

Open Innovation in Geographically bounded Organizational Fields: Recent developments in the pharmaceutical industry

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ABSTRACT

Many companies have changed their strategy from closed to open innovation. Empirical investigations of open innovation reveal that an ideal-typical model rarely occurs in reality. The present study identifies various open innovation approaches and analyzes regional open innovation processes to contribute to the development of a theoretically based and empirically grounded analytic concept of the linkage between regional economies and corporate regional open innovation strategies. Therefore, we focus on proximity in the open innovation process, especially the cultural underpinning of interorganizational relationships. Open innovation research has often neglected these two aspects. A more network-based perspective on open innovation provides a clearer and more differentiated analytic framework for understanding relationships among economic, political, and scientific actors along the "whole innovation chain." To expand the regional open innovation analytical framework, we investigate open innovation processes in the Basel region life sciences industry, where two large pharmaceutical companies have shaped the region and developed different open innovation strategies. We found that companies use different open innovation strategies related to spatial scales reflecting their awareness of proximity among actors and the socio-cultural underpinning of their interactions. The cultural underpinning seems to provide an important cornerstone of success in the partner interaction.

Keywords - Open Innovation, Culture, Organizational fields. Cluster, Life sciences

INTRODUCTION

In the last two decades, leading pharmaceutical companies have fundamentally changed their innovation strategies. Increased competition among companies, stronger regulations by national agencies, and growing difficulties in establishing new marketable drugs—to name a few driving forces—have ended the use of classical vertically integrated innovation models (Braun et al., 2011). As a result, the traditionally closed organizational innovation strategies were modified by integrating external actors into the innovation process. Instead, of organizing all innovation activity stages within the corporate boundaries, a reflexive and guided network among different organizations within an innovation chain proved to increase the chance of successfully developing new and profitable drugs. Research on open innovation strategies has attempted to examine these groundbreaking changes and emphasize the growing importance of knowledge networks and markets in the field of life sciences (OECD, 2012).

As Gassman et al. (2010, p. 3) note, open innovation concepts have advanced from “the research interest of a few to a mainstream research area.” Although the idea of open innovation (Chesbrough, 2003, 2008) generalizes the main characteristics of changing innovation strategies in many industrial sectors, we should consider it an ideal-typical model rather than an analytical framework. To develop a more tangible analytical framework for further research, we specifically relate the model of open innovation to new institutionalist and network-based approaches in organization theory and economic sociology. With the necessary shift from an ideal-typical model to an analytical framework, such a model

supports stronger explanations of context-dependent aspects of innovation processes, such as the distinctive characteristics of industrial sectors, as well as the influence of strategy, culture, and organizational structure. Moreover, empirical investigations in economic geography and organizational sociology demonstrate that different spatial scales—from the global to the local—affect innovation processes (Simard & West, 2006; Dörhöfer & Minnig, 2010). Following Tödtling et al. (2011), the focus on global innovation processes should be supplemented by consideration of regional aspects such as region-specific support solutions and the cultural underpinning of collaboration among different actors.

The present study contributes a broader socio-theoretical framing of open innovation processes. Therefore, we apply the neo-institutional concept of organizational fields (DiMaggio & Powell, 1983; Scott 1995, 2008; Dörhöfer & Minnig, 2012; Dörhöfer et al., 2011), specifically to overcome the existing focal firm perspective in open innovation research and develop a better understanding of the interactions among various actors in an innovation chain. Based on organizational field theory, we introduce the social, relational, and cultural embeddedness of open innovation practices and the specific logics of spatial scales into the analytical framework. For our empirical analysis, organizational relationships in an innovation process and the implications of various field actors’ proximity are of particular interest. Thereby, we expect to obtain deeper insights into the socio-cultural underpinning of knowledge-based interactions in regional clusters (Porter, 1998; Enright, 2003). Notably, geographical studies on relational economy (Bathelt & Glückler, 2011) and knowledge-based—as well as relationally oriented—

theory of spatial clustering (Malmberg & Maskell, 2002; Maskell, 2001; Bathelt et al., 2004) provide important insights to complement neo-institutionalist aspatial concepts.

The Theoretical Background section summarizes our theoretical framework, including the open innovation model, the application of the field framework, and the findings of economic geography on the implications of proximity in economic interactions. The Research Methods section describes recent changes in innovation strategies of pharmaceutical companies and presents an empirical study of the pharmaceutical companies in the Basel cluster. Finally, on the basis of our analytical framework, we conclude with a discussion of the empirical results and suggestions for further research.

Theoretical Background: Open innovation in geographically bounded organizational fields

In many organizations, the capability and expertise for innovation has traditionally been considered an autonomous core competence of a single organization, with the overall goal of succeeding in a competitive market environment. Management therefore made remarkable efforts, at least in the past, to largely maintain their innovation activities within their organizational boundaries. Investigating the innovation processes of many companies in different industrial sectors, Chesbrough (2003) began to question this internal, autonomous, closed innovation model. In his view, innovation processes are increasingly considered and managed as interactive frameworks that transcend not only team and department borders but also organizational borders

(Chesbrough, 2003, 2006). With knowledge worker mobility, the increasingly available venture capital, and universities' growing market orientation, start-up and spin-off companies have become able to enter the innovation process as important players (Chesbrough, 2003). Therefore, interactive innovation processes have become progressively possible and organizational walls around the internal innovation chain more porous. Gradually, an interactive and integrative innovation scenario evolved. Competing companies quite often became simultaneously co-operational partners in innovation as well, requiring that they address innovation management in new and different ways (Chesbrough, 2003). Lichtenthaler (2011, p. 77) defines open innovation as "systematically performing knowledge exploration, retention, and exploitation inside and outside an organization's boundaries throughout the innovation process. The concept of open innovation explicitly considers the trend toward interorganizational innovation processes."

In addition to the changes in the core innovation process (invention), managers modified the subsequent process of commercialization or exploitation of innovative ideas.

Firms commercialize external as well as internal ideas by developing outside as well as in-house pathways to the market. Specifically, companies can commercialize internal ideas through channels outside to their current businesses to generate value for the organization. Vehicles for accomplishing this include startup companies, which might be financed and staffed with some of the company's own personnel, and licensing agreements. In addition, ideas can also originate outside the firm's own labs and be brought

inside for commercialization (Lichtenthaler, 2011, p. 37).

These new developments increasingly challenge companies to handle this dilemma between cooperation and commercialization. In response, corporate strategic knowledge management must focus more on open innovation networks (Lichtenthaler & Lichtenthaler, 2009). Therefore, companies must strategically assess their internal and external knowledge management, that is, the exploration, retention, and exploitation of internally and externally generated knowledge resources. Corporate open innovation strategies and the practices also depend on the characteristics and the innovation processes of specific industrial sectors.

Lichtenthaler (2011) emphasized the importance of new management capabilities, which differ from those in a closed innovation process. Developing these capabilities takes time and extends beyond a primarily technical modification. In contrast, he underlines the importance of a "sufficient fit between open innovation processes and a firm's corporate strategy and culture" (Lichtenthaler, 2011, p. 76). Regarding future research on open innovation frameworks, Gassmann et al. (2010) further stress the importance of integrating and elaborating diverse theoretical elements, such as spatiality and structure, as well as process characteristics, the perspective of different actors (e.g., users and suppliers), the application of tools, institutional features, and cultural frames.

Open innovation must be understood as a broad and differentiated framework based on relationships between various actors, such as corporations, political agencies, and organizations for science and development, comprising an

innovation chain. As the boundaries of a single company become increasingly porous, we should more appropriately investigate innovation processes from a network-based perspective. To further expand research on the open innovation framework, we integrate the neo-institutional position (DiMaggio & Powell, 1983; Scott, 1995, 2008; Owen-Smith & Powell, 2008) and elements of regional economic studies (Cooke, 2001; Porter, 1998; Malmberg & Maskell, 2002). This approach supports us to integrate two additional aspects into the ongoing open innovation debate: the spatiality and proximity arguments in addition to the cultural perspective.

Organizational fields focus "attention on a collection of diverse types of organizations engaged in competitive and cooperative relations" (Scott & Davis, 2007, p. 117). DiMaggio and Powell (1983) defines organizational fields as "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products." (p. 148)

The comprehensive nature of the field's framework enables us to study organizational relationships on three distinct and important levels (cf. Scott et al., 2000, p. 13). First, the level of *organizational sets* directs the research on "a focal organization with its relations to other organizations that are critical to its functioning and survival" (cf. Scott et al., 2000, p. 13). By doing so, the whole value or innovation chain of a focal firm gains attention. Second, the level of *organizational population* is composed of the relationship and exchange processes among similar organizations in an industry. Third, the level of *organizational fields* incorporates both

organizational sets and organizational populations through the inclusion of other organizational forms as well. These are important for our empirical framework, which investigates geographically bounded organizational fields and incorporates considerations of regional studies.

The organizational field approach helps understand this interaction not only as a technical feature but also as a cultural phenomenon. Scott (1995) adds to the classical definition of the field (DiMaggio & Powell, 1983) the aspect of fields as "common meaning systems." The production and reproduction of institutions in the organizational field rest upon three distinct pillars. First is the regulative pillar that constrains and regularizes aspects of institutions with emphasis on rule setting, monitoring, and sanctioning activities. Second is the normative pillar, comprising "normative rules that introduce a prescriptive, evaluative, and obligatory dimension into social life. Normative systems include both values and norms" (Scott, 1995, p. 37). Third is the cultural-cognitive pillar, in which the field actors assume common social practices and shared understandings.

For further elaboration on the interdependence between organizations and institutional structures, the analysis of organizational fields should also consider the intermediary character of networks, such that network structures function as the "skeletons of fields" (Owen-Smith & Powell, 2008, p. 596). These network relationships are, on one hand, embedded into an institutional context that provides regulative, normative, and cultural-cognitive categories, enabling and constraining network exchanges. On the other hand, network and organizational interactions produce and reproduce the institutional context. Owen-Smith and Powell grasp this

"duality" of institutions and networks as "co-evolutionary relationship" (Owen-Smith & Powell, 2008, p. 616). The underpinning of network relationships and interactions by interdependent regulative, normative, and cultural-cognitive action patterns must be especially integrated within an analytical framework of open innovation processes.

In general, the boundaries of organizational fields are defined not geographically but functionally, such as the social construction of space and culture. Boundaries are continuously produced, reproduced, and changed (i.e., institutionalized) by actors' structured interactions. Although proximity, space, and spatial scales could be very helpful to broaden our understanding of organizational fields, those aspects have been thus far considered "blind spots" in neo-institutional research. Therefore, it makes sense to further integrate the spatial component into the organizational field framework (cf. Whittington et al., 2009, p. 94; Marquis & Battilana, 2009; Dörhöfer et al., 2010). Organizational fields should not be restricted and misunderstood as purely aspatial concepts, but may consist of different spatial scales, such as global and regional/local scale dimensions. They are interrelated, and each geographically based organizational field (regional fields in our terminology) has its own institutional logic. Recent research on open innovation in general (Simard & West, 2006) and regional studies in particular (Tödtling et al., 2011; Geenhuizen & Soetanto, 2012) emphasize the connection between proximity and open innovation strategies. Tödtling et al. (2011) recommend integrating the regional embeddedness of innovation practices in evolving conceptions of open innovation:

Open innovation strategies of companies benefit from certain regional culture characteristics and

that there is no uniform "model of open innovation that applies to all types of regions." Region-specific solutions and policies are required that account for divergent regional conditions. The research shows that we rarely find the ideal model of "uncontrolled" open innovation, but rather different forms of innovation practices that are somewhere in between the open and the closed model (p. 1885).

Research has analyzed the embeddedness of regional economic activities, particularly innovation, through different concepts such as industrial districts (Marshall, 1965; Markusen, 1996), regional innovation systems (Cooke, 1992, 2004), and regional clusters (Porter, 1998; Enright, 2003). Similar to the open innovation framework, regional economic literature understands innovation not as a closed, internal, purely inter-organizational process, but as an interactional process within a regional setting (Cooke & Morgan, 1994; Cooke et al., 2004; Cook, 2004; Saxenian, 1994; Tödling & Trippel, 2007). Regions in this context are conceptualized as innovational arenas and defined as

a meso level political unit set between the national or federal and local levels of government that might have some cultural or historical homogeneity but which at least had some statutory powers to intervene and support economic development, particularly innovation. (Cooke, 2001, p.949)

Although good reasons exist to draw regional boundaries in this way, an organizational/regional field approach does not start its analysis with prefixed regional spaces, that is, historically developed or politically defined regional spaces. Our empirical approach investigates the relationships among diverse actors and

their interactions to cartography functionally and geographically bounded spaces within organizational fields. We understand "organizational fields" as a broad analytical tool for exploring relationships, networks, and the logic of interactions among specific actors within a local or regional setting or system.

We could introduce space and embeddedness into the field framework through an integration of findings by relational economic geography (i.e., Bathelt & Glückler, 2011; Malmberg & Maskell, 2002). Relational economics starts its analyses, such as the organizational field approach, with "economic action as a social process, the structure of relations between agents, and the creation of formal and informal institutions" (Bathelt & Glückler, 2011, p. 29). As relational economics is primarily interested in institutional and relational contexts of economic exchanges, the meaning of spatial effects on economic processes could be understood only through empirical research: "we do not seek to identify spatial laws but, instead, look for explanations of localized economic processes and their consequences" (Bathelt & Glückler, 2011, p. 27). Based on empirical analyses, Asheim and Gertler (2005) emphasize that knowledge spillover ("buzz"), path-dependencies in the labor market of highly qualified workers, and the quality of life as a talent attractor provide solid arguments for geographical proximity. The co-location of diverse companies, knowledge institutions, and political actors enables knowledge spillovers, regular observation of competitors, and the possibility of comparing and benchmarking with one another (Malmberg & Maskell, 2002, p. 439). Furthermore, Malmberg and Maskell (2002) and Bathelt et al. (2004) conclude that successful innovation networks depend locally on cultural factors

such as trust, and common values and shared norms are the necessary common ground for successfully coordinating knowledge transfer processes. Other explanations for those localized processes are yet to be found.

In addition, the theoretical assumptions of organizational and regional fields, regional studies, and corporate socio-cultural embeddedness could be a first step in developing an integrated analytical framework to achieve a clearer understanding of open innovation processes. The literature currently needs additional empirical research to further elaborate the analytical framework. Therefore, the present study applies theoretical assumptions in an empirical study of open innovation strategies and processes implemented by the leading Basel region pharmaceutical companies.

RESEARCH METHODS

The pharmaceutical industry can be characterized as a knowledge-intensive and highly competitive sector. Major developments in pharmaceutical research, such as biotechnological advancements and the human genome project, have supported new and rapidly evolving industry segments. As a result, the composition of the pharmaceutical industry has changed. Today, it comprises five branches: (i) Research-based pharmaceutical industry (ii) Biotechnology firms (iii) Generic manufacturers (iv) Contract research organizations and drug delivery firms, and (v) Medical technology enterprises and medical technology (Fischer & Breitenbach, 2010).

Since the 1990s, many pharmaceutical companies' production and innovation model has shifted from a vertically integrated end-to-end strategy to a more network-oriented one. Various types

of companies possess specific competencies and play distinct roles in the pharmaceutical value chain. Although markets and value chains are highly globalized, the long-term development and evolution of well-known regional research clusters, such as Boston, Singapore, and Basel, play a pivotal role in organizing innovations.

We selected the Basel pharmaceutical cluster for empirical investigation for several reasons. First, Basel is one of the world's most important pharmaceutical clusters. Second, companies at all stages of the pharmaceutical value and innovation chain are located within the region, such as leading pharmaceutical companies, biotechnology firms, and suppliers. Third, leading pharmaceutical companies have concentrated their R&D capabilities in the regional cluster to build knowledge hubs and foster relationships with other regional organizations. Finally, the region's companies have successfully adapted their cluster organization to the changing environment (cf. Dörhöfer & Minnig, 2012).

We conducted empirical research in the context of the Corporate Culture and Regional Embeddedness (CURE) project, financed by the Sixth Framework Programme of the European Commission, 2007–2009. As a part of the project consortium, comprising partners from Germany, Wales, Austria, Hungary, Switzerland, and the Netherlands, we investigated the knowledge-intensive Life Sciences Region of Basel, Switzerland.

Based on our analytical framework of open innovation and organizational/regional fields, three main research questions guided the empirical investigation:

- Is there a difference between Chesbrough's ideal-typical open innovation model and the life

sciences companies' actual open innovation strategies and practices?

- How are regional companies organizing their open innovation processes within and beyond regional boundaries?
- What role do proximity and the cultural underpinning in regional innovation processes play?

We divided our research process into two parts, each targeting the exploration and further development of the research questions. In the first part, we conducted explorative interviews with key actors from different economic, scientific, political, and educational organizations in the region. We then analyzed documents from cluster studies, regional initiatives, and dominant regional

newspaper reports. After exploring the regional field, we conducted the second and main part of the research: 30 case studies based on qualitative interviews with representatives from various companies, knowledge institutions, and other organizations important to the field configuration, such as the international school and regional promotion agencies (Figure 1). In the second part, we focused on the knowledge sharing process and the complex cultural exchange processes beyond organizational boundaries in the organizational field. We analyzed the diverse data sources and information and appropriately aligned them to the research questions. We summarized the empirical findings and produced an explanatory case study for the Basel regional field.

Figure 1: Data on investigated organizations

| 1. Ownership | Geographical dimension | Majority owner from the region | Majority owner from Switzerland | Majority owner from another country |
|------------------------|----------------------------------|--------------------------------|---------------------------------|-------------------------------------|
| | Ownership structure | | | |
| | Listed on the stock exchange | 11 | 2 | 7 |
| | Not listed on the stock exchange | 6 | | |
| | Governmental involvement | 4 | | |
| 2. Time-dimension | | Old company (>20 yrs.) | Medium age company (10-20 yrs.) | Young companies (<10 yrs.) |
| | | 16 | 8 | 6 |
| 3. Size | | Micro (<10 employees) | SME (10-250 employees) | Large (>250 employees) |
| | | 5 | 12 | 13 |
| 4. Market-Orientation | | Regional | National | International |
| | | 4 | 5 | 21 |
| 5. Cluster | | Yes | No | |
| | | 22 | 8 | |
| 6. Knowledge-intensity | | Yes | No | |
| Knowledge-intensive | | 30 | 0 | |
| Innovation-intensive | | 20 | 10 | |

Open innovation in the life sciences industry: Common developments and findings from the Basel region

Within the life sciences industry, we observe both increased corporate competition and industry restructuring. These factors stimulate a

new configuration of innovation processes. Stronger regulatory hurdles, falling productivity in R&D, and the expiration of many so-called "blockbuster drug patents" have put pressure on large pharmaceutical companies' drug development strategy (cf. Deloitte, 2010; Hirschler & Kelland, 2010; Gassmann et al., 2008; Pricewaterhouse

Coopers, 2009). The restructuring of leading pharmaceutical companies, including many mergers and acquisitions, concentration on core-competencies, and support of spin-off activities, has simultaneously triggered a change in the pharmaceutical sector as a whole. Since the 1990s, many pharmaceutical companies' innovation model has therefore changed from a vertically integrated end-to-end strategy to a more network-oriented one, with various types of companies changing their roles within the pharmaceutical value chain and therefore developing specific competencies. Research-based pharmaceutical companies, the biotechnology firms, the contract research organizations, and drug delivery companies are of main importance to the innovation chain. Although large pharmaceutical companies previously pursued an end-to-end strategy that incorporated the main innovation chain activities, they now organize and monitor innovation networks comprising diverse actors. That is, the vertically integrated innovation chain has transformed into a more network-oriented collaboration of specialized firms, in which the large pharmaceutical company is responsible for the overarching, boundary-spanning organization of all phases of the innovation chain.¹

¹Our understanding of an innovation or value chain does not follow an orderly, linear input-output-model. Instead, we use the idea of the value grid model. "The [value] grid approach allows companies to move beyond traditional linear thinking. In a value-grid framework, there are a variety of new pathways to enhanced performance. They can be vertical (as companies explore opportunities upstream or downstream from the adjacent tiers in their existing value chain), horizontal (as companies identify opportunities from spanning similar tiers in multiple value chains) or even diagonal (as companies look more integratively across value chains and tiers for prospects to enhance performance and mitigate risk). Successful companies increasingly develop a

Gassman et al. (2008, p. 70) distinguish among three forms of collaboration between large pharmaceutical companies and smaller companies within the innovation processes: outsourcing, collaboration, and integration. The ultimate form of collaboration depends on the closeness of the reciprocal relationship, the specific character of the knowledge transfer, and the learning processes between the actors.

Following the radical change in the pharmaceutical industry between the 1990s and the present, modifications to the business or innovation model seem likely to continue evolving. Studies predict that research-based pharmaceutical companies will increasingly downsize their R&D capacities to evaluate and incorporate the smaller companies' inventions. A Deloitte (2010) study recommends a "shift from a pipeline to a portfolio strategy" for pharmaceutical companies:

To become the "Commercial Engine," Large Pharma must shift investment away from traditional in-house research activities [...] Instead, investment should focus on two areas: developing superior deal-making and alliance capabilities to enable virtual R&D, and redefining sales and marketing functions to own the patient relationship. (p. 6)

Those obvious changes in the pharmaceutical company innovation model could be described as a transformation from closed to open innovation. However, the Basel case study reveals that a social theoretical framework must underpin further investigation of open innovation strategies.

multifaceted value-grid perspective as they leverage new opportunities and respond to new threat" (Pil & Holweg, 2006, p. 72).

To more clearly explain open innovation processes, we begin with the introduction of the "home region" of two leading large pharmaceuticals companies and analyze the companies' open innovation strategies, distinguishing between global and regional open innovation. We then discuss the impact of proximity for specific knowledge-based and boundary-spanning interaction among different actors along the innovation chain.

Open innovation strategies in the Baselregion

The Basel Life Sciences Region has a long and extensive tradition in the chemical and pharmaceutical industries. This tri-national region, which encompasses Alsace (France), northwestern Switzerland, and southern Germany, has evolved into an important center of competency for the entire life sciences industry, particularly in the subsectors of pharmaceuticals, agribusiness, food, and medical technology. In addition to Novartis and Hoffmann-LaRoche, the two largest players in the life sciences industry based in Basel, the region currently houses more than 900 companies. An important precondition for the evolution of the regional core competencies in the life sciences sector is interdependence with other regional clusters such as "engineering, green technology, and IT, logistics and trade, and financial and insurance services" (BaselArea, 2010, p. 26ff.).

Over the preceding two decades, the chemical and pharmaceutical industries have evolved into a knowledge-based life sciences cluster. Many companies are now investing in R&D. The Triple Helix concept of government-industry-university

relationships (cf. Etzkowitz, 2003)² can explain the success of the regional life sciences field in general and the innovation capabilities of local companies in particular. A productive interplay among a variety of actors from policy, business, and science organization support the continuous advancement of the regional knowledge infrastructure and educational institutions. Regional (cantonal) government advances the regional field with requisite support and participates in various regional development initiatives (e.g., the Life Sciences Commission and a regional economic promotion project called "BaselArea").

Many leading Basel-based pharmaceutical companies are important international or global players. International status implies not only doing business in numerous national markets (international players) but also participating in many regional economic arenas (regional players). We consider an international company as active and based in several regions. The intensity of regional involvement may differ. In some regions they may act as a rather loosely connected visitor, whereas in others, they are locally engaged citizens and are even culturally rooted. Consequently, international companies have multiple citizenships. We can describe such companies as actively participating in many regions, developing multiple "belongingness" and institutional

² The Triple Helix theory focuses on a "transformation of innovation from an internal process within individual firms to one that takes place among firms and between firms and knowledge-producing institutions" (Etzkowitz 2003, p. 294), which includes a supportive role of the national and regional government. Although cooperation between the government, the companies, and the knowledge institutions occurs on a very high level of reflexivity, the actual state of affairs is more of a "work in progress" than an emergent interplay.

citizenships (Dörhöfer & Minnig, 2012). Such companies therefore organize their economic activities in general and their innovation activities in particular by integrating diverse capabilities within a variety of spatial scales. In addition, major companies' belongingness in diverse regional fields increases interaction among and fuels change and replication within those regional fields.

Thus, the open innovation strategies of leading pharmaceutical companies simultaneously occur on a global level (organizational field) and regional level(s) (regional field). From another perspective, leading pharmaceutical companies' open innovation strategies utilize global and regional innovation resources to mitigate the tension between cooperation and competition. Although the ideal open innovation model only implicitly considers the spatial dimension of innovation, the changing evaluation and perception of innovation networks beyond the boundaries of the individual company demonstrate the necessity of proximate interactions of different actors based on a "common cultural ground."

When choosing a business location for their activities (e.g., research, production, and sales), companies do not always have complete freedom of choice. Few regions in the world are considered promising locations for an R&D environment. R&D units require a special infrastructure and a wide variety of competences that a single organization cannot provide. These "clustered" competences are found in a specific region and are generally the result of the existence of numerous organizations and their ability to interact. For important pharmaceutical companies in the region, Basel provides highly specialized, productive grounds for innovation processes.

In addition to these common features of pharmaceutical open innovation processes in Basel, we find a remarkable difference between the concepts of the two largest and most important pharmaceutical companies, Novartis and Hofmann-LaRoche, in terms of their regional strategies. Novartis, founded in 1996 as a merger between Sandoz and Ciba-Geigy, is building the Novartis campus in Basel. Many well-known architects, such as Herzog and de Meuron, have designed the buildings; therefore, the campus project is of symbolic significance for Novartis and the entire region. The campus should be able to attract highly qualified international researchers and constitute a productive context for innovation processes among various actors. With an enormous financial investment, the management at Novartis aims to bundle diverse research facilities inside the company and assemble associated research institutions inside the campus. Research projects including external knowledge institutions, such as academic institutes or the University of Applied Sciences, will be conducted there. Moreover, the creation of such a dynamic campus necessitates reflection on the architectural design of the space intended for such intense knowledge sharing. The so-called "multi-space-concept" offers numerous closed and open working innovation spaces. The Novartis campus can be considered as a location for actors cooperating with the company; thus, the campus has limited openness. The future, however, will show whether and how further development of the campus broadens the concept of open innovation.

Similar to Novartis, Hofmann-LaRoche has constructed their image as a Basel-based company. This self-understanding implies that they regularly evaluate Basel, their main location. The

region's economic facts and competitive advantages play a decisive role in Hofmann-LaRoche's long-term embeddedness in Basel. The company-region interrelationship relies on a specific regional strategy, the open innovation strategy. Known as the "integration model," it implies that Hofmann-LaRoche is "part of the city". In contrast to the Novartis campus project philosophy of "building a city within a city," the Hofmann-LaRoche strategy emphasizes broader support of regional knowledge institutions, such as the University of Basel and regional hospitals, and innovation partners. In this case, open innovation refers to the connection with regional innovation partners and, as an interviewee stated, it means "to consider the Basel region as their innovation campus."

Although both innovation strategies are based on extensive internal research and development capacities, Novartis and Hofmann-LaRoche use the porosity of their company boundaries in two different ways. The Novartis strategy is more centralized on their location, while Hofmann-LaRoche pursues a more classical open innovation strategy with wider emphasis on the company's openness toward the Basel region.

More importantly, the primary challenge for the leading pharmaceutical companies is not simply to monitor their collaborations with different partners in various innovation stages, but to engage innovation network partners in bridging the innovation chain stages to share knowledge beyond their established knowledge silos. Thus, these actors' proximity, informal interactions, and the cultural underpinning of their collaboration are basic necessities for the drug development process. For instance, social networks such as the English-speaking research community or

communities of practice are important spaces for knowledge and information sharing. In the Basel region, there are many informal knowledge-sharing spaces beyond organizational boundaries. In addition to knowledge and information transfer, these settings are the hubs for local buzz, discussion of innovation strategies, and foundation of new start-up companies.

Open Innovation and Regional Proximity

In the international pharmaceutical sector, Novartis and Hofmann-LaRoche are categorized under the leading companies conceptualizing global and regional open innovation strategies. From the perspective of a large pharmaceutical company, open innovation is understood as follows:

One thing is to have good ideas; the other pre-condition is to leverage these ideas. And between these processes, there is a decision process, where the idea is focused. [...] These decisions must often be made by people who are not the most creative. However, to develop an idea further, you need such decisions." (Senior Manager 1)

Therefore, pharmaceutical companies must monitor and organize the entire innovation process, beginning with the identification of drug candidates and deciding its advancement to introduce the drug to the market. In addition, representatives from different actors on the innovation chain (e.g., research-based pharmaceutical companies, biotech firms, contract research organizations, and drug delivery companies) agree with the abstract definition of the pharmaceutical innovation process.

Another senior manager from a biotech company emphasized the importance of spatial scales in the

definition of the innovation process: "The discovery of a drug can occur anywhere, but the further development of a drug depends on pharmaceutical experience. And it is important to be located in a region where we have all this experience." (Senior Manager 2)

Because large pharmaceutical companies must collaborate with diverse partners for successful completion of the

drug discovery and development process, they must integrate the advantages of global and regional open innovation strategies. For a more detailed exploration of the open innovation process of the two leading Basel companies, we must closely examine the stages of pharmaceutical innovation and understand successful innovation processes as scientific, social, and collaborative challenges.

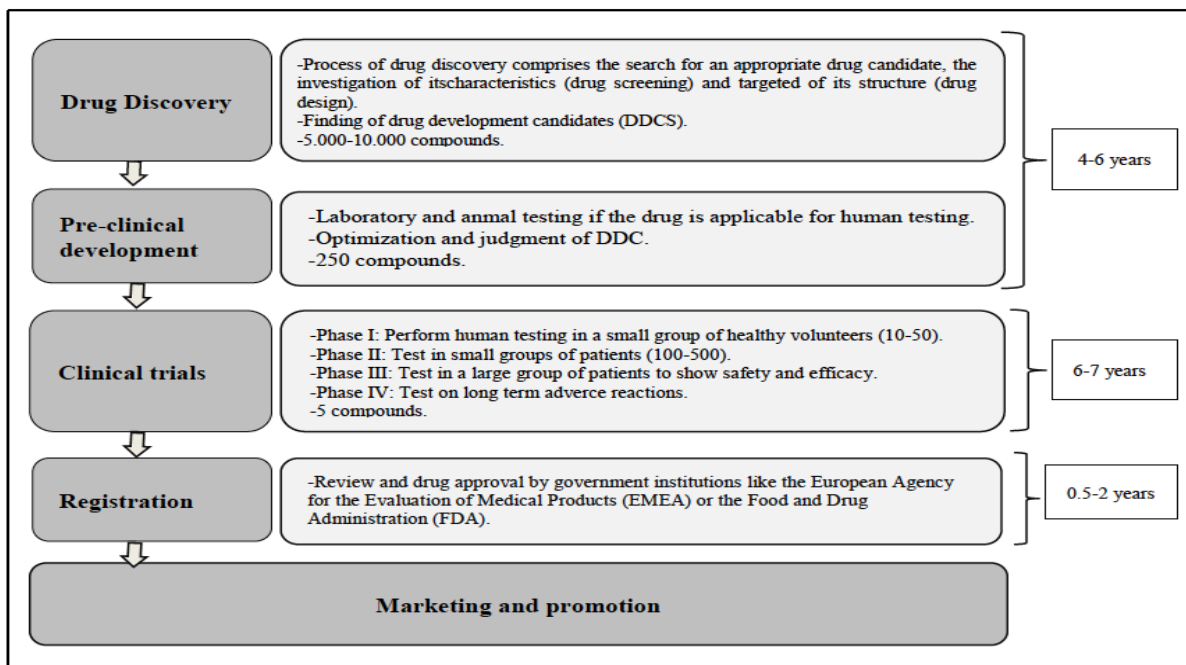


Figure 2: Pharmaceutical innovation chain (Dörhöfer & Minnig, 2012)

Source: innovation.org, 2010; Fischer & Breitenbach, 2010, p.36

The pharmaceutical innovation chain comprises five major stages (Figure 2). First, the company must identify an appropriate drug candidate with potential for further development.

To discover new drug candidates, pharmaceutical companies use both internal research competences and cooperation with external partners, such as biotech companies, universities, or research institutions. Because of the difficulty in finding promising new drug candidates, the strategy adopted by pharmaceutical companies has shifted from closed to open innovation processes. Therefore, the search

for drug discoveries beyond the boundaries of the focal organization has become increasingly important. In addition, it must be understood as important and collaborative competence in the future.

In one leading Basel pharmaceutical company, the discovery screening process is part of what it calls a "partnering" concept:

That's like scouting; one observes the activities of other companies, that is, small firms, biotech companies, or universities. [...] First, in what is called partnering, we decide with whom we will

cooperate because they have, or will have, something interesting for us. Then as a large firm, we have to consider two different tracks: On the one hand, we have the scouting, and we look at what is done worldwide, what we are interested in. On the other, we monitor our image as a company so that other companies would want to collaborate with us. [...] And then we have contracts. For example, if a biotech company has invented an interesting substance, then we could collaborate, or we could further develop the substance within our company depending on whether the substance succeeds, and then we could finally buy the company. These are the alternatives for us to obtain innovation potential from outside. (Senior Manager 1)

The first part of the innovation chain can be organized almost anywhere in the world, resulting in the establishment of potential partnerships with companies from a range of countries.

Second, the development process begins with pre-clinical development, comprising labor and animal testing to determine whether the drug is safe for human testing. The Basel companies in this study outsource many such activities and work together with "contract research organizations." For example, accredited firms with specialized labor equipment conduct laboratory testing. Although proximity plays a minor role for many testing activities, regular information exchange regarding the results of animal testing is the core requirement. Both partners must also maintain informal relationships among managers and employees.

Third and fourth, the clinical trials comprise testing groups of people in hospitals. Because of the importance of this innovation process stage, the experts of

pharmaceutical companies engage in testing activities. Consequently, one of the leading companies organized a regular exchange among physicians in the Basel region to create "clinical hubs" or "translational hubs." Successful tests trigger the governmental agency review and (one hopes) approval phase. In this process, involved actors' well-attuned practices provide an important locational advantage.

Finally, only large pharmaceutical companies have the requisite financial assets and infrastructure to market and promote the drugs. Small, innovative biotech companies with promising findings cannot conduct these processes, requiring them to enter into a partnership with a large company.

RESULTS AND DISCUSSION

This in-depth analysis of the different stages of the innovation process demonstrates that, as explained by experts, drug invention candidates can occur almost anywhere in the world. In contrast to the invention stage, the organizational and individual interactions of the development stages depend on an established "common ground" among diverse actors. A deep understanding of the development process constitutes an important element of the innovation process. If the innovation chain is grounded in a shared cultural framework, actors find it easier to bridge different innovation cultures (i.e., the steps of innovation and their actors). We differentiate between the "whole-chain-culture," referring to the network relationships in a functional manner, and the "local whole-chain-culture," comprising the specific characteristics of proximate, culturally underpinned network relationships and interactions (Dörhöfer & Minnig, 2010, 2012). Both these forms create intense connectedness and enable actors to

interact with and learn from each other (Powell et al., 1996).

Let us explain the development and maintenance of a regionally bounded "whole-chain-culture." First, many informal networks and communities in Basel underpin the interactions among diverse organizations. Often, the phrase "people know each other" characterizes informal networks. The base for these informal networks is the continuing exchange of scientists and employees among local organizations. The main exchange activities are as follows:

- Exchange of employees and managers between large pharmaceutical companies
- Exchange of staff between large pharmaceutical companies and biotech companies
- Exchange of staff between established companies and new start-ups or creation of spin-off companies
- Exchange between the scientists formerly working at the research institutions of the university and regional companies, particularly large pharmaceutical companies

Therefore, many employees have regular meetings and knowledge sharing with their former colleagues and the exchange of staff between regional organizations builds a broad cultural base of regional interactions. Through informal networks or employee experiences from former workplaces, such as in organizations positioned in another stage of the innovation chain, the shared culture implies an understanding of the entire innovation chain and differing perspectives.

For example, the director of a research institute with strong linkages to the large pharmaceutical companies states the following:

I would say a [large pharmaceutical] company likes to hire [from the research institute] because we already have a relationship [with the large pharmaceutical company]. The people here know people within the [large pharmaceutical] company, and they also know what it means to perform goal-oriented drug development. Even though we mainly do very basic research, people in our institute have contact with [large pharmaceutical company] people and have a broader understanding of development and product-oriented work.

To increase the interaction and common understanding between the disparate groups of people working on the different stages of product development, regional organizations in general and the large pharmaceutical and biotech companies in particular purposefully organize their cooperation activities proximate to other actors, as stated by Senior Manager 1:

Cooperative activities seem to be fueled and enabled by geographic proximity. For example, regional proximity plays an important role in the interactions [between biotech company and large pharmaceutical company]. Not only do we know each other—the biotech company was founded by the former large pharmaceutical company employees—but we have stayed in the region, and therefore, "we are just around the corner" and interaction seem easier and less formal.

Regional proximity also appears important for many smaller service organizations, interacting in supporting processes with both large and small life science and pharmaceutical companies. CEO 1 states the following:

Proximity and short distances are important selling arguments. In contracts, not only is the price important but also the opportunities for direct communication and fast response. The purpose and challenge are often to solve problems in close cooperation and interaction. [...] Those relationships have been built up over years; often, they build on the relation from the time studying at the university or the time working in those companies after finishing their education.

Such service organizations do not produce their own products; rather, they are outsourcing partners for small process steps that enable the main companies to focus on their core competence and maintain or gain flexibility. For those service companies, reliability and good relationships with research departments of their customers are of great importance.

In short, the cultural pre-conditions of successful drug candidate development are based on the actors' regional proximity and the regular interaction between individuals. Thus, a regionally bounded "whole-chain-culture" has evolved that enables the actors to bridge the innovation process stages' respective cultures.

CONCLUSION

The open innovation framework is an important and interesting approach to describe the pharmaceutical industry innovation process. However, a broader analytical framework and the integration of spatial arguments must supplement the ideal-typical description of open innovation. The organizational field framework and its application to empirical investigation of pharmaceutical companies in the Basel region enabled us to conduct an all-embracing analysis of innovation processes.

Innovation activities in the pharmaceutical industry require intensive interaction among diverse partners. At present, the innovation process from initial invention to the final product in the market takes, on average, more than 10 years. Several projects fail during this long and complex innovation journey. No company, not even the largest one, can encompass all the necessary competences and capacities of a development process that is long, complex, and risky. Innovation activities in the pharmaceutical industry have been and must continue to be predominantly organized as an open innovation and collaborative process. Therefore, the pharmaceutical industry is an ideal field to increase our understanding of the open innovation framework, and will enable further learning about the characteristics and challenges of this approach.

Consequently, the empirical findings underline the connection between the leading pharmaceutical companies' open innovation strategies and the implications of spatial scales in the innovation process. It is not by chance that pharmaceutical companies are engaged "citizens" and developers of their main regional bases. Moreover, companies organize their open innovation processes within and beyond regional boundaries, suggesting the awareness of the need for proximity among different actors and a socio-cultural underpinning of knowledge-based interaction. Most notably, the advancement of campus strategies and the appreciation of existing informal networks suggest that leading pharmaceutical companies have incorporated proximity in their open innovation strategies.

All organizations and their management in the Basel region understand themselves as part of a wide and intensive innovation framework or process.

Consistent with Powell et al. (1996), we find a "whole-chain-culture" representing an interesting case of a diverse organizational field that can create an intense connectedness with the ability to interact and learn from one another. Some organizations perform a directing role, whereas others play a supporting one. The Basel area contains all steps or competences necessary for the total innovation process, and thus, it could be considered "a wholechainregion" (Dörhöfer & Minnig, 2010). This term indicates that the entire process from innovation to marketing, including all of the necessary support functions (e.g., financing services, laboratory infrastructure, packaging design, and suppliers), is conducted within the region with actors closely connected. We also found a common culture across the organizational field, which we call "the wholechain region." The cultural underpinning seems to provide an important cornerstone of success in partners' interaction. This "wholechainculture" represents an interesting case of a diverse organizational field's ability to create intense connectedness through interacting and learning from one another (Powell et al., 1996).

In sum, we tested and refined our analytical framework on the basis of analyzing only one industry. Further research, especially case studies in other organizational and regional fields as well as cross-sectional surveys must be conducted. The present study contributes the first step in the direction of an analytical framework for open innovation.

REFERENCES

Asheim, B., & Gertler, M. (2005). The geography of innovation: Regional innovation systems. In J. Fagerberg, Jan

(eds.), *The Oxford handbook of innovation*. Oxford: Oxford University Press, 291-317.

- BaselArea (2010). Basel economic area. Optimal conditions for business success. Basel.
- Bathelt, H., & Gluckler, J. (2011). *The relational economy: Geographies of knowing and learning*. Oxford: Oxford University Press.
- Braun, A., Müller, E., Vladova, G., & Adelhelm, S. (Hrsg.) (2011). *Open Innovation in Life Sciences. Konzepte und Methoden offener Innovationsprozesse im Pharma-Mittelstand*, Reihe: Innovation und Technologie im modernen Management, Heidelberg, Springer Gabler.
- Chesbrough, H.W. (2006). *Open Business Models: How to thrive in the new innovation landscape*. Boston. Harvard Business School Press.
- Chesbrough, H.W. (2006). The era of open innovation. *MIT Sloan Management Review*, 44 (3), 35-41.
- Cook, P. (1992). Regional innovation systems: competitive regulation in the new Europe, *Geoforum* 23, 365-382.
- Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change*, 10(4), 945-974.
- Cooke, P., & Morgan, K. (1994). The regional innovation system in Baden-Württemberg. *International Journal of Technology Management*, 9(3-4), 394-429.
- Cooke, P., Heidenreich, M., & Braczyk, H. (2004). *Regional Innovation Systems: The Role of Governances in a Globalized World*. Routledge Chapman & Hall.
- Deloitte, (2008). *Reinventing innovation in large pharma*. Deloitte Development LLC publication, from www.deloitte.com.
- DiMaggio, P.J., Powell, W.W. (1983). The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48 (2), 147-160.
- Dörhöfer, S., & Minnig, C. (2010). Constructing regional spaces- social capital, culture and proximity (Full

- paper). *26th EGOS Colloquium Lisbon 2010*.
- Dörhöfer, S., & Minnig, C. (2012). Clusters as geographically bounded organizational fields: The meaning of proximity in the Basel pharmaceutical industry, in: *American Journal of Business and Management* 1(4), 259-270.
- Dörhöfer, S., Minnig, C., Pekruhl, U., & Prud'Homme van Reine, P. (2011). Contrasting the footloose company: social capital, organizational fields and culture. *European Planning Studies*, 19(11), 1947-1967.
- Enright, M.J. (2003). Regional clusters: What we know and what we should know. In Johannes Brouker, Dirk Dohse and Rüdiger Soltwedel (Eds.), *Innovation clusters and interregional competition* (pp. 99-129). Berlin: Springer.
- Etzkowitz, H. (2003). Innovation in innovation: The Triple Helix of university-industry-government relations. *Social Sciences Information* 42(3), 293-337.
- Fischer, D., & Breitenbach, J. (2010). Die Pharmaindustrie: Einblick, Durchblick, Perspektiven. Heidelberg: Spektrum Akademischer Verlag.
- Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, 40(3), 213-221.
- Gassmann, O., Reepmeyer, G., & von Zedtwitz, M. (2008). *Leading pharmaceutical innovation*. Berlin: Springer
- Hirschler, B., & Kelland, K. (2010). *Big Pharma and small R&D. Are big western pharmaceutical companies turning into distributors rather than inventors?* A Reuters special report. London
- Innovation.org (2007). *Drug discovery and development: Understanding the R&D process*. Retrived 15.03.2013, from http://www.innovation.org/drug_discovery/objects/pdf/RD_Brochure.pdf
- Lichtenthaler, U. (2011). Open innovation: Past research, current debates, and future directions. *The Academy of Management Perspectives*, 25(1), 75-93
- Lichtenthaler, U., & Lichtenthaler, E. (2009). A capability-based framework for open innovation: Complementing absorptive capacity. *Journal of Management*, 46(8), 1315-1338.
- Malmberg, A., & Maskell, P. (2002). The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering. *Environment and Planning*, 34(3), 429-449.
- Markusen, A. (1996). Sticky places in slippery space. A typology of industrial districts. *Economic Geography*, 72(3), 293-313.
- Marshall, A. (1965). *Principles of economics*. London: McMillan.
- Mumenthaler, S. (2009). Open Innovation in the Pharmaceutical Industry: The Case of Novartis. Paper submitted to UNCTAD expert meeting.
- OECD (2012). Knowledge networks and markets in the life sciences. OECD Publishing.
- Owen-Smith, J., & Powell, W.W. (2008). Networks and institutions. In Royston Greenwood, Christine
- Oliver, Roy Suddaby and Kerstin Sahlin-Andersson (Eds.) *The SAGE Handbook of Organizational Institutionalism* (pp. 594-621). Los Angeles, CA: Sage.
- Owen-Smith, J., & Powell, W.W. (2004). Knowledge networks as channels and conduits: The effects of spillovers in the Boston biotechnology community. *Organization Science*, 15(1), 5-21.
- Pil, F. K., & Holweg, M. (2006). Evolving from value chain to value grid, *MIT Sloan Management Review*, Summer 47(4), 72-80.
- Porter, M. (1998). *Clusters and the New Economics of Competition*. Harvard Business Review.
- Powell, W.W., Koput, K.W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly*, 41(1), 116-145.
- Pricewaterhouse Coopers (2009). Pharma 2020: Challenging business models. Which path will you take? Available at:

- www.pwc.com/gx/en/pharma-life-sciences/pharma-2020-business-models/index.jhtml
- Saxenian A.L. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge, MA: Harvard University Press.
- Scott, R. W. (2007). *Institutions and organizations*. 3rd ed. London: SAGE Publications.
- Scott, R.W. (1995). *Institutions and organizations*. London: Sage.
- Scott, R.W., Ruef, M., & Mendel, P.J., Caronna, C.A. (2000). *Institutional change and healthcare organizations: From professional dominance to managed care*. Chicago: Univ. of Chicago Press.
- Scott, W.R. & Davis, G. F. (2007). *Organizations and organizing: Rational, natural and open system perspectives*. Upper Saddle River, NJ: Prentice Hall.
- Simard, C., West, J. (2006). Knowledge networks and the geographical locus of innovation. In Henry Chesbrough, Wim Vanhaverbeke and Joel West (Eds.), *Open Innovation: Researching a New Paradigm* (pp. 220-240). Oxford: Oxford University Press.
- Tödling, F., & Trippel, M. (2007). *Regional Innovation Cultures*. CURE Working Paper. Institute for Regional Development and Environment. Vienna University of Economics and Business.
- Tödting, F., Prud'homme van R., P., Dörhöfer, S. (2011). Open innovation and regional culture—Findings from different industrial and regional settings. *European Planning Studies*, 19 (11), 1885-1907.
- Van Geenhuizen, M., & Soetanto, D. (2012). Benefitting from learning networks in "Open Innovation": Spin-off firms in contrasting city regions. In *European Planning Studies* (Forthcoming Special Issue – Beyond the regional cradle and policy trap)
- Whittington, K., Owen-Smith, J., Powell, W.W. (2009). Networks, propinquity, and innovation in knowledge-intensive industries. *Administrative Science Quarterly*, 54(1), 90-122.