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Knut Koschatzky

A theoretical view on public-private
partnerships in research and
innovation in Germany

 **Fraunhofer**
ISI



Contact:

Fraunhofer Institute for Systems
and Innovation Research ISI
Competence Center "Policy – Industry – Innovation"
Breslauer Strasse 48
76139 Karlsruhe, Germany
Phone: +49 / 721 / 6809-138
Fax: +49 / 721 / 6809-176
E-Mail: christine.schaedel@isi.fraunhofer.de
URL: www.isi.fraunhofer.de

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Abstract

Many case studies about public-private research partnerships (PPP) between academia and industry provide useful insights into the establishment and operation of these collaborative ties. Nevertheless, many of these studies follow their own perspective of analysis. According to Bozeman (2013: 312) "the scholarship on this topic remains relatively atheoretical or, more precisely, that it is "pre-theoretical" in the sense that much knowledge is accumulated but it has not been integrated into a matrix of empirical explanations". Taking the funding initiative of the German Federal Ministry of Education and Research (BMBF) "Research Campus – public-private partnership for innovation" (Forschungscampus – öffentlich-private Partnerschaft für Innovationen) as an example of a public-private partnership in research and innovation, it is the objective of this paper to develop a theoretical framework for the empirical analysis of this kind of PPP, and to apply this framework to the specific case of the German "Research Campus" initiative.

Keywords

public-private partnership, research and innovation, theory-based framework, research campus, Germany

1 Introduction

Short-term oriented market developments are not sufficient to cope with new technologies and to utilise new findings from basic research. They must be accompanied and enriched by strategic basic research (Grupp 1998). In this context, cooperations with the scientific community in the field of strategic basic research offer companies the opportunity to carry out respective research without building up own resources and infrastructures. Based on discussions about the triple helix model (Etzkowitz and Leydesdorff 2000), the willingness increased in public administration, politics and industry to support partnerships between the public and the private sector, for example in the form of public-private partnerships (PPP). We define a public-private partnership as a public service and/or a private economic activity, which is jointly financed and operated by the public sector and industry on the basis of a contract which regulates financing and operation (Koschätzky 2013: 21-22). PPPs in the context of strategic research are modes of cooperation between publicly funded research organisations and companies, and are characterised by a long-term institutional and strategic cooperation in order to achieve complementary goals by jointly operated research activities (Buckland 2009). Both sides bring in own resources and jointly share risks and possible income from the exploitation of research results (Becker 2003).

The funding initiative of the German Federal Ministry of Education and Research (BMBF) "Research Campus - public-private partnership for innovation" (*Forschungscampus – öffentlich-private Partnerschaft für Innovationen*) is an example of a public-private partnership in research and innovation. As Bozeman (2013: 312) argues about studies on university-industry research partnerships, that "*the scholarship on this topic remains relatively atheoretical or, more precisely, that it is "pre-theoretical" in the sense that much knowledge is accumulated but it has not been integrated into a matrix of empirical explanations*", many case studies in this field present anecdotic evidence, but do not contribute to a theoretical framework composed by either a new theoretical approach or theoretical explanations from different strands of the theoretical debate. The objective of this paper is therefore to develop a theoretical framework for the empirical analysis of PPP in strategic research, and to apply this framework to the case of the German "Research Campus" initiative.

As a first step, we point to theoretical work which deals with public private partnerships, innovation economics, coordination of networks and the chances and risks of such kind of transactions (transaction cost economics perspective), and the proximity dimension in exchange processes (economic geography), and derive conclusions for the analysis of the "Research Campus" initiative. In Section 3, we present "Research Campus" as an example of public private partnerships in strategic research in Germany. Section 4 analyses recent developments of the funding initiative by reflecting the theoretical conclusions. Finally, we draw conclusions regarding the implications of "Research Campus" for the German research and innovation system, but also regarding the underlying theoretical conceptions.

2 Public-private research partnerships: underlying theoretical conceptions

The paper develops a theoretical framework for the empirical analysis of PPP in strategic research. It explores three theoretical perspectives, namely transaction cost economics, innovation economics and economic geography. Transaction cost economics deal with coordination, control, governance, and regulation, with hierarchy in cooperation relations, with trust, opportunistic behaviour, and the absorptive capacities of the partners. Innovation economics can be applied for analysing the kind of distributedness of innovation processes, the openness of innovation, knowledge generation and exploitation processes, the role of human resources, and market orientation. Economic geography, finally, brings in the perspective of spatial and cultural proximity in exchange processes, the role of embeddedness, and the kind of knowledge which is relevant for face-to-face contacts. This third theoretical perspective has to be included because the

funding guidelines of "Research Campus" demand close spatial proximity of the collaborative ties of the involved partners in this form of a PPP. Main conclusions from the theoretical discussion are summarised in a heuristic approach which will be used as a framework for the analysis of public-private research partnerships funded by the German "Research Campus" programme.

2.1 Transaction costs perspective

From a theoretical point of view, strategic research partnerships can, among others, be explained by the transaction costs approach (Williamson 2002). This approach examines the circumstances under which cooperation agreements are the most efficient form of organisation. According to this theoretical approach, science-industry linkages can be explained by the fact that with increasing vertical disintegration, the necessity of exchange processes increases and thus the number of required transactions. Differentiation, technological complexity and interdependence lead to the increase in costs of activity coordination within enterprises, so that the pressure to search for external arrangements rises as well. But not only the firm internal transaction costs are rising, but also information asymmetries are increasing, resulting from production segmentation and bounded rationality of economic agents. As a matter of fact, the market - through the price mechanism - is not longer the most efficient form of resource coordination. The resulting question is that under what conditions companies opt for (firm internal) hierarchical coordination, for the market or for hybrid forms of cooperation. The answer is that in each case the most cost-effective variant should be sought. In this interpretation, transaction cost efficiency can be regarded as a motivation for public private partnerships.

The formation of network and partnership structure is a mode of coordination that enables flexible access to external resources and is a suitable tool for companies to save internal resources (Hunt and Morgen 1996; Aldrich and Zimmer 1986; Becker and Dietz 2004). With regard to knowledge and innovation, external acquisition can increase the coordination effort. As already pointed out, internal knowledge and skills must be available to use external knowledge ("absorptive capacity") (Cohen and Levinthal 1990; Lichtenthaler and Lichtenthaler 2009). Furthermore, networks and PPP can lead to rigid relations and can become encrusted ("weakness of strong ties"). So therefore flexible relationships with various partners and openness to new partners are important (Granovetter 1973; Granovetter 1985; Grabher 1993).

According to the transaction cost approach, PPP are one form of coordination in the field of research and development. As all market transactions, they are not free from risks and they pose a spectrum of challenges to the partners involved in such relation-

ships (Bapuji et al. 2011; Caloghirou et al. 2004; Escribano et al. 2009; van de Vrande et al. 2010; Du et al. 2014). One risk is the loss of strategically important knowledge for the firm, e.g. through opportunistic behaviour of network or cooperation partners (Williamson 1990: 54). The fear of loss can prevent or reduce the exposure to research partnerships. This leads to the necessity to regulate confidentiality and the utilisation of intellectual property rights (IPR). Usually, this is one of the core points in joint collaboration agreements. In particular small companies (but not only this group of firms) have a disadvantage here. Additionally, they have a lack in absorptive capacity which limits the use of knowledge from outside and the utilisation of this knowledge for internal activities. Missing internal knowledge and skills are a disadvantage for these firms in strategic research partnerships or even excludes them from this form of interaction. Another disadvantage could be limited resource endowments, especially with regard to the financing of R&D and innovation activities.

Within public private partnerships, transaction costs may be reduced internally, but could rise externally. In addition to the management of the innovation process itself, the management of the research partnership is a challenge. With regard to the development of a dense network, too close connections to the partners can lead to lock-in situations (Koschatzky 2001: 145). Flexibility and openness to new partnerships should be aspired. Another challenge and risk of failure is that usually power asymmetries evolve in partnerships with an unequal financial participation of the partners. Big companies which are able to invest more resources or to bring in own infrastructure are mainly much closer to strategic decision making processes than companies (or other partners) which are unable to contribute a similar amount of resources. As a result, hierarchies emerge with resulting impacts on the definition of the research agenda and implications for the whole network.

2.2 Innovation economics

According to innovation economics' recent understanding, innovation is an interactive and systemic process that creates novelties (Bathelt and Glückler 2012: 51-52). These novelties (inventions) become an innovation when they successfully reach the market stage and create demand. Innovation can be technological, process-related, organisational, social and cultural. A major difference to older interpretations of the innovation concept (e.g. the one defined by Schumpeter in 1911 [Schumpeter 1993]) is that nowadays innovation is regarded as a non-linear and cumulative process which is influenced by socio-cultural factors and which is characterised by interactivity between many stages and many agents contributing to the realisation of an innovation. As a matter of fact, innovation can also be interpreted as a distributed knowledge sourcing

and combining process between different agents. Both tangible and intangible (social) interactions with firms, research institutes, intermediaries, clusters, networks and others play a prominent role in the transfer of information, implicit and explicit knowledge to new technological, social and organisational solutions (Heidenreich et al. 2012: 272; Kline and Rosenberg 1986).

A quite recent paradigm, which is at least partially based on the distributed character of innovation, is the open innovation approach (Chesbrough 2003). Chesbrough argues that while in the past, innovation resulted from closed processes in the laboratories of large firms using own research and development facilities, nowadays successful innovation relies on the strategic integration of external ideas, knowledge and cooperation partners. A basic rationale for this openness is that the increasing complexity of technological development and thus innovation processes demands a strategic decision in firms to minimise technological and financial risks through collective efforts.

According to Chesbrough et al. (2006), open innovation is the strategic use of "knowledge inflows" and "knowledge outflows" in order to accelerate internal innovation activities in the context of the use of external knowledge in the company ("inbound"). Additionally, knowledge created in the firm will be provided to external use ("outbound") (Gassmann and Enkel 2006). The opening of the enterprises' innovation process therefore involves the systematic and targeted use of internal and external knowledge bases and "ideas" to create added value, with simultaneous definition of internal mechanisms that make use of this value (Chesbrough et al. 2006). According to van der Meer (2007), there are numerous mechanisms, methods and structures which enable knowledge inflows and -outflows. Creative workshops with universities or in-licensing promote, for example, knowledge inflows, while cluster (projects), public private partnerships or out-licensing favour knowledge outflows.

To sum up, major characteristics of open innovation processes are the integration of customers, users, and heterogeneous external experts in all phases of the innovation process in order to contribute jointly to the search for a solution of a specific problem. This process can be seen as interactive value creation (Reichwald and Piller 2009). Through open innovation, substitution effects by external research and capacity building by the partners can be realised in order to develop and to integrate ideas together (Dahlander and Gann 2010). Public private partnerships in strategic research are an organisational mode of open and distributed innovation processes.

2.3 Economic Geography

The distributedness of the innovation process depends on different influential factors: the modes of interrelationships between agents (knowledge base and specialisation), the dynamics in the distribution patterns of the agents (changes in the distribution patterns), and the scales which address the levels of innovation (incremental steps up to fundamental changes) (Coombs et al. 2003: 1126). Regarding strategic research collaborations in fields which are characterised by a high degree of uncertainty (which is often the case in basic research activities distant to the market), the kind of the involved knowledge base and its implication on the necessity to interact in close social and geographical proximity is of great importance. Usually, economic geography regards proximity as a relevant factor in innovation (Boschma 2005; Carrincazeaux and Corris 2011). Proximity can have different dimensions of which geographical and social proximity are the most relevant in the context of this paper. Geographical proximity refers to the spatial or physical distance between economic actors, while social proximity is related to the fact that economic relations are always embedded in a social context (Boschma 2005: 66-69). Nevertheless, there is no strict rule about the importance of each proximity dimension and depending on the content of innovation processes (technological, social, incremental, and radical) and the used and newly generated knowledge, different proximity configurations emerge. Referring to the classification of different knowledge bases, it is especially synthetic knowledge creation which has a tendency to be more sensitive to proximity effects between the actors involved, favouring local/regional collaboration (Asheim et al. 2011: 899). Synthetic knowledge refers to the application or combination of existing knowledge in new ways and is characteristic for the engineering field. But also analytical (science based) and symbolic (arts based) knowledge might include elements of local collaboration. Besides the kind of the involved knowledge, also intra-organisational resources affect the distributedness of the innovation process. On the one hand, the absorptive capacity of organisations (firms, research institutes) influence their ability to handle collaborations, to utilise own knowledge and to make use of external knowledge for internal purposes (Cohen and Levinthal 1990). This, on the other hand, demands a proper gatekeeper function in the organisation through which all relevant persons and departments are informed and included in knowledge exchange and innovation activities (Tushman and Katz 1980).

2.4 Analytical framework

The main conclusions from the theoretical reflections can be summarised in a heuristic approach which serves as a framework for the analysis of strategic research partnerships (cf. Table 1).

Table 1: Heuristic approach to analysing strategic research partnerships

Approach	Analytical focus			
Transaction cost economics	coordination, control, governance, regulation	hierarchy versus market, cost efficiency	trust, opportunistic behaviour	absorptive capacity
Innovation economics	distributedness, open innovation, interactive process, uncertainty	knowledge generation and exploitation	human resources	market orientation
Economic geography	spatial and social proximity	kind of knowledge, relevance of face-to-face contacts	regional potential and attractiveness	local/regional impacts and visibility

Source: own draft

The main statements of Table 1 can be summarised as follows:

- **Transaction cost economics:** In the transaction cost perspective, coordination, control and governance are basic principles of research partnerships. They are also the outcome of a selection process between hierarchical and market coordination. Firms opt for a firm external solution because they expect a more cost efficient result of this type of coordination. This includes a weighting between challenges, risks and the form of external collaboration and reflects the motivation structure of the firm.
- **Innovation economics:** Innovation is a distributed process and this distributedness is a central element of the open innovation approach. Open innovation is defined, among others, by the strategic use of knowledge inflows and outflows for interactive value creation and R&D activities targeted to established and new markets.
- **Economic geography:** Distributedness is also related to different proximity dimensions of which geographical proximity plays a special role, especially when newly generated knowledge is involved in exchange processes. Confidentiality and tacitness demand fact-to-face contacts between the researchers involved in the knowledge creation processes. In the combination of PPP and open innovation, partnerships like the "Research Campus" can be interpreted as nodes of open innovation in a protected space focussed on one location.

This analytical approach serves as a framework for the analysis of the German "Research Campus" programme.

3 Research Campus – basic characteristics

The funding initiative "Research Campus - Public-Private Partnership for Innovation" of the Federal Ministry of Education and Research (BMBF) goes back to a recommendation of the German Expert Commission on Research and Innovation (EFI), which demanded a greater use of PPP between science and industry in its report from 2009:

"Public Private Partnerships offer considerable opportunities, because they are frequently long-term projects and bring together complementary strengths in research and development. Active political support should be provided for further partnerships. Experience with Public Private Partnerships should be made available for a wide group of companies and research institutions" (EFI 2009: 41).

The objective of the funding initiative is to promote collaboration between partners from industry and research organisations by combining resources in order to develop new research fields in a middle to long-term perspective in the way of public-private partnerships located at the campus of a university or research institute. Strategic pre-competitive research should be strengthened and leverage effects by public funding for an increased private investment be created. Therefore, research campuses are a partnership between academia and industry focused on one location (Koschatzky 2014: 91).

Based on the EFI recommendation, the BMBF issued a call in August 2011 for the funding of research campuses. The funding initiative is part of the German Hightech Strategy (BMBF 2014a). Up to two million Euros of funds in the form of grants are available per research campus and year. This amount of funding has at least to be complemented by private funds in order to achieve the greatest possible leverage effect from public support. The maximum length of funding is 15 years. Applications could be made for the development of research campus models (pre-phase) as well as for the establishment of collaborations (main phase). In September 2012, an independent jury proposed ten proposals for funding (BMBF 2014b):

- Aachen: Digital Photonic Production (DPP), Electric Networks of the Future (FEN)
- Berlin: Mathematical Optimization and Data Analysis Laboratory (Modal AG), Connected Technologies, EUREF - Mobility2Grid
- Jena: InfectoGnostics
- Magdeburg: Stimulate - Solution Centre for Image Guided Local Therapies
- Mannheim: Mannheim Molecular Intervention Environment (M2OLIE)
- Stuttgart: ARENA2036 - Active Research Environment for the Next Generation of Automobiles
- Wolfsburg: Open Hybrid LabFactory (OHLF).

At that time, with the exception of ARENA2036 in Stuttgart, all research campuses started with the pre-phase, in most cases for one year. A central task was the establishment of the partnership "under one roof" in which both the spatial aspects of cooperation as well as the regulation of the organisation and the management of intellectual property rights were included. In summer 2014, one research campus left the funding programme. From 2015 onwards, nine research campuses are in the first main phase of five years funding.

The central features of the funding initiative are

- proximity, i.e. the pooling of activities and competencies of research in one place (on the campus)
- medium to long-term perspective for a special research topic, and
- mandatory public-private partnership.

These features can be confirmed regarding the underlying assumptions by analysing comparable cooperation programs in the US, Sweden and Austria, as well as appropriate evaluation studies (Kaplun 2013). Geographical and social proximity are a success factor for long-term collaborations between academia and industry. A medium to long-term perspective is essential in basic research. However, long-term relationships that exceed the strategic planning horizon of many companies can be an obstacle for them. The liability of legally secure regulated public-private partnerships is a central basis of long-term cooperation and reduces conflict potential. However, it can not always be realised on "eye level", because, for example, at least some universities and small and medium-sized enterprises (SME) have less bargaining power and sometimes also a lower interest in the own regulation of intellectual property rights (e.g. patents) compared to large companies.

The research campuses are active in diverse fields like energy, health/medicine, automotive/mobility. Several companies should be part of a research campus, ideally SMEs; but large (multinational) companies are drives in most cases. The partners of a research campus shall contribute at least 50% of the total budget together. Various forms of organisation and contracts are established suiting the specific demand of each research campus. One very important aspect is the regulation of IPR issues on "eye level".

4 Theory-based analysis of recent developments in the Research Campus initiative

4.1 Empirical background

The analysis is based on research work carried out in the project "Research Campus – pro active", funded by the German Ministry of Education and Research between 2012 and 2016. Empirical analyses include an annual collection of empirical data about structure and development of the research campuses, personal interviews with the research campus managers in 2014, 2015 and 2016, personal interviews with the presidents or rectors of the involved universities and mainly telephone interviews with two to three companies per campus in seven of the nine research campuses in 2015. Additionally, we analysed PPP models in Germany that were not funded by the Research Campus programme, and made case studies of similar funding models in Australia, Austria, Sweden and the United States (Koschatzky et al. 2015).

In the following we will focus on analytical aspects which we addressed in the discussion of theoretical conceptions in section 2, namely the transaction costs perspective, innovation economics, and economic geography.

4.2 Transaction cost perspective

Research Campuses are a long-term mandatory partnership based on reliable, contractually regulated relations. Their organisational status differs (association, limited liability company, non-profit company) and thus their coordination is regulated and organised differently as well (campus offices, board of directors, campus coordinators). Hierarchical relationships exist, depending on scientific excellence of the research partners and the financial abilities of the companies to invest in the Research Campus. Resources are pooled through the "under one roof" concept and complementarity exists regarding the partners' specific competencies in pursuing a jointly formulated research agenda. The partnerships are strategic networks with a high degree of central powers shared between mainly large firms and academic organisations.

The main reasons to opt for "Research Campus" as joint research platform were the institutionalisation and the liability of the cooperation as well as the clear governance rules and the "under one roof" concept. It allows the realisation of complementary objectives like training and further education, and the attraction of students and possible future employees. Additionally, the long-term perspective is an attractive option both for firms and research institutes. Nevertheless, many companies and research institutes maintain other forms of collaboration. But for this specific purpose, i.e. collaboration in

strategic basic research with a wider time perspective than usual, the "Research Campus" initiative was regarded as the best option.

Another important challenge, at least during the preparatory phase, was the regulation of IPR and informal communication processes. Depending on the internal structures within each research campus, different requirements led to different arrangements. The pre-phase was seen to be very helpful in this respect, because it allowed to develop a mutual understanding of the respective situations and to agree on regulations which fulfilled the interests at least of the negotiating core partners. At the beginning of the main phase, IPR problems did not yet occur because of the early stage of research and development activities. However, the need for regulation over time could be changed, because projects reach their application stage and patenting becomes a topic. Therefore the practicability of the IPR regulations has yet to be proven.

4.3 Open innovation perspective

Within a research campus, knowledge flows openly between the partners, even though it is regulated by confidentiality agreements. The aim is to generate innovation in new (technological) fields in order to create new markets and applications. Research campuses are regarded as a platform for defining new bilateral or multilateral projects, which can be carried out in or outside the campus. In this respect, the campus is open. On the other hand, it is a protected space because this kind of collaboration is based on trustful, sometimes long-existing relationships between the partners. These relationships have to prove their stability and sustainability within this new form of cooperation. Therefore there is an inherent tendency, at least during the start-up phase, to focus on the stabilisation of the existing network and not to open it up too quickly to other organisations, especially possible competitors.

4.4 Economic geography perspective

Geographical proximity is a mandatory funding principle, so the participating organisations do not have the choice to search for other spatial arrangements or even virtual forms of collaboration. Some companies criticised this rigid principle, but the majority of the interviewed partners are confident that close personal exchange in one laboratory or one building is a success factor (combination of geographical and social proximity). Some companies practice this kind of close collaboration also in other partnerships, so that it is not fundamentally new to them. The proximity principle is implemented differently in a way that university personnel is nearly fully present on the campus (four or five days a week), while company personnel prefers two or three days per week at most in

order to secure the knowledge exchange by an approximately two or three days presence per week in the company.

A positive aspect of proximity is that the cooperation in the research campus allows companies to get in touch with other companies much easier than outside the campus and to use these contacts for the arrangement of new projects. These projects can be carried out inside or outside the research campus. In these cases, the proximity dimension has a synergy function and acts as a seedbed for creative ideas.

4.5 General considerations

With regard to the three theoretical perspectives of the analytical framework, the following theory-based considerations are possible:

Transactions

Partner constellations differ, although not too much because most of the presented models are organised around a partnership between small, medium and large firms, universities and sometimes also non-university research institutes. On average per campus, 20 partners are involved, of which are eight SMEs, seven large firms, and five universities and research institutes. Explicit *governance modes* developed by the partners as obligatory requirement demanded by the BMBF are a necessary element of the PPP. These modes differ according to the *organisational status* of each campus. Some are organized as association, some as limited liability company, some as non-profit company. *Absorptive capacities* of the partners are sufficiently developed. Even small firms are fully integrated in the research projects and contribute to joint research objectives through own personnel or equipment. Especially in constellations which open new research avenues, *trust* between the partners is essential. Nevertheless, with regard to the involvement of large firms, also *hierarchy* and power plays a role. Core partners, which mainly are large companies or universities, can pay a higher membership fee and have thus more rights to influence the research agenda.

Innovation

Open innovation is at least a core assumption in all PPP-models. Tasks are *distributed* among the partners in this form of partnership. Nevertheless, the *degree of openness* depends on the interests of all partners. There exists an inherent tendency to focus on the stabilization of the existing network and not to open it up too quickly to other organisations, especially possible competitors. Openness can therefore be an internal openness but an external closeness. In the context of innovation, learning and qualification

of *human resources* are key elements in PPP, especially with regard to the qualification of Master and PhD. students, post doctoral students and further qualification. *New markets* should be created, but in most cases are not yet developed.

Geography

Spatial proximity is mandatory, plays sometimes a role, but is not always necessary. *Regional or social proximity* between the partners in a collaborative network matters, especially in early phases of the cooperation experience and research activities. In cases where distinct centres are established it is more a technical characteristic that partners are located close by. Personnel from the companies is not always present in the labs, because these researchers have to maintain the link with the research department in their company through weekly personal visits. PPP of a certain size usually have a high *regional or sometimes national visibility* and could also be a policy instrument to support regional specialisation and development, especially in regions which do not possess a dense research infrastructure.

5 Conclusions and recommendations

In this paper we pursued the approach to analyse recent developments in the research campus initiative on the basis of explanations stemming from PPP organisation, transaction cost economics, innovation economics, and economic geography. We believe that this is a starting point for the combination of empirical findings with the development of a 'matrix of empirical explanations' (Bozeman 2013). The theoretical approaches define fundamental principles which offer sufficient possibilities to develop a theoretical framework around research collaborations between industry and academia. In our case, the economic geography perspective had to be included because the proximity dimension plays a specific role in the research campus programme. In related activities in other countries, this might be different.

Organisational theory (choice and implications of the modes of organising and regulating strategic research partnerships) (e.g. Bolton and Dewatripont 2005) and behavioural approaches are other aspects which should be looked at in more detail in further studies. Our study results can be seen as a first attempt to contribute to a shift from pre-theoretical to theoretical analysis of strategic research partnerships. Nevertheless, we recommend more theory-based case studies of different PPP models in research and innovation in order to formulate an analytical framework which contributes to the advancement of theoretical and empirical research in this field.

Regarding "Research Campus" we can conclude that an already well developed culture of cooperation between scientific organisations and industry, which is the case in Germany, favours the pooling of different interests and competences in long-term oriented strategic research fields. As often stated in interviews with companies or the research campus management, existing contacts and trust between the major actors in a research campus were the main foundations for establishing this kind of partnership.

Nevertheless it is still unclear whether the research campuses will become a successful and sustainable PPP-model in Germany. It has to be noted that "Research Campus" is so far an experiment based on expectations, but not on extensive empirical evidence, especially regarding the achievement of objectives. What can be observed until now are the first steps in a longer process with imponderables and challenges. This affects, among others, the question of how open innovation processes will be in times when market implementation comes closer, or the interpretation and handling of IPR regulations when exploitation potentials become more visible. These aspects demand further research in the coming years.

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