than it succeeds to answer, it is a step forward for research focusing on the 'grey area' of the policy aspects of the ecosystem approach concept. Future research results may also

provide valuable policy suggestions concerning business ecosystems as this approach is still in its early infancy policy-wise. The analysis and the created framework set several questions to be answered in future research. Some of these questions are listed below.

- What is the overall role of the public sector in business and innovation ecosystems?
- Should we even try to influence business ecosystems with policy instruments or should the ecosystem evolution be left to be driven by the processes of self-organisation and self-renewal?
- What are the essential policy mechanisms needed to nurture existing and emerging business ecosystems?

Considering the structure of business ecosystems, at which policy level (regional, national or international) should the policy mechanisms and tools be set?

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