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New forms of regional interaction between universities and industry evidence from Germany

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Abstract

More recently, the contribution of German universities to regional knowledge and technology transfer and their "third role" is particularly pronounced by the fact that the range of their tasks as well as their autonomy has increased significantly. Terms like new public management, self-control and strategic management underline this new role. Based on a stronger regional focus in national innovation policy, the objective of the paper is to analyze the recent developments of universities with regard to their regional activities. Of special interest will be the identification of the most prominent forms of the "third role" of universities and the analysis of new organizational modes of collaboration and interaction with industry. Based on a survey among German professors and the management levels of universities and by introducing the 'Research Campus' (Forschungscampus) program recently implemented by the German government, the paper shows that multilateral, multi-functional networks and long-term institutionalized partnerships are increasingly established.

1 Introduction and objectives

Although economic geographers and regional economists highlight the specific role of regions in national economic development and their political support since decades (Ewers and Wettmann 1980; Krugman 1991), national innovation policy neglected the potentials of effective policy-making by explicitly supporting regions with favorable starting conditions for growth and wealth for a long time. Only after the quick diffusion of the cluster concept in industrial and technological policy all over the globe, national policy makers became aware that the region is not only a platform like a sector or a technology, but something specific which demands closer attention. As a matter of fact, regional policy executed by regional policy makers was complemented by a regionalized innovation policy formulated and implemented by national political levels (Koschatzky 2012).

Since the region as such is too unspecific for policy action, certain regional focal actors or organizations are regarded to be important starting points for policy making. In this respect, universities were discovered as an active regional player. Besides their knowledge generation and knowledge diffusion function, which was highlighted in many theoretical and empirical studies (Gibbons et al. 1994; Martin 2010), a more pronounced "third role" of universities received higher importance (Benneworth et al. 2009; Gunasekara 2004; 2006; Westnes et al. 2007). This "third role" is oriented towards the animation of regional economic and social development and thus an important activity in the triple helix-university-industry-government relations (Etzkowitz and Leydesdorff 1995). In this context the emergence of "entrepreneurial universities" or the "boundary-

spanning roles" of new university units (Youtie and Shapira 2008) are discussed. As a result, policy makers became able to actively address their considerable self-interest in the local and regional engagement of universities (Asheim et al. 2007; Benneworth and Hospers 2008; Mayer 2007) and made universities an important target group in national technology and innovation promoting programs (Schiller and Kiese 2010). Examples of new university engagement are the participation in cluster initiatives or the collaboration with industrial companies in strategic research fields in a long term perspective (Koschatzky and Stahlecker 2010).

In the case of Germany, which was characterized by strong public governance of universities until the start of this century, the range of university tasks has increased significantly during the last 10 to 15 years, but without a corresponding increase in allocated financial resources. On the other hand, university autonomy increased, new public management principles have been introduced and self-control has been enhanced. New organizational possibilities have been opened which nowadays allow universities to act as strategic actor by their own.

The objective of the paper is to highlight the shift of national innovation policy towards the regional level (Section 2), to analyze the new possibilities universities have in interacting with industry in ways beyond classical project based collaborations (Section 3), to analyze forms of regional interaction of German universities in order to identify different characteristics of the 'third role' of universities (Section 4), to link these regional activities with public funding programs which are based on strategic research interactions with industry (Section 5), and to draw conclusions about the future contribution of universities to the establishment of dynamic and flexible collaborations between universities and industry in the German innovation system (Section 6).

2 Policy background

When looking at the regions as policy framework and target group in (national) innovation policy, it is necessary to distinguish between two levels of governance. Regional innovation (and technology) policy covers all public measures that are formulated and implemented by local organizations for the region in the context of technology and innovation (Koschatzky 2012). These measures may be financed by the region itself, but also occur in co-funding with other political hierarchies. Regionalized innovation policy covers all public measures to promote technology and innovation in regions, but are formulated and implemented by political levels from outside the region. They may but need not be coordinated with the regional political administration. The latter cover activities of, for example, national governments, in which a national program with national objectives use regions or regional actors and their networks respectively as starting

point for policy action. While regional policy aims explicitly at the improvement of living conditions and the reduction of disparities among different regions in a country, regionalized innovation policy may increase disparities because in most cases already better developed regions provide better starting conditions for technology and innovation policy measures than less developed regions.

In Germany, starting with the BioRegio contest initiated by the Federal Ministry of Education and Research (BMBF) in 1997, a trend towards a greater emphasis on the regional dimension in the design of research, technology and innovation policy measures by the national political level can be observed (cf. Dohse 2000; Kiese 2012; Kohler-Koch 1998; Koschatzky 2005; Koschatzky and Kroll 2007). This trend reflects developments that were observed at the European level and worldwide since the early 1990s (e.g. in the context of the promotion of regional innovation strategies by the European Commission, cf. Charles 2003; Gunasekara 2004; Nauwelaers and Wintjes 2002; Premus et al. 2003). At the European level, especially since the beginning of the 7th Framework Program and its focus on innovation in European structural funding, a complex coexistence of local/regional and regionalized innovation policy emerged. In this fabric of different intervening policy levels, top-down implemented measures are usually associated with greater programs volumes (e.g. in the leading-edge cluster competition of the BMBF each cluster receives up to 40 million Euro of public funding), while bottom-up strategies to promote regional strengths (and specialization) are usually associated with less funding (at least when directly funded by the region itself).

Regionalized innovation policy is a more recent phenomenon, while regional innovation policy is not a new topic, but was already in the focus of political science discussions at the end of the 1970s (Ewers and Wettmann 1980). However, not only the framework conditions for innovation have changed since then (keywords: knowledge economy, creative industries), but also the economics of innovation, new growth and trade theory and the resulting new economic geography have generated new insights into the causes and mechanisms of spatial development. These insights gained a strong influence on the relevance and content of regional and regionalized innovation policy (Pflüger and Südekum 2005).

New arguments for spatial development and differentiation according to new trade theory, new growth theory, economics of innovation, and geography of innovation are (cf. among others Lambooy and Boschma 2001):

- the characteristics of innovation processes like its cumulative character, uncertainty, and complexity
- the existence of localized, non-standardized knowledge (e.g. in clusters or in metropolitan innovation systems)

- the existence and quality of human and social capital
- learning and learning processes
- positive externalities, which are no longer interpreted as localization and urbanization economies, but as spillovers and knowledge externalities
- the existence of supporting innovation networks
- an inter-regional and inter-institutional openness and
- production regimes without transport costs dependence (with corresponding implications for settlement patterns and the environment).

From this point of view, the following implications for policy intervention arise (cf. Heidenreich and Koschatzky 2011):

- Market or system failures justify political intervention in economic and spatial development. Different policy approaches are necessary for this intervention.
- Disparity reduction between regions (e.g. the reduction of income inequalities) is regarded as possible. This compensation however takes place only in the long run and does not affect all regions in a country. A regional equilibrium in terms of stable relations between regions may, but must not occur.
- Regional policy action need is given when spatial integration does not lead to the decrease, but to the increase of agglomeration effects and to an increased inter-regional income divergence. However, there is no indication as to when this is the case and when political intervention is justified.
- Regional policy is an appropriate tool for the governance of spatial processes, but it should be considered that even non-spatial policies might have regional effects.

Using the new arguments for spatial development as a basic rationale for policy action, it became more and more popular to make use of specific regional strength (e.g. the existence of certain knowledge, competences, organizations and people) in national and European innovation and technology policy. This development was fueled by the stepwise devolution of political powers to the regional level in formerly centrally organized countries (e.g. like France). As a consequence, we witness an increasing complexity in regional policy making. The challenge here is that regional development is more and more affected by different types of policies and by different political levels. It can be observed that multi-actor and multi-level governance structures emerge across Europe. The policy arena consists of a variety of political, corporate, social and scientific bodies (Kuhlmann 2001). Since policy making usually does not take place in the form of top-down decision making, it is a result of networking and bargaining between different societal actors, interest coalitions and systems (Perry and May 2007). The regional level is sometimes object, sometimes own actor in innovation and technology

policy. Nevertheless, from both angles it is not the "region" as such which is object or actor, but specific regional configurations and organizations like firms, universities or non-university research institutes. In this respect, universities are not only regarded as object of science and education policy, but of technology and innovation policy as well. The enlargement of functions, but also expectations, which are associated with this policy shift, will be elaborated in the next section.

3 Universities and regional interaction

With respect to the orientation of universities towards their regional environment, already a variety of economic and social scientific studies were published (cf. Bleaney et al. 1992; Cooke 2002; Gunasekara 2006; Keane and Allison 1999; Kitagawa 2004; Thanki 1999). In Germany, especially the 1990s witnessed economic studies which dealt with the impact and effectiveness of regional universities (Voss 2004). The focus was on the economic efficiency of these organizations, particularly as a regional employer and as a direct and indirect (through employees and students) consumer of products and services (Niermann 1996 for the University of Bielefeld; Oser and Schröder 1995 for the University of Konstanz; Voigt 1996 for the Technical University of Ilmenau, and most recently Kowalski and Schaffer 2012 for the Karlsruhe Institute of Technology). These studies demonstrate that universities exert considerable employment and income effects on their region, some even as the largest regional public employers.

A second line of research emerged since the late 1990s from the increasing variety of tasks of higher education, the orientation of many policy makers and university administrators on the U.S. transfer model and the development of the triple helix model (Abramson et al. 1997; Etzkowitz and Leydesdorff 1995). The "Entrepreneurial University", which was outlined in several studies (e.g. Clark 1998; Gibbs 2001); has not only the task to act entrepreneurial in the sense of attracting excellent academics and generating royalty income from the transfer of university research results (Etzkowitz et al. 2008), but also to promote ideas of entrepreneurship among employees and students with the goal of creating new business spin-offs (Franzoni and Lissoni 2009). In this respect, academic spin-offs, which settle in the close environment of their incubator organization, play an important role also in the German research system (Rabe 2007; Stahlecker 2006). In recent years, the general research focus is more on the fluidity and hybridization of research organizations (Kaufmann and Tödtling 2001) and on the "boundary-spanning roles" of new university units (Youtie and Shapira 2008). Looking at the spatial implications of the spillover effects of research and teaching, their active contribution to regional development ("third role") is highlighted (Gunasekara 2004;

Westnes et al. 2007). In this context, specific forms of knowledge and technology transfer activities like temporary forms of strategic cooperation between universities and firms in which scientists from both organizations cooperate in a public-private partnership are analyzed in more details with regard to the German situation (Frank et al. 2007; Koschatzky and Stahlecker 2010).

Additional aspects which are discussed in the German scientific literature are the transfer of New Public Management principles in the context of university autonomy and their implications on the development of universities (Jansen 2007; 2009; Schubert 2008), as well as the resulting new scope in terms of a stronger regional orientation of universities in the sense of actively acting strategic actors (Krücken et al. 2009; Krücken and Meier 2006; Nickel 2004). Increasing expectations of political actors in the context of the regionalization of research and innovation policy regarding the fact that universities should play an important role in regional capacity-building and profile development and should engage in regional networks, clusters and other initiatives are a consequence of this development (Fritsch et al. 2007; Koschatzky 2005). This applies not only to the German national political level, but also generally to the political actors in the region who increasingly have a significant self-interest in such engagement of universities and other regional research institutes and actively support such approaches (Asheim et al. 2007; Benneworth and Hospers 2008; Mayer 2007; Sternberg 2000). It can be concluded that the regional engagement of research organizations receives a re-evaluation in the strategic planning of universities and research institutes by the changing paradigm of public education, research and technology funding.

The following conclusions can be drawn from the current theoretical discussion:

- Universities are important knowledge producing and knowledge diffusing organizations in the innovation system and fulfil interface functions between basic and applied research.
- Depending on the nature of knowledge and its formation conditions, spatial and social proximity are key factors influencing the interaction relationships between knowledge producing and knowledge using organizations.
- In addition to their role as regional economic factor universities affect via their spillover effects from education and research the development of their regional environment.
- The variety of tasks as well as the organizing principles, by which the higher education system is characterized, has significantly increased in complexity since the beginning of the 21st century. Interfaces between research organizations are changing towards flexible and hybrid structures. Also between science and industry new forms

of cooperation have emerged. Within the universities new governance principles have led to an increased dynamic of functions and tasks.

- Universities have become a popular object of political action outside the traditional science policy and are considered as an important driver of a knowledge-based regional development.

As a result of the rapid changes with regard to regulatory framework conditions and expectations expressed by political actors which favor regional engagement for different reasons, some professors as well as the administrations of universities have developed strategic approaches in order to improve regional transfer and partnerships. In these partnerships,

- a wide range of public and private partners are included, namely research institutions, public and political authorities, enterprises, as well as societal actors or third sector organizations,
- multilateral partner constellations often develop, and
- not only ad-hoc, short-time collaborations are covered, but increasingly also long-term partnerships which are institutionalized in different forms (e.g. in public-private-partnerships).

The forms of coordination and control of activities which emerge in this context depend on the increasing differentiation in the university system and on the existing regional integration and the academic profile of the respective university (Boucher et al. 2003; Power and Malmberg 2008). It is expected that the measures might lead to the formation of different types of universities with specific regional foci. At least in Germany, there is little empirical work in this field so far. This can be attributed to the fact that most of the relevant strategic processes were completed either not yet or only recently (Grande et al. 2013; Krücken et al. 2008).

4 Forms of regional activities of German universities

In order to map the regional activities of universities, we carried out two comprehensive surveys between April and June 2011: an online survey was addressed to 14,023 professors from universities and universities of applied sciences (the former *Fachhochschulen*) which were identified via the German database "VADEMECUM - sites of research", and a postal survey to 1,435 deans and 366 presidents/vice-presidents via a postal survey (representing universities and universities of applied sciences as well). The focus of the universities of applied sciences is more on practical education utilizing close linkages to regional companies while universities fulfil the classical role of research and education. Addresses for presidents and deans were gathered from the

German Rectors' Conference and the German Faculties Day, two important organizations in the field of higher education. Around 1,600 professors replied, while 482 deans and 176 presidents filled in the postal questionnaires (Koschatzky et al. 2013). Results from these surveys were validated through ten case studies of different German universities and universities of applied sciences which included around ten interviews each with professors, presidents and deans.

Our intention was to include forms regional activities which go beyond the classically fields of technology transfer, university teaching, and the execution of technology-oriented cooperation projects. A basis for such broader view is provided by Benneworth et al. (2009), who describe different types of university activities (cf. Table 1). Although not intended, a regional focus is visible in these kinds of activities, because 'knowledge travels on legs' (quoted in Benneworth et al. 2009: 2). Many (but not all) of the activities take place in the regional environment. This typology was used to structure the questionnaires of our empirical surveys.

Table 1: Typology of university activities

Types of university activity		Main areas of engagement
Research	R1	Collaborative research projects (in the sense of technology transfer to industry)
	R2	Research projects aiming at a knowledge gain for all partners (mutual exchange, common knowledge generation)
	R3	Contract research
	R4	Research on such groups which include a feedback to these groups
Knowledge sharing	K1	Consultancy
	K2	Public funded knowledge exchange projects
	K3	Measures of competence building at regional actors
	K4	Knowledge sharing through student "consultancy"
	K5	Participation at public dialogue and media discourses
Services	S1	Making university assets and services accessible
	S2	Support hard-to-reach groups at the use of assets
	S3	Intellectual expert contributions
	S4	Contribution to civic life of the region
Teaching	T1	Teaching appropriate engagement practices
	T2	Practical education for citizenship
	T3	Public lectures and seminar series
	T4	Further education for hard-to-reach groups
	T5	Adult and lifelong learning

Source: adapted according to Benneworth et al. (2009: 6)

Since we explicitly carried out a survey of regional universities' activities, it cannot be ruled out that mainly professors responded who already had experiences in their region. This bias should not be overlooked. Although universities of applied sciences show a slightly higher propensity for regional activities, for most of the analyzed criteria there is no statistically significant difference between them and research or technical universities.

The results of the professors' survey suggest that regional activities among this group are widespread: In total, more than 90% of respondents occasionally (57.4%) or often (33%) carry out activities in their region, which are related to their work as a university teacher or resulting from this. Additionally, despite the high proportion of regional interaction, 51% of the respondents said that the current research activities focus on pursuing networking with international partners. Another 34% mentioned national and only 10.2% regional partners. This makes it clear that regional interaction and internationalization are not mutually exclusive, but complementary.

This assessment regarding the regional involvement was supported by the management level of universities. 79.3% of the presidents and 64.9% of the deans reported an increased participation of the professors at their institution in regionally-oriented activities over the past ten years. Universities seem to cooperate mostly with organizations which are not belonging to the group of universities. Companies are the most frequently chosen partners for regional cooperation (35.1%), closely followed by public institutions like federal, state or local organizations (29.9%). Theses numbers empirically underline the involvement of a wide range of public and private partners.

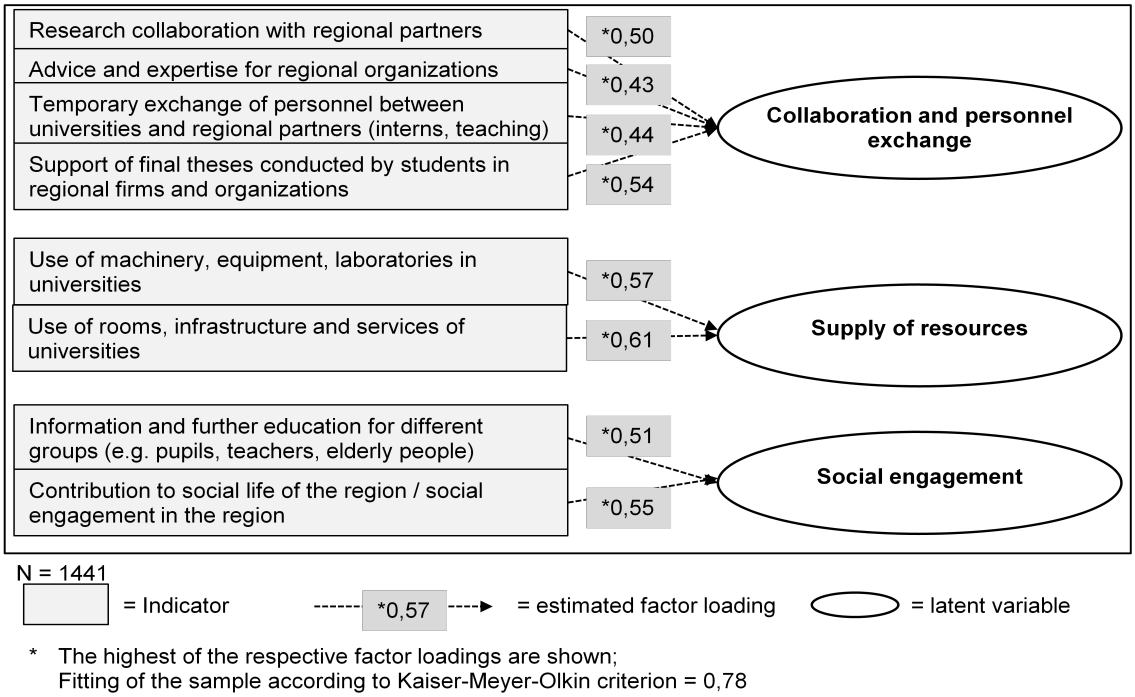
The motivation for establishing regional relationships is rooted in several interrelated reasons, namely attracting external funds (with regional companies acting as contracting partners in research and transfer related activities), striving for excellence in research by building strategic partnerships with public as well as private stakeholders or contributing to regional development involving local organizations and companies alike. Internal amendments regarding attractive conditions for students and employees for instance also play a role. The responses also show that the motivations for regional activities are mainly of intrinsic nature. The setting of incentives for regional interaction through financial and other bonuses in German universities is not a common practice yet. In cases in which the university management wants to increase the motivation of their professors for regional activities, this was done especially through financial incentives, as well as by a reduced teaching load (this especially in universities of applied sciences). The university management has some possibilities for providing incentives, but this is mainly the case when regional engagement is part of a centrally coordinated strategy. The amount and intensity of regional activities depends also on the disci-

plines. Contributions to civic life are mainly rooted in the social sciences, while collaboration (with industry) and exchange of personnel is a general practice in the engineering sciences.

While specific types of regional activities in individual cases may be motivated quite differently, it can be assumed that the activity types described in Table 1 can be grouped along fundamental intentions. Against this background, the latent, i.e. not directly measurable regional interaction structures should be determined analytically. In order to capture these interrelations statistically, a factor analysis of the variables shown in Figure 1 with the highest frequencies in the survey was performed (main axis analysis with orthogonal Varimax rotation to facilitate the interpretation of factors). The factor model created this way allows identifying higher-level dimensions which can be interpreted as a "fundamental intentions." The results of the factor analysis can be found in Figure 1. Here, the respective highest loadings of indicators have been attributed to one of the three latent variables ("basic intentions").

It can be seen that collaboration and personnel exchange, the supply of resources, and social engagement as latent variables show the highest factor loadings. The first latent variable reflects the bilateral exchange of formal and professionalized forms of cooperation and the exchange of personnel, especially in the field of education and teaching. More professional and formal forms of cooperation seem to go along with a temporary exchange of people, which both applies for more long-term oriented research collaborations and for short-term service-oriented activities. Both formal research collaborations and consulting activities as well as the exchange of human capital via students, graduates and business people can be interpreted as different forms of the use of existing informal relationships and thus be linked to individual trajectories. Spatial and cultural proximity is an important ingredient in their development (cf. Broekel and Binder 2007; Perkmann and Walsh 2009).

Figure: 1 Factor analysis of forms of regional interaction



Source: Koschatzky et al. (2013) based on own data collection

Another latent dimension is the provision of resources which is characterized by high loadings of the variables "provision of university's resources" and "provision of university's services." This dimension can be interpreted in spite of its specific character as an ingredient or origin of emerging relationships between academics and regional actors in the sense of the first dimension. One possible cause that in the context of the factor analysis this separate dimension was created is that in contrast to the first dimension these forms of regional activities can not be fully carried out in self-responsibility of the professor. The "provision of resources" requires in many cases a consultation with the faculty and university administration or internal approval processes that can not be decided solely on the level of a single chair or institute.

With regard to collaboration and the supply of resources the management of universities often makes these highly visible and strategically important activities as activities at their own affair and invests substantial resources in the acquisition and the following implementation of projects and initiatives. In the view of university administrations it can be summarized that there are significant potentials of the strategic use of regional activities and that in turn universities as part of their "third role" (Gunasekara 2004) may be an important driving force of regional development.

5 Promotion of strategic research collaborations in Germany

Economic globalization and the science-based character of new technologies increased the complexity in technology and product development (Narula and Zanfei 2005). In the industrial sector, this results in new requirements for the use of basic knowledge. In addition to a short-term market orientation, long-term market development, resulting innovation needs and respective technologies are important consequences of this development trend. This might have implications on the forms and intensities of collaboration with research institutions, because intra-firm resources and competencies (knowledge, capital) are often not sufficient to handle this complexity. In Germany, temporary or longer-term oriented forms of collaboration of German companies with universities and non-university research institutes can be observed since the mid-2000s. Their aim is to carry out joint research activities in areas strategically important for the companies in a medium to long term perspective (Koschatzky and Stahlecker 2010). These developments are reflected in the R&D expenditures of German industry. Since the mid-1990s, these expenditures increased significantly (from 30 billion Euro in 1995 to about 57.5 billion Euro in 2010). In parallel, also the external R&D expenditures increased (from about 3.5 billion Euro in 1995 to about 10 billion Euro in 2010) (Stifterverband für die Deutsche Wissenschaft 2012). The external R&D expenditures represent the R&D activities which are funded by companies but not performed in-house. They are thus an expression of the division of labor in R&D and respective outsourcing processes by which complex innovation projects are characterized nowadays. Affiliated enterprises mostly benefit from this kind of outsourcing, but also linkages to the science sector have intensified since the early 2000s. These linkages are not only based on the classic project finance model, but reflect a variety of project partnerships and other forms of cooperation such as donations, endowed chairs, staff exchanges and temporary research collaborations.

The German innovation policy responds to these developments by two big funding schemes of the Ministry of Education and Research (BMBF), which additionally reflect the political focus on the regional level. The first is the leading-edge cluster competition, which was launched in 2007 with its first round. Its major objective is to establish strategic partnerships between science and industry and the generation of innovations in future technological fields that are outlined in the high-tech strategy of the German government (BMBF 2013). The criterion of spatial proximity between the partners in a cluster is a significant starting point. It is assumed that this local/regional focus brings together the strengths of the partners and establishes lasting value chains. The central criteria for the selection of winning clusters were their strategies outlined for future

markets in the respective industries. In three rounds of competition five clusters were selected at a time and funded over a maximum period of five years. Up to 200 million Euro were available for each competition round (Stahlecker and Kroll 2012).

The Research Campus (Forschungscampus) program (RCP) initiated in 2012 is the most recent and certainly one of the most ambitious initiatives addressing the regional function of universities in Germany. The RCP, as well as the leading-edge cluster competition, are not focusing on regional development, but on activating regional research and technological potentials to achieve a superior goal. What makes the RCP so unique and at the same time so ambitious is that it goes far beyond of what similar interventions until now have been intended in terms of strategic, long-term private-public research partnerships which are institutionally and organizationally embedded in a certain region. Thus, with the RCP the federal government started a new instrument to initiate and strengthen co-operations related to research and innovation. One of the basic assumptions of this particular approach is the observation that medium- to long-term research co-operations at the interface between science and business are becoming more and more important regarding the capability of Germany as an innovation location (BMBF 2011).

The RCP features a combination of three distinct characteristics:

- Proximity – the bundling of research activities and competencies at one location, as possible on a university or public research campus.
- The medium- to long-term adaptation of a specific research topic, ideally within a research program.
- A mandatory public-private partnership.

The RCP integrates a critical mass from science and industry regarding research in a future-oriented subject. From the business sector, several companies should be part of a Research Campus (RC), ideally SMEs. However, it turned out that large (multinational) companies are mainly the drivers within the RC. From the science sector, one or several universities have to be involved. Furthermore, one or more non-university research centers should be engaged. Currently, ten different RC, which have been selected in the course of a competition, are operating. Each selected RC will be funded by 1-2 million Euro per year over a total period of up to 15 years. Thus, one RC with an average retention period of 10 years can receive up to 20 million Euro funds for common research activities. In addition, the companies and other partners who are involved in the RC have to supply significant own contributions, at least at the same amount as public funding (Koschatzky and Stahlecker 2013). The following table indicates the ten RC currently operating. Regarding their subjects, the RCs are primarily

active in the field of "grand challenges", like energy, automobiles/mobility and health/medicine.

Table 2: Overview of the research campus models

Campus	Subject	Location
ARENA 2036 – Active Research Environment for the Next Generation of Automobiles	Support of sustainable future mobility and production; multifunctional composite materials	Stuttgart
Connected Technologies	Smart homes and networked living of tomorrow; development of a basis for technologies, modes of interaction and business models for new application scenarios in the home environment.	Berlin
Digital Photonic Production	Laser application in production and construction of composites related to future areas like mobility, energy, health and ICT.	Aachen
Electrical Nets of the Future	Environment friendly sustainable energy technologies; research on direct current voltage for power transmission	Aachen
Sustainable Energy- and Mobility development through coupling of intelligent nets and e-mobility	Integrated research on e-mobility by coupling energy technology approaches with mobility- and urban concepts	Berlin
INFECTOGNOSTICS	Development of a technology portfolio which enables a highly-efficient and rapid on site proof of infection agents and microbiological contaminations.	Jena
Mannheim Molecular Intervention Environment – M2OLIE	Long-lasting research strategy with the aim to develop a molecular medical intervention environment regarding cancer therapy	Mannheim
Mathematical Optimization and Data Analysis Laboratory – MODAL AG	Research on data based modeling, simulation and optimization of complex processes in logistics and medical technology. Main objective: optimization of nets, systems and related processes for instance regarding rail traffic, petroleum gasoline maintenance or medical diagnostic technologies	Berlin
Open Hybrid LabFactory	Research focus on hybrid light construction; development of new process technologies aiming at the construction of innovative large-scale and functional light construction components	Wolfsburg
STIMULATE – Solution Centre for Image Guided Local Therapies	RC develops and optimizes technologies for the screening of minimal-invasive methods in medicine; the focus is on important widespread diseases in the fields of oncology, neurology and cardiovascular diseases	Magdeburg

Source: www.bmbf.de

Apart from the considerable public budgets and the different topics addressing societal and technological challenges, the universities engaged in the RC, appraise the new program as an opportunity to strengthen their specific profiles and at the same time achieve a certain degree of attention and reputation in the region and beyond. The latter aspect is pretty much in line with the purpose of many universities to increase their regional engagement vis-à-vis other research institutes and universities within the region and regarding the business sector. However, a federal initiative like the RCP and its different RC should not be mixed up with a "closed-shop" exclusively belonging to a few companies and universities, rather than sort of pilot models for other universities and companies to imitate successful RC. Furthermore, the RC should also not be mixed up with an approach that – due to its regional focus – prevents internationalization of science, research and technologies, but as a measure that strengthens pre-competitive, long-lasting research in very specific fields for the involved partners.

A new program like the RCP confronts both universities and companies with completely new requirements – structural, organizational and related to human resources. In this respect, key questions are: which pre-conditions have to be fulfilled on both sides, which structures are appropriate, and which obstacles have to be overcome. The current observations of the ten RC point to quite different approaches, for instance regarding the contractual modes (e.g. IPR regimes) or the organizational models which have been chosen.

It can be observed that most of the companies which are engaged in a RC are large and technology oriented companies playing a significant role in the respective regional and also national innovation system. The overall research strategy of the university administration (president, chancellor) as well as the entrepreneurial management of business-related activities can be identified as the driving force of the RC involvement of a university and is also a profound basis for the collaboration with industry. A part of these management and governance competencies are for instance agenda-setting and moderation of regional engagement related activities.

In contrast to countries like the USA or Great Britain, public-private-partnership models are a relatively new phenomenon for German universities. Several universities in Germany – even prior to the RCP – have established PPPs, but only rarely in such a comprehensive approach. In consequence, the RC are currently experiencing with different organizational models with the aim to identify the most adequate one. Against the background that each RC is operating under slightly different framework conditions – for instance in terms of the companies and university institutes involved, or the concrete RC topic – it remains to be seen which concrete models will be established and which reasons are decisive.

6 Conclusions and recommendations

The objective of the paper was to elaborate the increasing importance of local and regional contexts as an anchor for national innovation policy support measures and to demonstrate that universities are becoming increasingly important in this context. This is supported by the scientific debate which repeatedly emphasizes the relevance of spatial and social proximity in the development of new knowledge, for example in the form of the collaboration of universities within their regional environment.

The recent developments in Germany and other countries show that regional or local creative environments (Cooke and Morgan 1994) are increasingly made the starting points of national programs. In this context creative organizations, such as universities and other research organizations, are an important actor group. Two trends can be observed. On one hand, universities increasingly operate autonomously and enter different forms of partnerships in the immediate and wider regional context. On the other hand, this increases the expectations of policy makers in the context of the regionalization of innovation policy who search for organizations that can play a central, often catalytic role in this kind of policy.

In addition to flexible, project-based research partnerships between universities and firms in the regional environment increasingly more long-term institutionalized partnerships with regional partners like those under the umbrella of the Research Campus program can be observed. Their objective is to pursue a common research agenda in a long term perspective. Such partnerships are often multilateral, as they not only include research organizations, but integrate different regional actors from politics, industry and society. Apart from research, often additional objectives are pursued, for example the profile and image building of the university and the region. This hybridization will increase and in future include other aspects such as the creation of attractive career opportunities in times of decreasing numbers of students (demographic change effects). Due to the growing demands that are addressed to universities, such multilateral and multi-functional networks are beneficial in several ways – not only for the universities, but for all partners. From the perspective of the university many not directly research or teaching-related tasks can be managed in a division of labor. In addition, the exchange and mobility in heterogeneous networks offer the opportunity to achieve innovative results in knowledge production and knowledge exploitation – as long as the autonomy of the university in teaching and research is maintained.

Agenda-setting and moderation are the major starting points of the university administration (presidents, chancellors) to influence the strategic use of regional engagement activities. A central coordination of the manifold activities within a university is neither

administratively feasible nor a desirable university policy. Instead, in terms of corporate planning it can be recommended that university administrations should ensure that the regional activities with respect to the achievement of the main university objectives in teaching and research will be developed comprehensively. Visions for positioning the university as an innovative and attractive research location using the diverse potentials of regional interaction are helpful. A particular strength of the management level is derived from its ability to stimulate cross-faculty initiatives and to bring existing activities together in order to promote and institutionalize these activities at the university level, but without preventing own activities at the faculty level. In this way, motivated professors and other university staff members can be gathered behind a common objective and additional innovation potentials are lifted. University administrators benefit most from regional-based potentials if they manage to overcome existing institutional rigidities and allow the formation of new collaborations and strategic alliances.

7 References

Abramson, N., Encarnação, J., Reid, P.P. and Schmoch, U. (1997): *Technology Transfer Systems in the United States and Germany - Lessons and Perspectives*. Washington, D.C.: National Academy Press.

Asheim, B., Coenen, L. and Moodysson, J. (2007): Constructing knowledge-based regional advantage: implications for regional innovation policy. *International Journal for Entrepreneurship and Innovation Management*, 7, 140-155.

Benneworth, P., Conway, C., Charles, D., Humphrey, L. and Younger, P. (2009): *Characterising modes of university engagement with wider society: A literature review and survey of best practice*, Final Report, 10th June 2009. Newcastle upon Tyne: Newcastle University.

Benneworth, P. and Hospers, G.-J. (2008): The new economic geography of old industrial regions: Universities as global-local pipelines. *Environment and Planning C: Government and Policy*, 25, 779-802.

Bleaney, M.F., Binks, M.R., Greenaway, D., Reed, G.V. and Whynes, D.K. (1992): What does a university add to its local economy? *Applied Economics*, 24, 305-311.

BMBF [Bundesministerium für Bildung und Forschung] (2011): *Leitfaden zur Antragstellung in der Förderinitiative ForschungsCampus – öffentlich-private Partnerschaft für Innovationen des Bundesministeriums für Bildung und Forschung*. Bonn: BMBF.

BMBF [Bundesministerium für Bildung und Forschung] (Ed.) (2013): *Wohlstand durch Forschung – Bilanz und Perspektiven der Hightech-Strategie für Deutschland*. Berlin: BMBF.

Boucher, G., Conway, C. and Van Der Meer, E. (2003): Tiers of Engagement by Universities in their Region's Development. *Regional Studies*, 37, 887-897.

Broekel, T. and Binder, M. (2007): The Regional Dimension of Knowledge Transfers: a Behavioral Approach. *Industry and Innovation*, 14, 151-175.

Charles, D. (2003): Universities and Territorial Development: Reshaping the Regional Role of UK Universities. *Local Economy*, 18, 7-20.

Clark, B.R. (1998): *Creating Entrepreneurial Universities*. New York: Pergamon.

Cooke, P. and Morgan, K. (1994): The creative milieu: a regional perspective on innovation. In: Dodgson, M. and Rothwell, R. (Eds.): *The Handbook of Industrial Innovation*. Aldershot: Edward Elgar, 25-32.

Cooke, P. (2002): Biotechnology clusters as regional, sectoral innovation systems. *International Regional Science Review*, 25, 8-37.

Dohse, D. (2000): Technology policy and the regions - the case of the BioRegio contest. *Research Policy*, 29, 1111-1133.

Etzkowitz, H., Ranga, M., Benner, M., Guaranys, L., Maculan, A.M. and Kneller, R. (2008): Pathways to the entrepreneurial university: towards a global convergence. *Science and Public Policy*, 35, 681-695.

Etzkowitz, H. and Leydesdorff, L. (1995): The triple helix-university-industry-government relations: a laboratory for knowledge-based economic development. *EASST Review*, 14, 14-19.

Ewers, H.-J. and Wettmann, R.W. (1980): Innovation-oriented Regional Policy. *Regional Studies*, 14, 161-179.

Frank, A., Meyer-Guckel, V. and Schneider, C. (2007): *Innovationsfaktor Kooperation. Bericht des Stifterverbandes zur Zusammenarbeit zwischen Unternehmen und Hochschulen*. Essen: Edition Stifterverband.

Franzoni, C. and Lissoni, F. (2009): Academic entrepreneurs: critical issues and lessons for Europe. In: Varga, A. (Ed.): *Universities, Knowledge Transfer and Regional Development. Geography, Entrepreneurship and Policy*. Cheltenham: Edward Elgar, 163-190.

Fritsch, M., Henning, T., Slavtchev, V. and Steigenberger, N. (2007): *Hochschulen, Innovation, Region. Wissenstransfer im räumlichen Kontext*. Berlin: edition sigma.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M. (1994): *The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies*. London: Sage.

Gibbs, P. (2001): Higher Education as a Market: a problem or solution? *Studies in Higher Education*, 26, 85-94.

Grande, E., Jansen, D., Jarren, O., Rip, A., Schimank, U. and Weingart, P. (2013): *Neue Governance der Wissenschaft. Reorganisation - externe Anforderungen - Medialisierung*. Bielefeld: transcript Verlag.

Gunasekara, C. (2004): The third role of Australian universities in human capital formation. *Journal of Higher Education Policy and Management*, 26, 329-343.

Gunasekara, C. (2006): Reframing the Role of Universities in the Development of Regional Innovation Systems. *The Journal of Technology Transfer*, 31, 101-113.

Heidenreich, M. and Koschatzky, K. (2011): Regional innovation governance. In: Cooke, P., Asheim, B., Boschma, R., Martin, R., Schwartz, D. and Tödtling, F. (Eds.): *Handbook of Regional Innovation and Growth*. Cheltenham: Edward Elgar, 534-546.

Jansen, D. (Ed.) (2007): *New Forms of Governance in Research Organization – Disciplinary Approaches, Interfaces and Integration*, Dordrecht.

Jansen, D. (Ed.) (2009): *Neue Governance für die Forschung. Tagungsband anlässlich der wissenschafts-politischen Tagung der Forschergruppe "Governance der Forschung" Berlin, 14.-15.3.2007*. Baden-Baden: Nomos.

Kaufmann, A. and Tödtling, F. (2001): Science-industry interaction in the process of innovation: the importance of boundary-crossing between systems. *Research Policy*, 30, 791-804.

Keane, J. and Allison, J. (1999): The intersection of the learning region and local and regional economic development: Analysing the role of higher education. *Regional Studies*, 33, 896-902.

Kiese, M. (2012): *Regionale Clusterpolitik in Deutschland. Bestandsaufnahme und interregionaler Vergleich im Spannungsfeld von Theorie und Praxis*. Weimar bei Marburg: Metropolis Verlag.

Kitagawa, F. (2004): Universities and regional advantage: Higher education and innovation policies in English regions. *European Planning Studies*, 12, 835-852.

Kohler-Koch, B. (Ed.) (1998): *Interaktive Politik in Europa: Regionen im Netzwerk der Integration*. Opladen: Leske + Budrich.

Koschatzky, K. (2005): The Regionalization of Innovation Policy: New Options for Regional Change? In: Fuchs, G. and Shapira, P. (Eds.): *Rethinking Regional Innovation: Path Dependency or Regional Breakthrough?* New York: Springer, 291-312.

Koschatzky, K. (2012): Regionale Innovationspolitik. In: Lange, J. and Brandt, A. (Eds.): *Strukturpolitik 3.0. Innovation, Strukturwandel und die Zukunft der Regionalpolitik*. Rehburg-Loccum: Evangelische Akademie Loccum, 147-170.

Koschatzky, K., Hufnagl, M., Kroll, H., Daimer, S., Dornbusch, F. and Schulze, N. (2013): Regionale Vernetzung von Hochschulen. In: Grande, E., Jansen, D., Jarren, O., Rip, A., Schimank, U. and Weingart, P. (Eds.): *Neue Governance der Wissenschaft. Reorganisation - externe Anforderungen - Medialisierung*. Bielefeld: transcript Verlag, 163-182.

Koschatzky, K. and Kroll, H. (2007): Which side of the coin? The regional governance of science and innovation. *Regional Studies*, 41, 1115-1127.

Koschatzky, K. and Stahlecker, T. (2010): New forms of strategic research collaboration between firms and universities in the German research system. *International Journal of Technology Transfer and Commercialization*, 9, 94-110.

Koschatzky, K. and Stahlecker, T. (2013): New forms of regional university engagement. Evidence from Germany, Paper presented at the University-Industry Interaction Conference, 28-29 May 2013. Amsterdam: UIIC.

Kowalski, J. and Schaffer, A. (Eds.) (2012): *Das Karlsruher Institut für Technologie - Impulsgeber für Karlsruhe und die TechnologieRegion*, KIT Scientific Reports 7630. Karlsruhe: KIT.

Krücken, G., Blümel, A. and Kloke, K. (2009): *Towards Organizational Actorhood of Universities: Occupational and Organizational Change within German University Administrations*. Speyer: Deutsche Hochschule für Verwaltungswissenschaften.

Krücken, G., Kosmützky, A. and Torka, M. (2008): *Towards a Multiversity? Universities between Global Trends and National Traditions*. Bielefeld: transcript.

Krücken, G. and Meier, F. (2006): Turning the University into an Organizational Actor. In: Drori, G., Meyer, J. and Hwang, H. (Eds.): *Globalization and Organization*. Oxford: Oxford University Press, 241-257.

Krugman, P. (1991): *Geography and Trade*. Leuven: Leuven University Press.

Kuhlmann, S. (2001): Future governance of innovation policy in Europe - three scenarios. *Research Policy*, 30, 953-976.

Lambooy, J.G. and Boschma, R.A. (2001): Evolutionary economics and regional policy. *The Annals of Regional Science*, 35, 113-131.

Martin, B.R. (2010): Inside the Public Scientific System: Changing Modes of Knowledge Production. In: Kuhlmann, S., Shapira, P. and Smits, R. (Eds.): *The Theory and Practice of Innovation Policy*. Cheltenham: Edward Elgar, 25-50.

Mayer, H. (2007): What is the role of the university in creating a high-technology region? *Journal of Urban Technology*, 14, 33-58.

Narula, R. and Zanfei, A. (2005): Globalization of innovation. The role of multinational enterprises. In: Fagerberg, J., Mowery, D.C. and Nelson, R.R. (Eds.): *The Oxford Handbook of Innovation*. New York: Oxford University Press, 318-345.

Nauwelaers, C. and Wintjes, R. (2002): Innovating SMEs and regions: the need for policy intelligence and interactive policies. *Technology Analysis and Strategic Management*, 14, 201-215.

Nickel, S. (2004): Dezentralisierte Zentralisierung. Die Suche nach neuen Organisations- und Leitungsstrukturen für Fakultäten und Fachbereiche. *Die Hochschule*, 1/2004, 87-99.

Niermann, U. (1996): *Wirtschaftsfaktor Universität - Eine input-output-orientierte Analyse am Beispiel der Universität Bielefeld*. Münster: Lit-Verlag.

Oser, U. and Schröder, E. (1995): *Die Universität Konstanz als Wirtschaftsfaktor für die Region*. Konstanz: Center for International Labor Economics.

Perkmann, M. and Walsh, K. (2009): The two faces of collaboration: impacts of university-industry relations on public research. *Industrial and Corporate Change*, 18, 1033-1065.

Perry, B. and May, T. (2007): Governance, Science Policy and Regions: An Introduction. *Regional Studies*, 41, 1039-1050.

Pflüger, M. and Südekum, J. (2005): Die Neue Ökonomische Geographie und Effizienzgründe für Regionalpolitik. *Vierteljahreshefte zur Wirtschaftsforschung*, 72, 46.

Power, D. and Malmberg, A. (2008): The contribution of universities to innovation and economic development: in what sense a regional problem? *Cambridge Journal of Regions, Economy and Society*, 1, 233-245.

Premus, R., Sanders, N. and Jain, R.K. (2003): Role of the university in regional economic development: The US experience. *International Journal of Technology Transfer & Commercialisation*, 2, 369-383.

Rabe, C. (2007): *Unterstützungsnetzwerke von Gründern wissensintensiver Unternehmen. Zur Bedeutung der regionalen gründungsunterstützenden Infrastruktur*. Heidelberg: Selbstverlag des Geographischen Instituts der Universität Heidelberg.

Schiller, D. and Kiese, M. (2010): Editorial: Universities and research institutes as engines of regional cluster and economic development. *Berichte zur deutschen Landeskunde*, 84, 105-113.

Schubert, T. (2008): New Public Management und Leistungsmessung im deutschen Forschungssektor: Theorie, Umsetzung und Wirkungsanalyse. Doctoral-Thesis. Erlangen-Nürnberg: Friedrich-Alexander-Universität.

Stahlecker, T. (2006): *Regionale Bindungen im Gründungs- und Entwicklungsprozess wissensintensiver Dienstleistungsunternehmen - Dargestellt am Beispiel der Regionen Bremen und Stuttgart*. Münster: LIT Verlag.

Stahlecker, T. and Kroll, H. (2012): Das Clusterkonzept als multidimensionales Themenfeld: methodische und inhaltliche Perspektiven. In: Koschatzky, K. and Stahlecker, T. (Eds.): *Clusterpolitik quo vadis? Perspektiven der Clusterförderung*. Stuttgart: Fraunhofer Verlag, 1-32.

Sternberg, R. (2000): University-Industry Relationships in Germany and their Regional Consequences. In: Acs, Z.J. (Ed.): *Regional Innovation, Knowledge and Global Change*. London, New York: Pinter, 89-120.

Stifterverband für die Deutsche Wissenschaft (2012): *FuE-Datenreport 2012. Analysen und Vergleiche*. Essen: Stifterverband.

Thanki, R. (1999): How do we know the value of higher education to regional development? *Regional Studies*, 33, 84-89.

Voigt, E. (1996): Die Universität als Wirtschaftsfaktor am Beispiel der TU Ilmenau. *Raumforschung und Raumordnung*, 54, 283-289.

Voss, R. (2004): Regionale Wirksamkeit von Hochschulen - ein Konzept zur Analyse und Bewertung. In: Präsident der Technischen Fachhochschule Wildau (Ed.): *Wissenschaftliche Beiträge. Forschung, Lehre, Technologietransfer*. Wildau: Technische Fachhochschule Wildau, 103-113.

Westnes, P., Hatakenaka, S., Gjelsvik, M. and Lester, R.K. (2007): *The 'third role' of universities in strengthening local capabilities for innovation* (= Work note IRIS No. 2007/095). Stavanger: International Research Institute of Stavanger.

Youtie, J. and Shapira, P. (2008): Building an innovation hub: A case study of the transformation of university roles in regional technological and economic development. *Research Policy*, 37, 1188-1204.

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