Open campus development at Janssen Pharmaceuticals: How a multinational pharmaceutical company is shaping a regional innovation ecosystem through open innovation.

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Abstract

In this study, we examine in detail the regional innovation ecosystem set up by J&J (Janssen Pharmaceuticals) in its global R&D center Beerse, Belgium. This initiative is exemplary for recent open innovation developments in multinationals that take a long-term and strategic approach to innovation thereby actively shaping the regional ecosystem. This approach goes beyond the traditional focus of open innovation as the multinational not only sources ideas from the outside but also actively shapes the environment by leveraging external talent and expertise, sharing public infrastructure, raising funding and influencing public policies: those are key enablers for establishing a vibrant, world-class R&D environment.

We develop a conceptual framework that combines elements of open innovation, innovation
ecosystems and regional economics. The combination of the three theoretical approaches is required to fully explain the benefits and dynamics of the regional innovation ecosystem Janssen Pharmaceuticals is developing in Beerse.
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ABSTRACT

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Key words: open innovation, innovation ecosystem, regional innovation system, pharmaceutical innovation, research, campus development, science and technology, multi-stakeholder collaboration, research policy
1. Introduction

In this study, we examine how Janssen Pharmaceutical, a subsidiary of pharmaceutical giant Johnson & Johnson, develops an “open campus” on its site in Beerse (Belgium) applying open innovation activities in a coherent way to turn a traditional research and production site into one of the most vibrant locations in the world to develop pharma related innovations. The main objective of Janssen’s strategy is to shape relationships with the environment by focusing on external resources and competencies available within the region. The company makes an effort to develop a strong and sustainable knowledge base at its campus in Beerse. This is realized by combining talent, expertise, infrastructure, policies, and funding through a variety of innovation and educational initiatives and events. With this strategy, Janssen accelerates innovative research and boosts the development of entrepreneurial ventures in the region. The transformation of the site into an open campus allows the company also to increase its productivity by creating mutually beneficial relationships between regionally bounded public and private research partners and by attracting high-tech startups on the campus. These examples show how companies benefit from local links when open innovation becomes integrated into a regional/local context. We also have to emphasise the role of non-economic relationships and social exchange as well as the need to create synergy with regional policymakers.

A regional innovation ecosystem as developed at Janssen reveals the increasing complexity of contemporaneous open innovation practices. It also represents a relatively novel phenomenon to open innovation research. Open innovation scholars would normally talk in more general terms about knowledge inflows and outflows without providing insights about spatial organization of R&D. Although open innovation scholars have overlooked this spatial aspect, it has been studied in detail in innovation ecosystems and regional economics where studies have tried to explain the phenomenon of regionally embedded innovation ecosystems.
We propose to combine these literature streams with open innovation to understand new phenomena such as Janssen’s open campus, which can be considered regionally embedded innovation ecosystem. One can claim that as a literature streams their content might be overlapping, mostly because they share an interest in the same concepts which are for instance networks or open innovation and innovation ecosystems themselves. We argue that although these three streams share a common focus on innovation as a collaborative activity, they look at them in different contexts using different theoretical perspectives. For instance, the theoretical foundations of open innovation have been laid by Chesbrough who linked innovation performance with purposeful flows of knowledge between organisations (Chesbrough 2003). Innovation ecosystems would mostly see open innovation as a process of value creation in environmentally conditioned inter-organisational networks, whereas regional economics is focusing on public-private interface, increasingly labelling as open innovation intersectoral collaborative activities and using territorial innovation system as a model for describing them. Open innovation, innovation ecosystems and regional economics are often positioned as different bodies of literature and correspond to different communities. Moreover, when it comes to studying interdisciplinary phenomena such as regionally embedded innovation ecosystem, there is lack of a broader and coherent framework that could guide this kind of research.

We suggest that open innovation research can only deal with the increasing complexity of open innovation related phenomena, such as open campuses, by a better connection with different theoretical perspectives. Therefore, we introduce a conceptual framework to combine the theoretical perspectives from the area of open innovation, innovation ecosystems and regional economics. The combination of these three fields leads to an integrated approach to allows us to comprehend the increasing complexity of open innovation practices in a rapidly changing environment.
The paper is organized as follow. First, we describe regionally embedded innovation ecosystem at Janssen. Second, we provide an overview of the core ideas in the fields of open innovation, innovation ecosystems and regional economics. Third, we bring the three theoretical perspectives together into a complementarity framework, grounding it in the overarching aspects related to the development of regional innovation ecosystem. Finally, we wrap up the paper drawing some conclusions and discussing the implications of our findings for innovation research, managerial practice and innovation policy.

2. Regionally embedded innovation ecosystem at Janssen

2.1. Introducing the company Janssen Pharmaceuticals

Paul Janssen funded Janssen Pharmaceuticals in 1953 in Belgium. Janssen is part of Johnson & Johnson (J&J) from the early sixties. J&J has three business sectors: consumer health, medical diagnostics and pharmaceutical sector. Since it was purchased by J&J in 1961, Janssen represents worldwide all the companies of J&J that have activities in the pharmaceutical area. Janssen employs 36,000 people; it is active in 150 countries and owns 30 research institutes worldwide. It is the 5th largest company in the pharma sector. Janssen Belgium is the flagship R&D site of Janssen in Europe. Following the challenges of pharmaceutical R&D including decreasing productivity of in-house research, the company has been extensively collaborating with external partners using a variety of approaches that provide access to external knowledge and technologies. The open innovation practice at Janssen has been systematically expanding, and more traditional approaches such as R&D alliances and licensing agreements have been complemented with incubators and global innovation centers. The combination of diverse open innovation activities was necessary to search for the right partners and to acquire state-of-the-art knowledge and technology. Effective exploration and exploitation of external resources became an important source of
competitive advantage at Janssen: the company was successful in bringing to the market a number of novel treatments and products that were originated elsewhere.

Although at first glance open innovation at Janssen seems to sustain the company’s productivity, understanding the complex relationship between internal and external R&D shows that R&D externalization also introduced substantial risks of diminishing direct control over innovative inputs and outputs which, in turn, determine the availability of useful knowledge and technology in the long term. To deal with this kind of challenges external exploitation of technology and knowledge has to be considered as a part of company’s broader strategy and requires proactivity. For instance, Janssen is focusing on future-oriented strategic activities by boldly departing from the traditional firm-centric view on innovation towards an ecosystem approach. The company is also using its capacity to develop initiatives that can keep up with continuously changing technological context. Instead of “opening up” for searching from externally available solutions only when required by the firm’s innovation processes, the company is focusing on making sure that strategic knowledge will be available whenever needed.

The development of a regionally embedded innovation ecosystem is a part of a broader strategy of building strong R&D presence at Janssen’s campus in Belgium. This vision was supported by the strategy to set up the ‘Janssen Campus’ in 2009. The campus serves as a part of unique ecosystem covering the complete drug development life cycle. With state-of-the-art production facilities, Janssen Campus Belgium plays a central role in the worldwide supply chain of pharmaceutical innovation. There is, however, internal competition between the research units of J&J across the globe. Each unit has the potential to provide the multinational access to the regional knowledge base available in that location. This, in turn, allows the multinational to experiment with different technologies and approaches that altogether provide more flexibility to adjust to external challenges. J&J commits financially to a project
based on the strategic fit and alternative options available from other research units in J&J. Therefore one of the strategic objectives of Janssen is to sustain its position as an innovation leader, based on its internal competencies and connections with a strong regional knowledge base that is attractive enough to compete with other research locations. Janssen also continues exploration and exploitation of resources globally by strategically locating its teams in the best performing hubs for scientific research in the world where J&J established its innovation centers. These centers are situated in London, Boston, California and Shanghai.

To strengthen its leading position globally, Janssen systemized its efforts and took a leading role in developing a regional ecosystem for innovation. A strategy linking internal R&D, open innovation and regional resources have been put in place. In a nutshell, this strategy combines internal capabilities and collaboration with partners in the regional ecosystem to sustain the future innovation potential and competitiveness of the company. Below we describe Janssen’s approach in more detail.

2.2. What are the key elements of the regionally embedded innovation ecosystem at Janssen Pharmaceuticals

The regionally embedded innovation ecosystem developed by Janssen is a dynamic, complex and adaptive system of connected talent, expertise, infrastructure, funding and governmental policies (Figure 1). Together these elements create the ecosystem architecture that serves as a model for defining and managing key structures, roles and relationships in the ecosystem. The ecosystem, in this case, is not an empirically observable entity but rather conceptual construct: Focusing on talent, expertise, infrastructure, funding and policies helps Janssen navigate through the environment and strategise on the development of external resources and competencies. Innovation at Janssen is seen as the outcome emerging from continuous interactions between these elements. We will now describe these elements one by one.
I. **Talent:** An attractive innovation environment starts with the presence of top-talent. The objective of Janssen is to ensure that the best talent around the world is willing to settle down at its campus in Belgium. That, in turn, requires that salaries are competitive, immigration and labour policies are flexible, top universities and research labs are available etc. Most of these factors are not under Janssen’s control, and therefore the firm’s relationships with public authorities and universities are important to get involved in related decision processes. Activities, undertaken by the company to attract and develop talent, include summer courses, internships, competence building, etc. Janssen’s engagement with
young talent already starts at the level of secondary schools. Long-term investments in talent development help to bridge the gap between internal needs and the availability of external expertise.

II. **Expertise:** Both internal and external expertise are key ingredients to support a company’s innovation performance. Janssen is active in setting up incubators and accelerators, and in connecting internal research groups with top external expertise. Janssen Belgium has been working hard to make the company’s campus in Beerse accessible to outsiders and to enable internal research teams to reach out easily to a large network of innovation partners. The Janssen Campus Office was established to fulfil this role in Belgium. It plays a crucial role in connecting the outside world with innovation teams within the company. This interaction is in particular important for academic scientists who very often find it challenging to make a connection with big companies. To enable that process, the company develops industry-science links by conducting joint research projects, facilitating mobility of university staff and sharing infrastructure.

III. **Infrastructure:** Modern drug discovery entails an increasing number of technologies. Many of them can only be developed using the very expensive equipment. Sharing state-of-the-art technology with other organizations is imperative. Janssen could for instance profit from superfast connectivity (1 Gigabyte/sec) providing the company global connectivity to academic institutes with a subsidy granted by the Belgian Science Policy Office (Belspo). Another important element of innovative infrastructure in the ecosystem set up by Janssen is the physical infrastructure for incubating new projects and bringing together internal and external experts, and business and scientific expertise under one roof.

IV. **Funding:** (External) ideas and technologies need appropriate financing to develop into new products. Therefore, Janssen makes major efforts to create a deal flow with Belgian and international communities of inventors, through bootcamps, matchmaking events, CVC
investments, accelerators, incubators, and close collaboration with business angels and VCs. The sources of funding that sustain innovative projects in Janssen’s ecosystem depend on the maturity of the ecosystem. The initial stage of ecosystem development would require public-private initiatives and partnerships (PPPs) which have already been recognised for their incentivising effect on the cooperation between public and private actors for innovation. Combining financial resources from the government and the industry also helps to improve the institutional framework for co-operation between public and private actors. Furthermore, PPP as a funding mechanism is put in place to improve the attractiveness of Flanders as a top location for R&D activities. Gradually, after PPP initiatives reach the commercial phase, the role of private and corporate equity capital increases, supporting creation and growth of new businesses. Eventually, these new enterprises are expected to benefit also from tax incentives and offering from a banking system.

V. **Policy:** A lot of factors that are crucial to the success of the ecosystem are not under the control of Janssen. The government (here the Flemish government) is a major decision maker when it comes to public investments in R&D, education policy, infrastructure, safety, etc. By working closely together, both can win: Janssen can develop a world-class innovation ecosystem in Belgium which, in turn, will lead to more investments from its global businesses and from other actors that want to be part of the vibrant ecosystem on and in the vicinity of the campus. The government also wins as this strategy allows Flanders to be at the frontier of recent scientific and technological developments. Public grants have a leveraging effect on subsequent investments of firms who choose to settle in Flanders for their research because of the attractive ecosystem. This, in turn, accelerates the growth and strengthens the ecosystem over time. It is thus important for a large company as Janssen to keep direct contact and stay aligned with public authorities and regulatory agencies.
2.3. **How Janssen’s innovation ecosystem architecture works in practice**

Recognizing the important role of talent, expertise, infrastructure, funding and innovation policies is an important step to understand how Janssen’s innovation ecosystem works in practice. However, that is insufficient because these five building blocks have to be integrated. Conceptually we can represent the integration as a roadmap which shows how to combine public and private R&D and how to translate their results into measurable innovative outcomes. In this case, the roadmap links Janssen’s objective of increased deal flow both in Belgium and internationally with the government’s goal to create economic value and provide solutions for societal challenges.

Janssen’s strategy also shows how the company wants to boost the ecosystem by connecting the inside with the outside while using horizontal anchors such as key enabling technologies (KETs) and public-private initiatives. (Figure 2).

---------------------------------INSERT FIGURE 2 ABOUT HERE----------------------------------
Figure 2 Janssen’s roadmap to connect inside with the outside. Source: Janssen internal documents.

Note: Gray boxes indicate policy driven public-private initiatives.

In the regional innovation ecosystem, one of the strategies to increase the impact of key technologies is clustering of actors that share interest, relevant expertise and facilities. Clusters help to organise complementary resources in the region. Janssen developed and orchestrated such a cluster to strengthen the company’s strategic focus on neurodegeneration. Janssen developed this cluster together with a broad range of partners including knowledge institutes, government agencies, business and academia, specialised in different aspects of technology development, commercialisation and valorisation. Figure 3 shows the combination of knowledge, technology and expertise that comes from different partners working together within the cluster orchestrated by Janssen.
Modular interfaces of talent, expertise, infrastructure, policy and finance also define relationships between different stakeholders. These relationships are dynamic and are changing during an ecosystem life cycle. The main phases of the ecosystem life cycle are reflected by changing numbers and types of partners, changing requirements for expertise and infrastructure as well as approaches towards financing innovation (Figure 2). For instance, in the early phases, Janssen builds a connection with research centers, universities and other companies to explore alternative technological solutions in a precompetitive collaboration. After this exploratory phase firm builds stronger ties to startups and new entrants, that explore underlying technologies. In this transition phase, Janssen also connects to financial
organisations, which support investment and play an important role in determining which of new technologies will become standards. Students are encouraged to experiment with their ideas to unveil their commercial potential by getting access to incubators and accelerators. It is in Janssen’s interest to spark entrepreneurial spirit and spawn start-ups that offer assets which are important for technological innovation and have already gained commercial value. Strategically, it creates a deal flow options for Janssen and translates into innovative outputs such as new products and new businesses. Janssen’s ecosystem strategy is also linked to policies, programs and projects of national, regional and local governments and their agencies within the innovation framework defined by the agenda of European Union. By bringing together those different perspectives, the company can upgrade its strategic intervention from merely reacting to intertwining conditions that define innovative resources availability and appropriability to proactively manage them.

2.4. How is the regional innovation ecosystem at Janssen Pharmaceuticals enriching existing approaches to innovation

The description of Janssen innovation ecosystem shows how the company creates a dynamic innovation architecture by strategically connecting different elements of the innovation ecosystem. The analysis of the innovation ecosystem at Janssen reveals that innovation practice of modern organisations is embedded in a new relational context. Practice from Janssen shows that open innovation in large companies is no longer about outside in or inside out connections only, but also about nurture and sustain the ecosystem of partners and resources which requires taking long-term planning and focusing on the future. Although company uses global socioeconomic context for spanning organisational boundaries, the region has been identified as a new boundary maintaining the structure.
Focusing on external resources and relationships is a common approach for an innovation ecosystem. Most of the industrial innovation ecosystems would, however, focus on developments of technological knowledge and knowledge assets as an immediate outcome. In Janssen’s case, the ecosystem strategy is directed towards creating the right conditions for developing an external knowledge base that is aligned with the innovation strategy of the company. Janssen is taking care of the external environment favouring developments of strategic resources. For Janssen, it is important that existing and potential partners expand their innovation base in the direction that is aligned with the company vision of the future. By working together with governments, universities, financial organisations and industry, the company facilitates the development of institutional capacity to respond to the future knowledge and R&D demands.

This approach is relatively new in the field of open innovation, and it reveals the complexity of modern innovation practices that stretch across multiple roles, partners, processes, structures and functions. Understanding the role of a large company as a driving force in setting up such ecosystem can be therefore a challenging task. It might need taking a completely new perspective to explain how innovation can flourish through the interaction of different types of partners. This phenomenon of orchestrating a regional ecosystem spans across different literature streams that share interactive (collaborative) view on innovation but explain open innovation practices from different perspectives. For instance, the original open innovation framework has been mostly focusing on the mechanisms for connecting technologies and markets and providing advice to individual companies how to valorise on internal and external knowledge by spanning organisational boundaries. The ecosystem approach is shifting the focus towards the socioeconomic aspects of collaboration, explaining part of the variation in innovative performance through different roles and interdependencies between actors in innovation networks. Regional economics literature has been focusing on
the triple helix and other approaches to knowledge generation and its translation into regional innovation systems. Each literature stream has its contribution of contemporary developments in innovation management, but none of them explains entirely the complex initiative as we described in the Janssen case. Bringing these three literature streams together represent possibly a new approach to understand complex configurations of open innovation as we will show in the next sections. First, we will start with the overview of the core propositions of three literature streams that provide theoretical underpinnings of the phenomenon that we described above.

3. **The theoretical underpinning of the regionally embedded innovation ecosystem at Janssen**

In our study, we try to understand the development of regionally embedded innovation ecosystems using elements of the three literature streams: open innovation, innovation ecosystem and regional economic. Table 1 provides an overview and summary of the most important aspects of these three theoretical perspectives.

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Table 1. Overview and comparison between selected literature streams

<table>
<thead>
<tr>
<th>Theoretical underpinnings</th>
<th>Open Innovation</th>
<th>Innovation Ecosystems</th>
<th>Regional Economics</th>
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<td></td>
<td>Innovation seen as a function of division of labour and global knowledge production, distribution and</td>
<td>Innovation depends on socially organized knowledge production represented by the system of the relations between R&amp;D activities, structural links, tacit</td>
<td>Long-standing theoretical associations between location and innovation; Important role of higher education.</td>
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<th>Perspective</th>
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<td>Economic and non-economic partners collaborating within networks</td>
<td>Economic and non-economic partners collaborating within territorial innovation system</td>
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<tr>
<td>Innovation Mechanisms</td>
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<tr>
<td>Innovation processes</td>
<td>Market and non-market, shaped by technology</td>
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</tr>
<tr>
<td>Decision Framework</td>
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<td>Intervention Logic</td>
</tr>
<tr>
<td>Approach to innovation</td>
<td>Collaborative, Interorganizational, Participatory, Decentralized</td>
<td>Collaborative, Interorganizational</td>
<td>Collaborative, Interorganizational, Facilitation-oriented</td>
</tr>
<tr>
<td>Practical implementation</td>
<td>Managing innovation in large firms; Reducing the cost and risk of innovation; A rich repertoire of open innovation tools and practices to search for partners, technologies and market opportunities.</td>
<td>Managing multi-stakeholders collaboration as a mechanism for knowledge transfer and nurturing innovation in a complex milieu of social and economic relations in a way that leverages various aspects of value creation.</td>
<td>Policy development i.e. cluster policies; Development of legal and regulatory frameworks i.e. intellectual property frameworks; Institutional arrangements i.e. government subsidies and allocation of resources to public research institutions.</td>
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<tr>
<td>Limitations</td>
<td>Focusing mostly on firm-level strategies; overlooking the role of broader environment driving innovation;</td>
<td>Conceptualization of innovation ecosystem does not account for multilevel structure of the ecosystem; Complications in the area of intellectual property and the ownership when the innovation is created jointly; Unequal appropriation of the value when the owner is in a strong position to demand and receive a disproportionate share of jointly created value</td>
<td>The limited role of spatial clustering in sustaining innovation and facing global technological and socio-economic challenges.</td>
</tr>
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**3.1. Open innovation perspective**
Open innovation is one of the youngest but popular frameworks that guide innovation practices in different types of organisations. The open innovation paradigm was originally developed by Chesbrough (2003) starting from the observation that useful knowledge is widely distributed and that a company never can hoard the brightest minds. From the perspective of an individual organisation, innovation can be seen as a function of global knowledge production, distribution and mobility (Buckley and Ghauri 2004). From an open innovation perspective, what matters is how a business can tap into readily available technology and knowledge or whether it needs to co-develop it with an external partner(s). Organizations are interested in open innovation because it offered a more cost-efficient way to innovate and it reduces some risks associated with traditional vertical integration approach to R&D and commercialisation. Instead of pursuing a closed innovation it was proposed that product or service development can be supported by external ideas and technologies (outside-in open innovation). Moreover, open innovation encouraged letting go internally developed ideas and technologies that did not serve the business (inside-out open innovation). Later on, the coupled process was introduced linking outside-in and inside-out processes by combining external knowledge sourcing with external exploitations of ideas and IP (Gassmann and Enkel 2004). The open innovation funnel was introduced as a useful conceptual representation showing how innovation process of new product development can benefit from external knowledge whereas internal knowledge is monetised through external paths to the market (Chesbrough 2006).

Business model thinking is a key mechanism providing a decision framework for open innovation. An organisation would acquire innovation resources externally or would sell its unused ideas and technologies based on their fit with the business model (Chesbrough and Rosenbloom 2002). Recently, new open business models were proposed to strategically combine the benefits of interacting with a large pool of knowledge holders and integrating
these into the company’s innovation processes (Chesbrough 2006). Research and practice that built on the paradigm proposed by Chesbrough revealed a plethora of inter-organisational arrangements that support the collaboration between universities, corporate R&D, start-ups and venture capitalist. A rich repertoire of open innovation tools and practices has been offered to support searching for partners, technologies and market opportunities (Bianchi, Cavaliere et al. 2011). Companies that choose to use external knowledge and technologies can in-license them, co-develop them or source them from communities of practitioners, customers or specialists.

One important aspect of open innovation is that open innovation defined as the “purposive inflows and outflows of knowledge to accelerate internal innovation, and expand markets for external use of innovation” (Chesbrough, Vanhaverbeke and West 2006, vii) is mostly focusing on firm-level strategies. The question of the contextual influences on open innovation has received surprisingly little attention to date – an exception is Chesbrough and Crowther (2006). Therefore, open innovation, lacking the focus on strategic alignment between the business organization and environmental aspects of innovation such as science and technology policies, funding and education at the meso- and macro- levels cannot by itself provide a foundation for companies’ long-range planning.

3.2. Innovation ecosystems perspective

Innovation ecosystem can be viewed as a realisation of proactive and inter-organisational approach to open innovation (Adner 2006), (Adner and Kapoor 2010). While open innovation focuses primarily on the flows of explicit knowledge between different actors, it falls short on a comprehending system of important elements that shape the business environment of innovating firms. Moreover, these elements are not anymore viewed as a part of the exogenous environment but became a subject of strategic intervention and enabled firms to proactively shape their business environment rather than remain reactively shaped by this
environment or merely adapt to it (Christensen 2014). What is more important, this proactive relationship with the environment is used to explain differences in innovative performance, generated by interactive patterns and connections between organisational, technological and environmental factors (Johannessen 2009).

Theories on innovation ecosystems have already offered a broader view on innovation than open innovation by connecting economic and non-economic parts of the innovation process into a stable structure of broad socioeconomic impact (Mercan and Göktaş 2011). “An innovation ecosystem refers to inter-organisational, political, economic, environmental, and technological systems through which a milieu conducive to business growth is catalysed, sustained, and supported” (Russell, Huhtamäki et al. 2015). An innovation ecosystem strategically links diversity, structure and processes in a growing web of inter-organisational ties and interdependencies represented by an increasing number of collaborating partners coming from different industries and sectors and who jointly organise their innovation activities (Adner 2006). The role of non-economic structures such as education and public policy has also been recognised in that process (Mercan and Goktas 2011). Public-private partnerships between business, research and higher education foster innovation ecosystems. The technology and innovation development process is in the ecosystem perspective viewed as a continuously evolving interplay between constituents that are connected through a complex network of relationships. These constituents co-create and share value and depend on each other for survival. Therefore commitment and trust are amongst the key coupling forces in the ecosystem (Moore 1996, Iansiti and Levien 2004, Russell, Still et al. 2011, Hengstler 2016).

In an innovation ecosystem, the coordinating role of the lead innovator has been recognised and attributed to a so-called orchestration function (Dhanaraj and Parkhe 2006). The actions of the orchestrator go far beyond occupying and defending positions that are
strategic for immediate economic and financial outputs. Instead, the orchestrating role requires managerial considerations over the process and the direction the ecosystem will take and further evolve (Adner 2006). The capabilities in developing, managing, and coordinating a network of relationships becomes an important source of competitive advantage profoundly influencing conduct and performance of the organisation (Zaheer, Gulati et al. 2000, Gurau 2005, Ritala, Armila et al. 2009). The ecosystemic approach directly links relational capabilities with successful innovation.

The theory of innovation ecosystem provides a broad framework for organising and developing the ecosystem, however, there are several shortcomings in this approach. For instance, the ecosystem approach can lead to several complications in the area of intellectual property ownership. When innovation is created jointly, unequal appropriation of the value may be a problem if one of the partners is in a strong position to demand and receive a disproportionate share of that jointly created value (Belderbos, Cassiman et al. 2014).

3.3. **Regional economics perspective**

An important aspect of the regional economics literature is the study of the relationships between innovation processes and spatial structures, showing long-standing theoretical associations between location and innovation (Moulaert and Sekia 2003). Synergistic advantages of technology, innovation and location are seen as an essential feature of regional economic growth. Industrial and regional policies draw on the observation of an uneven spatial distribution of innovative behaviour linking them to the relationship between space and production cost conditions, differences in the geography of creativity and entrepreneurship, and geographical proximity of small and medium-sized enterprises (Iammarino and McCann 2006). Emphasis has been laid on positive externalities of regional clustering due to local information and knowledge spillovers, local supply of non-traded inputs and a skilled local labour pool (Marshall 2009). Spatial clustering of actors has been
seen as one of the first prerequisites for the emergence of long-term, systemic socio-economic effects of collaboration (Isaksen 2001).

Whereas open innovation and innovation ecosystems literature have primarily dealt with the firms and relationships between them, the regional economics literature is mostly about structure and institutions (Doloreux and Parto 2004). This approach emphasises the role of collaboration between different institutional actors including publicly funded research institutions and industry R&D centers. Successful innovation is seen as a result of interactive and cooperative processes rather than the domain of an individual organisation. The Triple Helix model has been proposed as a useful approach to acknowledge the contributions of multiple stakeholders and to analyse university-industry-government relations in a knowledge-based economy (Etzkowitz and Leydesdorff 1995). Later, financing institutions (Leydesdorff 2012) and civil society (Leydesdorff 2012) have also been introduced, expanding the context of the model and opening the conceptual opportunities for additional helices.

Regional economics has been focusing on two major mechanisms driving innovation which are technology push and market pull. The first one implies technological opportunities pushing forward from scientific discoveries; the second argues that the most critical driver of innovation are market needs. With the main focus on patentable technologies, innovation in regional economics has been conceptualised in a relatively narrow sense as collaboratively developed technologies.

Regional economics influenced public policy development and resulted in initiatives that promote technology-based economic growth and entrepreneurial skills. The intervention logic provides a decision framework for choosing between available options to support innovation. It sets out the chain of expected effects between the actions implemented and the expected outcomes and their positive economic and societal impact. The important economic
role of higher education has been recognised, and universities have been encouraged to
develop the links between industry and business (Olssen and Peters 2005). Examples in that
direction are different forms of incubators and accelerators as well as formal government
programs supporting university start-ups and commercialisation of academic results
(Etzkowitz 2003, Grimaldi and Grandi 2005). Moreover, policies are put in place to facilitate
technology transfer and increase the effectiveness of intellectual property rights in promoting
the development and deployment of innovation. Institutional arrangements such as
government subsidies and allocation of resources to public research institutions channel
resources to innovation activities and also help to transfer technologies through the market
and non-market processes. Industrial clusters are another example of a policy tool which can
play an important role in an increasingly complex, knowledge-based and dynamic economy
(Porter, Clark et al. 2000).

Although the spatial proximity between actors has been recognised as an important
driver for collaboration, it became clear that spatial clustering is not enough to sustain
innovation. For example, most clusters tend to pursue a loosely coupled, facilitation-oriented
approach that does not guarantee the required intensity of collaboration among local actors.
Furthermore, most of the clusters are concerned either with applied or basic research which as
argued by John (John and Pouder 2006) results in substantial differences in innovative
characteristics, potential, and sources of regional advantage.

Based on the analysis of open innovation, innovation ecosystems and regional
economics our research identified distinctive characteristics of inter-organisational
approaches to open innovation. On the one hand, there is literature on open innovation and
innovation ecosystems that explains managerial activities and roles under different inter-
organisational settings. On the other hand, there are approaches focusing on larger territorial
systems of innovation. In this section, we have identified different characteristics of open
innovation, innovation ecosystems and regional economics. In the next section, we will explore links, complementarities and synergies between these three approaches to explain the benefits of the ecosystem at Janssen Pharmaceuticals with the objective to develop a framework that can guide the development and upgrading of regional innovation ecosystem from the perspective of a large company.

4. Complementarity framework for developing the regional innovation ecosystem

Large companies nowadays innovate in the way they organise innovation both internally and externally. Some of the more complex ways of organising innovation require a combination of the three theoretical perspectives which we have described in the previous section. The way how Janssen Pharmaceuticals is organising its campus in Beerse and is developing its long-term R&D strategy is a good case in point: it requires a combination of open innovation, innovation ecosystems and regional innovation systems as illustrated in Figure 4.

------------------------------------INSERT FIGURE 4 ABOUT HERE------------------------------------
We will look at regional innovation ecosystem developed by Janssen using three different perspectives and integrating them into a framework that is rich enough to provide an accurate view of Janssen’s campus development. The specific elements of the framework and their practical illustrations can be found in Table 2.

Table 2. Complementary perspectives on Regional Innovation Ecosystem with practical illustrations
### What elements of Open Innovation do we find at Janssen Pharmaceuticals?

<table>
<thead>
<tr>
<th>Practical illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Tapping into abundant knowledge through four globally distributed Innovation Centers and Janssen Pharmaceuticals Campus Office in Belgium.</td>
</tr>
<tr>
<td>- Firms should profit from external resources</td>
</tr>
<tr>
<td>- Janssen Pharmaceuticals’ portfolio is dominated by the products that are originated elsewhere.</td>
</tr>
<tr>
<td>- Business model innovation is more important for competitive advantage of the firm than technological innovation.</td>
</tr>
<tr>
<td>- Janssen Pharmaceuticals is focusing on shifting its business model to integrated customer-centric disease management by offering transformative solutions for disease prevention, treatment and interception by working with non-traditional partners such as governments and non-profit agencies and establishing initiatives such as Venture &amp; Incubation Center.</td>
</tr>
<tr>
<td>- Firms should combine internal and external paths to market to advance the development of new technologies</td>
</tr>
<tr>
<td>- Company is planning to spin-off some of the projects from Venture &amp; Incubation Center.</td>
</tr>
<tr>
<td>- Firms should combine internal and external ideas.</td>
</tr>
<tr>
<td>- Company is combining internal and external competencies and knowledge, providing start-ups and academia with the access to complementary skills and expertise.</td>
</tr>
</tbody>
</table>

- The knowledge is widely dispersed beyond the firm
- *Not all smart people work for us* (Chesbrough 2003).

- Firms should profit from external resources
  - *We should buy others’ IP whenever it advances our business model* (Chesbrough 2003).

- Business model innovation is more important for competitive advantage of the firm than technological innovation.
- Innovation is aligned to a firms business model.

- Firms should combine internal and external paths to market to advance the development of new technologies
  - *We should profit from others’ use of our IP* (Chesbrough 2003).

- Firms should combine internal and external ideas.
  - *External R&D can create significant value: internal R&D is needed to claim some portion of that value* (Chesbrough 2003).
  - *If we make the best use of internal and external ideas, we will win* (Chesbrough 2003).
<table>
<thead>
<tr>
<th>What elements of innovation ecosystem do we find at Janssen Pharmaceuticals?</th>
<th>Practical illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Innovation ecosystem accounts for complexity of innovation process and accounts for relationships between socioeconomic factors that are important for innovation such as technology, knowledge, talent, expertise, education, infrastructure and policies.</td>
<td>- Janssen Pharmaceuticals is developing innovation ecosystem by focusing on talent, expertise, founding, infrastructure and policies as a key drivers of open innovation.</td>
</tr>
<tr>
<td>- Innovation ecosystem includes a range of actors from academia, industry, foundations, scientific and economic organizations, and government at all levels.</td>
<td>- In its effort to specialize in supercomputing Janssen Pharmaceuticals brings together industry and academia, governmental funding was used to invest in infrastructure, local universities educate experts with the relevant skills to implement and develop new technologies.</td>
</tr>
<tr>
<td>- Hub company plays orchestrating role of the innovation ecosystem.</td>
<td>- Janssen Pharmaceuticals used it leadership position to purposively guide the development of competencies important for innovation by unlocking the knowledge and resources from different actors in the ecosystem. Some examples include ExaScience Life Lab partnership or focused regional cluster in neurodegeneration.</td>
</tr>
<tr>
<td>- Value is jointly created by the partners and value distribution among the partners is taken care of by the hub firm.</td>
<td>Janssen Pharmaceuticals develops an innovation ecosystem where different partners work together and jointly create value. The value is dispersed across the ecosystem and the role of Janssen Pharmaceuticals is to make sure that the company will be able to claim portion of that value and also that other actors who join the networks will benefit from the value proposition of the ecosystem.</td>
</tr>
<tr>
<td>- Innovation ecosystem is designed in a way that it provides condition for</td>
<td>- JLINX (JLINX) has been set up in Beerse to provide incubation to</td>
</tr>
</tbody>
</table>
all stages of innovation process from basic research to commercialization. early-stage companies to catalyse scientific innovation by offering start-ups flexible ways to grow and collaborate.

<table>
<thead>
<tr>
<th>What elements of regional economics do we find at Janssen Pharmaceuticals?</th>
<th>Practical illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Spatial proximity provides favorable conditions for interactions between actors and stimulates flow of knowledge.</td>
<td>- Janssen Pharmaceuticals builds a numerous partnerships with local universities, research institutes and companies.</td>
</tr>
<tr>
<td>- Location is important for the internal competition in multinational companies.</td>
<td>- Janssen Pharmaceuticals Belgium selected as one of 4 supercomputing centers within J&amp;J corporation.</td>
</tr>
<tr>
<td>- Governmental institutions and policies play important role in supporting and incentivizing innovation. The relationship between innovation policy and innovation strategies of the firms is bidirectional.</td>
<td>- Strong concentration of pharma research in Flanders and neighboring regions, both through universities and research centers as well as companies.</td>
</tr>
<tr>
<td>- Structural factors such as education, funding, infrastructure, job markets and entrepreneurship drive innovative growth.</td>
<td>- The Janssen Pharmaceuticals strategy provides a robust example that companies need to account also for the impact that institutions, decisions makers and political processes make on the innovation process.</td>
</tr>
<tr>
<td>- Orchestrating role in regional context expands towards making impact on employment and education.</td>
<td>- Janssen Pharmaceuticals is the biggest private investor in R&amp;D in Flanders which makes important impact on the regional innovation ecosystem and increases the company’s strategic role in the region.</td>
</tr>
<tr>
<td>- Orchestrating role in regional context expands towards making impact on employment and education.</td>
<td>- Janssen Pharmaceuticals case illustrate that availability of skilled workers, funding and state-of-the-art knowledge influence the process of knowledge creation in the region.</td>
</tr>
</tbody>
</table>

- Janssen Pharmaceuticals, provides example of anchoring company which through its increasing economic impact on employment, development of local talent and well-
4.1. Open innovation

Janssen Pharmaceuticals recognises the external world has the potential to solve many of the company’s innovative challenges (Chesbrough 2006). Janssen Pharmaceuticals believes that “not all the smart people work in the company” and that it must tap into the knowledge and expertise of bright individuals outside the company. The abundance of knowledge made Janssen Pharmaceuticals believe that the world is the company’s lab and that the research and development have to be done in collaboration with different types of partners. The company’s R&D is no longer only generation knowledge, but it is also acquiring external knowledge, by identifying and building connections to excellent science in universities and labs around the world (Chesbrough 2006). Following this strategy, Janssen Pharmaceuticals works closely with worldwide innovation centres created by Johnson and Johnson and strategically located in the most vibrant hubs for scientific research, including London, Boston, California and Shanghai. In this way, it became easier for the company to scout the knowledge landscape continuously and keep up with state of the art research and connect to useful knowledge whenever needed. Janssen Pharmaceuticals Campus Office plays a similar role in Belgium where a dedicated team is focusing on open innovation and establishing contact with external parties.

One of the main drivers for implementing open innovation at Janssen Pharmaceuticals is to increase chances for developing new products based on both internal and external capabilities and to improve the productivity of internal R&D. Open innovation paradigm was recognised as a solution to the productivity problem by redefining the research function of the company from exclusively inventing new knowledge to accessing and integrating external knowledge.
This required developing a suite of tools that are designed to identify, access and accelerate the best science externally. In Janssen Pharmaceuticals this was achieved through the increased acquisition of assets, companies, and technologies as well as entering into strategic collaborations, including joint ventures, developments, and commercial partnerships. This variety of approaches is used to collaborate at every stage of the innovation chain, from early discovery and development to market introduction. This also allows searching medical breakthroughs wherever they occur, whether that is in universities, research organisations, or a biotech or pharmaceutical companies. This strategy proves to be working at Janssen Pharmaceuticals as most of the products brought to market in recent years, originated from outside the company. In other words, Janssen Pharmaceuticals used externally sourced IP to tackle unmet medical needs and create in this way a profitable pipeline of new products.

Another element of the open innovation strategy at Janssen Pharmaceuticals is the business model innovation. Janssen Pharmaceuticals’ business model has moved away from the traditional, vertically integrated pharmaceutical company that focuses only internal R&D as a key function for drug discovery and development. Janssen Pharmaceuticals complemented internal R&D with externally available technology and put in place new functions, processes and structures that support open innovation. The overall objective is to shift its business model to integrated customer-centric disease management by offering transformative solutions for disease prevention, treatment and interception. This transformation requires a multidisciplinary, cross-company and cross-industry approach to innovation. For this reason collaboration at Janssen Pharmaceuticals isn’t just about research and development. The company also partners with governments and non-profit agencies on new strategies for access to medicines, affordable pricing, patient education and support. Janssen Pharmaceuticals established a Venture & Incubation Centre (VIC) which is a business incubator and venture accelerator with the main role in launching new healthcare activities adjacent to Janssen
Pharmaceuticals’s core business. With this initiative, the company wanted to foster entrepreneurial talent and build a collaborative community that embraces open innovation. To increase the viability of new ventures, they work in collaboration with Janssen Pharmaceuticals who provides financial, legal and marketing services. The company will also manage the venture’s exit considering several options such as integration with one of the existing business units or by spinning it off.

Open innovation at Janssen Pharmaceuticals is a blend of internal expertise and external knowledge. How this blending is done at Janssen Pharmaceutical can be illustrated by the way the company works with academia. An interesting example is a stellar initiative, which comprises of a granting scheme for sponsored research projects and scientific exchange activities in the area of neurodegeneration. The aim of this initiative is to encourage collaborative research between the academic partners and the R&D groups of Janssen Pharmaceuticals to combine excellence in all aspects of translational research and developmental capabilities. This synergy between academia and Janssen Pharmaceuticals is believed to cover different capabilities needed to address several of the productivity roadblocks present in pharma R&D. To enable that process, the company actively develops industry-science links by conducting joint research projects, facilitating mobility of university staff and sharing infrastructure.

4.2. Innovation ecosystems

The strategy of Janssen Pharmaceuticals shows that it is important to see open innovation as a long-term endeavour which produces the expected results only if supported by an environment which is conductive to open innovation. How to develop such an environment is a new question in the field of open innovation as it was previously assumed that firms could
source knowledge that was always readily available externally. The new approach requires that large firms use strategically intervene in external networks and ecosystems to go beyond the existing open innovation framework (Vanhaverbeke and Cloodt 2006).

Janssen Pharmaceuticals is actively developing its innovation ecosystem by focusing on talent, expertise, founding, infrastructure and policies as a key driver of open innovation. The company carefully crafts each of these elements in an effort to turn the region into a hub for innovation and entrepreneurship. The main functions of Janssen Pharmaceuticals innovation ecosystem are to generate and disseminate new knowledge (through research, education and training) and new technologies (through development and commercialisation) and to move them from the basic research to the marketplace. The innovation ecosystem is designed to foster basic and applied science and translate their results into new processes and products that boost the volume and value of innovation for the whole ecosystem. This ecosystem includes diverse actors from academia, industry, and economic organisations as well as governments and their agencies, to name only a few ones. While the public and private entities jointly contribute to developing basic science and applied science as well as basic technology, the venture capital provides an additional finding as the technology matures. Although the organisation of ecosystem is not rigidly planned the collaborative effort is well designed and focused around the areas that are important for innovation as the following illustrations show.

ExaScience Life Lab is an example how Janssen Pharmaceuticals is using a network of multilateral relationships in the innovation ecosystem to get access to supercomputers which are believed to become a strategic innovation resource in future laboratory research. ExaScience Life Lab is a partnership where Intel’s expertise in the field of supercomputers has been combined with the extensive expertise of Flemish universities and research institutes in life science and biotechnology. This partnership has been established as a catalyst in the
search for technological innovations such as supercomputers and breakthroughs in life science and biotechnology. Janssen Pharmaceuticals is a part of this unique initiative: by gaining access to external expertise in combination with internal know-how the firm can create added value for the company, its customers and whole ecosystem. To make sure that Janssen Pharmaceuticals and whole ecosystem can benefit from the ExaScience Life Lab partnership in the long-term, the company helps the region to stand out as a top hub for supercomputing in life sciences. This requires broader collaboration with different types of partners including regional government. The latter played an important role in this endeavour by providing funds for infrastructural investment in a supercomputer. Janssen Pharmaceuticals played an active role in the decision process for this investment through its advice to the Flemish government and by convincing local politicians that many public and private organisations in the region could benefit from applying this technology for their R&D. With this approach, the company rationalised the resource management and gained access to strategic infrastructure by implementing a fee-for-service model, at the same time avoiding direct investment out of the own pocket.

Without sufficient supply of expertise and talent in bioinformatics and biostatistics, this investment would probably never materialise. In Flanders, there is, however, an excellent supply base of faculty researchers and students at the University of Hasselt which has already been offering master and doctoral courses in important specialities in pharmaceutical research. In this case, Janssen Pharmaceuticals has been capitalising on generic links and relationships with local universities as providers of talent and research services. The strategic role of Janssen Pharmaceuticals acting as an industrial partner encouraged academia to deepen and expand knowledge in bioinformatics over time and to create a new technology niche in alignment with Janssen Pharmaceuticals’s business needs.
The above example illustrates the role of Janssen Pharmaceuticals as a hub company taking an orchestrating role in the innovation ecosystem. Janssen Pharmaceuticals used its leadership position to purposively guide the development of supercomputing power by unlocking the knowledge and resources from different actors in the ecosystem (Dhanaraj and Parkhe 2006). The proactive role of Janssen Pharmaceuticals in that process is directly linked to company’s strategic decisions where to deploy own resources and skills and where to search for them externally. This orchestrating role in developing innovation ecosystem is seen as an important source of competitive advantage in a long run (Burt 2004).

The orchestrating role of Janssen Pharmaceutical also requires considerations over joint value creation and fair distribution of value in the innovation ecosystem (Vanhaverbeke and Cloodt 2006). Janssen Pharmaceuticals develops an innovation ecosystem where different partners work together and jointly create value. This value is dispersed across the ecosystem and becomes embedded in multiple facets such as knowledge, technologies, relationships, policies, infrastructure, and human capital. Janssen Pharmaceuticals strategically navigates through all of these elements making and developing them in the direction adjacent to the company’s innovation strategy and business model so to make sure that the company will be able to claim a portion of the value created in the ecosystem. Moreover, a number of actors including universities, start-ups and company’s competitors benefit from joining inter-organisational networks created in this innovation ecosystem. This kind of networks which jointly create value for target groups has been labelled “value constellations” (Vanhaverbeke and Cloodt 2006). Several mechanisms help the hub firm to set up value network including acquisitions, licensing agreements, nonequity alliances, joint ventures, contracting, and other types of relational engagements that go beyond arm’s-length relations. Janssen Pharmaceuticals has been using all of them.
Janssen Pharmaceuticals has been designing the innovation ecosystem in such a way that it can cover all stages of innovation process from basic research to commercialisation. For this, it is important to identify and nurture early-stage companies actively pursuing research with the potential to transform human health. Janssen Pharmaceuticals in Belgium is collaborating with J&J to catalyse scientific innovations by offering start-ups flexible ways to grow and collaborate across the European life science ecosystem. In line with that, a new company incubation model called JLINX has been launched at the Janssen Pharmaceuticals Campus Belgium, and it is located in a dedicated facility on the campus in Beerse. “JLINX provides entrepreneurs with opportunities to share ideas and collaborate with each other while accessing a unique combination of resources including investment, infrastructure, and access to relevant internal and external scientific, technical and business expertise”. These promising transformative innovations will be developed through venture investment from both J&J and external investors.

**Regional economics**

Janssen Pharmaceuticals believes that its innovative potential is not only related to its ability to work with the best scientists around the world but also to its ability to create an environment that makes it attractive for top scientists, other companies, start-ups and venture capital investors to collaborate with Janssen Pharmaceuticals at its campus. Open innovation literature has labelled this relationship between innovation and location as a “come-to-me-model” (Mortara and Minshall 2014). When they work together, a system of interconnected institutions and organisations emerges, and the function of this system is to create, store, and transfer the knowledge, skills and expertise generating new technologies and innovations in this way. Spatial clustering of actors is one of the mechanisms that support these processes (Isaksen 2001). For example, the socio-spatial embeddedness in the region has been argued to play an important role for firms’ innovation success and accumulation of knowledge.
Inter-organizational relationships also play an important role in managing innovation (Eisenhardt and Martin 2000). Developing relationships in the region not only provides Janssen Pharmaceuticals with access to specialised resources and capabilities important for the innovation process but it also supports the development of common social and cultural values that help sustain inter-organisational relationships over time (Sotarauta, Ramstedt-Þen et al. 2010). The durability of relationships is particularly important for building trust between different organisational cultures which applies in particular to the context where public and private actors need to work together. Spatial proximity provides the favourable conditions for interactions between actors and stimulates the flow of knowledge. This suggests that firms’ innovation processes can benefit from local linkages (Audretsch 1998).

Indeed, a capability to strategically manage the process of knowledge creation and flows between the company and its location is becoming an increasingly important source of competitive advantage in large, multinational organisations. As suggested by prior research local embeddedness is found to foster subsidiary innovation and to benefit from local knowledge base (Andersson, Forsgren et al. 2002), (Almeida and Phene 2004), (Håkanson and Nobel 2001). This requires a set of competencies and absorptive capacity that together facilitate interactive learning, local resource utilization. When the local knowledge creation fit firm-specific requirements, subsidiaries increase their intra-firm bargaining power and attract the provision of corporate resources (Mudambi and Navarra 2004). The supercomputer, for instance, was for Janssen Pharmaceuticals a strategic development because at the corporate level J&J was already looking for four places in the world for having access to supercomputer infrastructure. Janssen Pharmaceuticals in Belgium could become one of those sites by working together with the local government to develop key equipment and infrastructure. Territorially embedded infrastructure plays also an important role in attracting partners to a
specific location. This is one of the reasons behind investment in OI campuses such as one
developed on Janssen Pharmaceuticals’s corporate R&D site in Beerse.

Janssen Pharmaceuticals strategy shows how companies need to account for the
impact that institutions, decisions makers and political processes have on the innovation
process. These insights are important to better organise for innovation and more to efficiently
leverage the available resources. For example, Janssen Pharmaceuticals’s cooperation with
the Flemish government resulted in public investment in the supercomputer. The role of
politics and governmental institutions among other things is to support education, develop the
technological base and provide companies with incentives to invest in innovation. The role of
structural factors in driving innovative growth also shouldn’t be undermined. These factors
include for instance the availability of skilled workers, funding and state-of-the-art knowledge
which together influence the process of knowledge creation via multiple input and feedback
loops that exist between the actors in the innovation system. For example, undertaking
research and development activities as well as bringing innovation to the market depend on
the availability of skilled workforce. In return, this new knowledge and markets can point
towards new avenues for research and have a feedback loop to educational programs.

The systemic interaction between education, science and business is used by Janssen
Pharmaceuticals to combine public policy with private sector interests to strengthen regional
innovation ecosystem. Following the lessons from regional economics, education is addressed
in a much wider context than the needs of short-term innovation. On the one hand the quality
and breadth of the university faculties, opportunities for multidisciplinary studies and their
openness to participate in contract research projects are important for inviting private partners
to joint development projects. Quality provision of primary to secondary education,
international multi-lingual high schools, open universities with international degrees, schools
for lifelong learning and continuous re-education are equally important to create a pool of
talent and sustain innovation in long-term. Educational activities also complement the R&D activity element by providing high-quality graduate programs for master’s and doctoral students or international summer schools that bring together students, scientists and industry experts. Other forms of interorganizational education and learning include internships between academia and industry and business and entrepreneurship camps. Janssen Pharmaceuticals has been actively engaging in this kind of initiatives.

The regional perspective also expands the view on the orchestrating role of innovating company whereas the concepts such as anchoring company have been already proposed (Karlsen 2013). Janssen Pharmaceuticals provides an example of anchoring company which through its increasing economic impact on employment, development of local talent and well-educated workforce has an important presence in the regional innovation ecosystem. Conversely, Janssen Pharmaceuticals as an anchor and orchestrator increasingly recognises that the success of the company depends on the healthy local environment which is developed at the interface between companies, workers, universities and governments (Harkavy and Zuckerman 1999). A vibrant local socioeconomic context is essential for the development of a joint system of organisational and regional learning around a territorially embedded R&D function and for getting access to a knowledge incorporated in regional systems of innovation, cooperative relations, institutions and policy patterns (Braczyk and Heidenreich 1998). Strong territorial systems of innovation are also seen as an effective way to attract new partners and collaborations.

5. Conclusions and implications for research on open innovation

The analysis of regional innovation ecosystem shows that open innovation is no longer about individual outside-in or inside-out relationships in large-companies only, but more and more about nurturing and sustaining the ecosystem of partners. Long-term planning and
forecasting in that direction requires broadening the scope of partners engagements towards non-traditional activities including leadership and governance in new relational context (Lavie 2006) (Moran 2005) and linking them to the business outcomes and performance. Innovation scholars need to take into account the fact that boundaries of innovation context are changing as actors are widely dispersed, knowledge flows global and technological fields are converging. In contrast to the traditional paradigm, innovation is not any longer driven by technology and competition, but other drivers are transforming the way companies innovate. The nature of innovation has also changed, and its combinatorial and relational character is becoming increasingly important (Salter and Alexy 2014). What is more, organisations, ecosystems and communities should be able to measure, manage and improve their innovation process to deliver results that are predictable, probable and profitable (Curley 2016).

An interesting practical illustration of how open innovation is evolving in the proposed direction is open innovation 2.0 (Curley and Salmelin 2013). This concept is focusing on 'quadruple helix' of government, industry, academia and citizens that jointly accelerate innovation and progress by aligning their goals, amplifying resources and attenuating risks.

From our study, we also conclude that there is a need for better defining the boundaries of open innovation theory and more accurately establishing its unique contribution to innovation research and practice. By examining differences and complementarities between a number of perspectives, we found out that they act in synergy with the “classic”, firm-level approach of open innovation defined by Chesbrough (2013, 2006). Focusing on the individual agency as a part of a broader system of innovation not only follows a well-established theoretical tradition but it also has practical value for managers who are increasingly challenged by the changing and increasingly complex environment. Development of dynamic capabilities that could help deal with this kind of challenges represents a possible avenue for open innovation research. Researching the mechanisms that
improve connectedness between open innovation strategy and the environment also presents a formidable challenge for open innovation research. Altogether, there is a great potential for open innovation to successfully account for contextual, structural and relational characteristics of innovation and deal with the complexity of multi-stakeholders collaboration.

6. Managerial implications

Our study has several important learning points for managerial practice. First of all, companies that practice open innovation might find it useful to understand the limitations of the concept in its current form. The open innovation paradigm by itself has a limited potential to guarantee long-term and sustainable, innovative performance. Also, the way open innovation is approached very often makes it an interim solution for large innovation challenges. This is why many organisations practising open innovation fail to develop a strategy in line with the requirements of the external environment. It can be improved by taking a broader perspective on open innovation, recognising and influencing external conditions under which open innovation can flourish.

Understanding and influencing the external environment is a challenging task demanding continuous scrutiny and acting upon various external conditions. Better defining the context can help focus on those environmentally conditioned aspects that are most relevant to sustaining competitive advantage. These elements should work as a holistic frame (blueprint) that allows managers to focus on the relevant issues by reducing complexities into manageable simplicities. Having these blueprints is important for aligning strategic objectives and tactical demands of open innovation with the environment. For instance, Janssen’s combination of talent, expertise, funding and policy established an innovation architecture that provides a means for driving strategy through actionable results. These elements together create evolutionary and evolving metasystem that can ensure alignment between changing the
business model, strategy, vision, stakeholder needs, product innovation and policies. Together
the five building blocks of Janssen’s ecosystem create a decision framework that facilitates
problem analysis, planning and developing roadmaps as well as deploying multiple scenarios
for transformational change. Companies need this kind of decision frameworks, which can be
useful for modelling relationships at different levels, i.e. regional systems of innovation,
business ecosystems, innovation networks and clusters etc.

Therefore we recommend managers to challenge the way they think of open
innovation and approach it as a long-term program that involves strategic planning,
arhitectural blueprint and holistic thinking about innovation structures, functions and
processes. This requires a multidisciplinary approach to socioeconomic systems and the
ability to synthesise separate findings from different perspectives. Our framework draws on
open innovation, innovation ecosystems and regional economics and provides a practical
example how to do that.

7. Policy implications

Our study also has several implications for public policymakers. Efficient policymaking for
innovation is increasingly important to secure the provision of infrastructure, human capital
and financial resources in creating a vibrant innovation environment. Public policies together
with private investors influence the demand and supply of innovative research and new
ventures. They also determine how profits are valued and protected including legal
arrangements that reduce risks associated with innovation. Together they can better direct the
resources by focusing on the areas of the global market potential, high societal value and local
impact. It is, therefore, crucial to have policies that promote the development of
socioeconomic networks in which key stakeholders including industry leaders, research
centers, universities, VCs, governmental agencies and institutions are motivated and
supported to engage in novel ventures and are willing to take a calculated risk. To design effective incentives in that direction innovation policies must understand collaborative relationships between multiple actors.

Policymakers need to focus more on removing barriers to collaboration between relevant actors including themselves. This implies that governmental agencies and political institutions become more open, more approachable and more responsive to different stakeholders. Governments must, therefore, develop competency and culture to engage in stronger relationships with the private sector and relate to multiple players.

**Limitations**

In our study, we focused on different approaches to open innovation and collaboration following the assumption that none of them sufficiently deals with the increasing complexity of innovation practice and does not reflect on its systemic nature. By doing so, we aimed at creating space for multi-level and multi-perspective research that is needed to capture the complexity of broadly distributed innovation activities. Our approach might suffer however from some arbitrary decisions that we had to make regarding the selection of relevant theoretical perspectives and the construction of the theoretical framework. Better understanding the systemic nature of open innovation represents a major challenge for further research.

**REFERENCES**


