

How to make regions (more) innovative

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Introduction

Several studies emphasize the role a broad and dense institutional infrastructure, both in quantitative and qualitative terms, can play for regional research and technology development (RTD). Such an infrastructure includes universities, public and private research & development (R&D) institutions, a sufficient supply of highly qualified labour and a generally good infrastructure of business support institutions. However, although infrastructure can create the context for an innovative region, infrastructure alone is not a sufficient condition for R&D and innovation to occur. Interactions between different institutions are needed to trigger research development and innovation processes, with networking and cooperation providing the glue for innovative activities on firm and regional level (Welter and Kolb 2006).

In this regard, the paper will focus on important “soft” factors of regional innovation systems, namely learning, network development and network actors within a regional context. Their importance will be explored based on an extensive review of studies and worldwide good practice regions in Welter and Kolb (2006), and illustrated with “real life” examples from different European regions. For this, we draw on experiences made within the project “Creating a RTD Investment Policy for Regions in Emerging and Developed Economies” (CRIPREDE), financed by the EU within the “Regions of Knowledge 2” programme in 2006-2007. Regions from Ireland, The Netherlands, Great Britain, Germany, Latvia, and Slovenia, none of which could have been called “a leading innovative region”, have participated in this project.

During the project, an “Adaptive Model” has been developed that acknowledges and addresses the need for flexible, tailor-made solutions when trying to improve regional RTD. This model which combines audit and decision-making tools with guidance for process facilitators has been applied in the six different regions with the aim to foster RTD in each of the partner regions (CRIPREDE 2007). We have initiated regional partner meetings and monitored these settings in order to foster regional RTD through developing a regional action plan. Consequently, we have been involved in the project both as researchers and participants; moreover we took on a double role in both facilitating the process and participating in the development of the regional action plans. While the participant role has been dominant during the duration of the project, not allowing for any major critical distance from a scientific point of view, we have now reflected on these experiences and therewith, to some extent, stepped back and resumed our roles as “independent” and “objective” observers (Herlau and

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Tetzschner 1994). The observations made throughout the process give some insights into how to make regions (more) innovative.

The Starting Point: Spatial Innovation Regimes

The experience of collaborating in the CRIPREDE project has reinforced the importance of understanding how national and regional variations in innovation regimes can influence RTD performance. At regional level, spatial innovation regimes play an important role for RTD. An ideal-type innovation regime is entrepreneurial in contrast to routine innovation regimes, fosters the application of new and untested technologies, and therewith promotes a higher level for R&D activity and performance. Such an innovation regime is characterised by open structures and a variety of technological concepts with pioneer firms playing a dominating role (Nelson and Winter 1982). Different territorial innovation models such as Industrial Districts, Localised Production Systems, Cluster or Innovative Milieus, analyse regional development paths with an emphasis on RTD, innovation, and entrepreneurship in a wider meaning, including regional and local institutional dynamics (Moulaert and Nussbaumer 2005). Drawing on these concepts, cross national, interregional and sectoral differences in R&D activities are a result of the predominant innovation systems at various levels as well as the specific development paths of industry and enterprises (Breschi 2000). Territorial systems of innovations emphasize that firms are part of a wider network of public and private sector institutions, which are involved in RTD. Besides this, key features of such a territorial innovation system are linkages, and knowledge flows between institutions as well as learning (Mothe and Paquet 1998: 105).

The bottom line of the conceptual discussion, however, is that there exists no model fitting all regions nor offers an ideal pathway for regions to excel in RTD – a challenge which was taken up by the CRIPREDE project, leading to the development of an adaptive approach usable in different regional environments. Although the overall strategy for creating a successful region obviously does not exist, at least all these models provide various important elements that influence a region and its actors to become more RTD-orientated.

Based on an extensive literature review, an analysis of “good practice regions” and expert interviews, Table 1 outlines input factors required for RTD processes and outcomes as well as possible critical points arising throughout, thus capturing stylized “good practice” elements. There are three main categories of factors influencing RTD, namely resource endowments, institutional infrastructure and knowledge. Within each category, one can distinguish between “hard” and “soft” influences. Each group of factors results in factor-specific outcomes, and factor-specific processes are needed to influence the level and existence and performance of regional RTD. Despite overlaps, there is a need to simultaneously focus on factors and processes as it is the interplay between both that can foster RTD. This issue emerging from the conceptual review also has been supported by stakeholders in the CRIPREDE project regions, thus originating as the core of the Adaptive Model (CRIPREDE 2007).

While the CRIPREDE regions shared some similarities, in particular the mix of urban and rural characteristics, they clearly differed significantly in terms of some other characteristics mentioned in Table 1. Some of them (Cumbria / UK, Siegen-Wittgenstein / Germany) were old-industrialised regions, where a well-educated labour force existed; in Siegen-Wittgenstein we also can observe international linkages of small enterprises as one important factor contributing to regional RTD, although this does not include the international migration of highly skilled personnel (Fromhold-Eisebith 2002a, 2002b). Demographic changes face all of the regions with a major challenge regarding the availability of skilled workforce in the long run. Universities as hubs for knowledge and learning, which previous studies (Lawton-Smith 2003) have been identified to foster regional RTD, exist in all regions, although all of them are regional universities, only partly contributing to fostering technological excellence

through attracting “star scientists” (Table 1). In general terms, the CRIPREDE regions lacked international visibility and could not be regarded as “talked about” in the context of innovation (Hospers 2005). Some of them such as South East Ireland or Novo Mesto in Slovenia also lacked sufficient scale of activity to produce localisation benefits in particular technologies and regional sector diversity in order to create flexibility and maximise “fungeability” of knowledge (Antonelli 2003) or global technology leadership (Feldman 1994, Saxenian 1994).

Table 1
Good Practice Elements and Critical Factors for Regional RTD

General Conditions / Resources					
Category	Hard Factors			Soft Factors	
Territorial resources	Infrastructure, human capital, institutional capital			Regional image and identity	
Market resources	Size, customer base, distribution channels			Openness of customer base for new processes, products, services	
Industry resources	Age, size of industry base, technology orientation and level of technology use			‘Curiosity’, i.e., open for new ideas and divergence from routines	
Processes	Regional ‘antennae’ in picking up regional triggers and using them in implementing regional RTD strategy				
Institutional Infrastructure					
Category Level	Hard Factors			Soft Factors	
	Macro Level	Meso Level	Micro Level	Macro Level	Micro Level
Systemic / organisational	Division of tasks and responsibilities between municipalities and other agencies	Dense institutional networks of intermediaries (chambers, business associations, unions, business support agencies)	Dense business networks Good general support infrastructure for entrepreneurship	‘Open region’	High level of cooperation and interaction between actors
Individual	High communicators	Network promoters	Star scientists	Open minds	Networking skills
Process	Good governance, e.g., political commitment and coherence of institutional infrastructure & integration and openness at individual and institutional level Creation of social capital in the form of trust-based and reciprocal relationships within region				
R&D Oriented Knowledge Base					
Category Level	Hard Factors			Soft Factors	
	Macro level	Meso Level	Micro level	Macro Level	Micro Level
Systemic	Existence of (semi-) public research infrastructure, universities	Existence of education and vocational training institutions	Special R&D support and education, instruments for research transfer	Existence of technical culture	Common values such as trust and reciprocity
Individual	Policies for attracting high skilled labour	Policies for upgrading skills	R&D policies, policies for upgrading skills	Attitude towards (new) technologies	Professional skills & social competencies
Process	Shift from individual and spatially dispersed learning to collective learning Creation of technical culture Creation of social capital in the form of trust-based and reciprocal relationships within region				
Critical Factors					
Overembeddedness		Possible indicators			
<ul style="list-style-type: none"> • lock-in effects • negative path-dependencies • inertia 		<ul style="list-style-type: none"> • culture: traditional regional identity, often ‘glorifying’ industrial past • technological regime and sector structure: lack of or low R&D-orientation, low technical culture and interest • networks and firms within region: closed networks, focusing on intra-regional linkages, neglecting extra-regional and international linkages 			
Source: Adapted from Welter and Kolb (2006), based on literature review and key expert interviews.					

Table 1 also refers to some of the processes that generate RTD, such as embeddedness, “institutional thickness”, and the role of regional and local governance. In the following, we

discuss processes that are referring to “soft factors” of regional RTD, condensing them in the major categories “Learning in a Spatial Context”, and “Networks & Network Actors”.

Learning in a Spatial Context

“Soft” knowledge-based factors include the existence of a technical culture on a systemic level and people’s attitude towards this as well as their professional and social skills and the existence of values supporting such a culture (Table 1). Previous research has examined the significance of regions and the regional context for learning processes, based in part on the development of the concept of the “learning region” (Simmie 1997). With regard to R&D and innovation, knowledge refers to scientific knowledge, but also to those capabilities and skills needed in commercialising inventions, in transferring scientific research results into operational concepts, and in adapting research results to an enterprise context. As such, knowledge is an input needed for regional RTD, while learning refers to the process underlying the transfer of tacit and non-codified knowledge into explicit and codified knowledge. Regarding technical knowledge, Antonelli (2000) pointed out that this type of knowledge is to a certain extent industry- and firm-specific, as such also region-specific, and thus difficult and costly to use in other contexts. Therefore, technical knowledge is obviously an important contribution to regional RTD. One could even say that technical culture is needed as an element for a favourable RTD environment (Malecki 1997: 89). Here, universities, science parks and the like may contribute to the stock of regional knowledge which in turn constitutes the technical culture of an area. However, the existence of such institutions does not guarantee a regional high-tech centre, because geographical proximity alone is not sufficient (Malecki 1997: 90). Access to technical knowledge can be restricted due to its tacit and idiosyncratic nature (Antonelli 2000: 537). If scientific and technical knowledge does not exist on a regional level, or effective mechanisms to spread technical knowledge throughout a region are not established, regions can experience problems raising the level of R&D. Table 1 shows that so-called regional antennae play an important role in this regard: this refers to individuals or organisations which are forerunners in identifying and acting on regional triggers, bring in regional and extra-regional knowledge and draw on this in developing and implementing a regional RTD-strategy.

All this helps foster learning within the region, which is one of the key processes influencing regional R&D development (Oinas and Malecki 1999: 14). Learning can be understood as a situated and context-dependent, cumulative process that embeds new knowledge into rules, routines, and existing norms, which guide behaviour (Lazaric and Monnier 1995: ix, cited in Mothe and Paquet 1998: 7). Learning processes need triggers and thresholds, as organisations and individuals tend to stick to routines and known behaviour as long as they feel comfortable with the results (Nelson and Winter 1982), as became apparent in all CRIPREDE regions when we took stock of the existing initiatives and networks for regional development. In this respect, the CRIPREDE project itself is a good example to illustrate learning in the region, because it triggered learning processes. In most regions, the need for change had (long) been recognised, but rather implicitly, without discussing it and acting upon it. In other words: the willingness for change, which is an important requirement for learning to happen, existed, but apparently the capacities to conduct change were (still) lacking. With the start of the project, research teams in the different project regions set out to initiate regional partner meetings and networks and monitored the dynamics of these settings in order to foster regional RTD. Their role as “independent” and “neutral” observers helped regional stakeholders in all regions to openly acknowledge the need for change and improvement concerning RTD; and they also appreciated the external support given by the CRIPREDE research teams in that regard. For example, in Cumbria (UK) the project was “the right project at the right time” as it delivered an understanding of RTD at a time when regional actors were starting to recognise the

importance of improving RTD performance, while in Stedendriehoek (Netherlands) the project came as a “wake-up-call”.

Learning in the region also warrants the exchange of ideas and the development of social relations as well as more formalised co-operation, that is, an environment conducive for learning processes (Table 1). On this issue, the process of engagement with key regional partners in the CRIPREDE regions was particularly instructive. The implementation of the CRIPREDE Model was overlain on pre-existing institutional and partnership arrangements within each region that was place and time specific. In Cumbria (UK), for instance, the process coincided with a period of discussion surrounding the “Economic Plan” for the County and the role of the sub-regional development agency for Cumbria (Cumbria Vision). In Novo Mesto (Slovenia) the project fostered the awareness of regional stakeholders that the region is an important entity for economic development, while in South East Ireland CRIPREDE was the catalyst bringing together all regional stakeholders in one forum, the “Spirit of Enterprise Forum”.

In each of these cases, collective learning played a role, as a learning process between different agents (enterprises, public research institutions, etc.), rather than organisational or individual learning. It includes the regional accumulation of knowledge which is freely shared and transferred among the participants through social interactions (Capello 1999). As Lawson (1997: 21) pointed out the discussion around collective learning is “an attempt to trace out the mechanisms by which proximity influence innovative behaviour”. Learning is in many ways a collective process because of repeated interactions between individuals within and across organisations (Malmberg, Sölvell, and Zander 1996); and collective learning is closely linked to proximity, as it is based on conversations and interactions among stakeholders within a particular context.

In situations in which collective learning is required (Moingeon and Edmonson 1998), trust can play a critical role facilitating or hindering these processes. Trust emerges from previous knowledge or recommendations of trusting persons; it evolves through a process of getting to know each other and thus can foster innovation through learning, as it assists in triggering changes in behaviour and attitudes. Trust can act as a prerequisite; it can be an outcome or an obstacle. Indeed, in some of the CRIPREDE regions, existing trust has facilitated collective learning. For instance, in Stedendriehoek (NL) all participants knew each other well and already had a rather high level of trust, which contributed to an intensive and open exchange of ideas and discussion of bottlenecks. The same applies to the German region, Siegen-Wittgenstein, where regional stakeholders had known each other for years, having worked together in several other projects or working groups.

However, this also could have acted as deterrent to the project itself, taking into account the possible “dark sides” of trust as indicated in Table 1, namely lock-in effects and inertia, all of which had happened before as became apparent in the discussions during the CRIPREDE project. Lazaric and Lorenz (1998: 1) understand trust as a necessary condition for (organisational) learning to occur, as the latter is marked by contingencies which cannot be anticipated, and in such situations “individuals will be unwilling to commit their resources to a collective endeavour in the absence of trust”. The authors also conclude that there is no guarantee that trust will actually happen, as mistrust and failed learning may also prove to be mutually reinforcing. Another barrier to learning in the region results from the fact that the emergence of trust “requires an initial leap of faith” (Möllering 2006). However, in our project this was facilitated in most regions by previous mutual knowledge of regional partners, as pointed out above, and / or reinforced throughout the process through positive experiences in the emerging CRIPREDE networks. This is the next theme we now will discuss.

Networks & Network Actors: the Institutional Infrastructure for Regional RTD

In general, the significance of networks for regional development has long been acknowledged in the literature on regional and local development (e.g., Amin and Thrift 1994). Related to R&D and innovation, Schätzl (1999: 103) distinguishes three dominant network configurations, namely science-led, industry-led and policy-led. In science-led regional networks, universities or research institutions trigger regional development with a particular role for R&D. Examples include Silicon Valley, Route 128 or Cambridge in the UK. In industry-led networks RTD-intensive large firms are the innovative hub, with close links to university research, with examples including the Finnish telecommunication concern Nokia or the German automobile company VW in Wolfsburg. Finally, policy-led networks are to be observed in Silicon Glen in Scotland, or in regions where policy-makers initiated successful science parks.

It is debatable which network forms are the most successful in fostering RTD within a region. Science-led networks are said to be seldom successful in the long run (Malecki 1997), although examples such as the Silicon Valley or Cambridge appear to prove the opposite. Sternberg (1999) has analysed innovation networks, concluding that they can foster “sclerotic milieus” (p. 91) and that they are difficult to integrate into a regional milieu if built top-down. Moreover, some authors stress the possible negative effects of networks and networking such as an increase in transaction costs, because of the resources needed to build and sustain networks which renders networking difficult for smaller firms, the danger of free-riders who will reduce collective advantages of networking, the trade-off between exclusivity of networks and excluding regional actors as well as problems arising with power asymmetries within networks (Sternberg 1999; Welter, Ammon, and Trettin 2004).

More recently, research has turned to discuss network emergence (Human and Provan 2000; Sarasvathy and Dew 2003; Schutjens and Stam 2003), also with relation to a specific regional context (Butler and Hansen 1991; Littunen 2000; Welter and Trettin 2006; Welter, Trettin, and Neumann 2008). This gains importance in the context of discussing factors facilitating or impeding regional RTD as shown in Table 1. Of interest are questions around the role of actors, ways to build legitimacy in a regional context, and factors inhibiting networking. Trust is the “lubricant” without which network activities would not be possible (Anderson and Jack 2002). Here, in the CRIPREDE project, the set up of regular meetings, as mentioned above, contributed to build up trust or, where it already existed, to improve and stabilize it. This is particular obvious in the regions in the new EU member states (Latgale in Latvia and Novo Mesto in Slovenia), where the project initiated a regional trust-building process through its meetings which created a forum for repeated contacts between regional stakeholders.

With regard to R&D and innovation activities in a regional context, weak networking ties, in particular those, which extend beyond a region, assist in transporting new ideas and information regarding new technologies (back) into the region. A diverse set of persons working in different contexts allows for loose couplings and infrequent contacts, thus adding diversity within networks and providing access to various sources of knowledge, information, and opportunities to meet new people. Thus, weak ties “represent local bridges to disparate segments of the social network that are otherwise unconnected” (Elfring and Hulsink 2003: 411). The regional stakeholder meetings throughout all the CRIPREDE regions underline this effect as they made meetings and exchanges of different people and opinions possible on an unofficial basis. In this regard, two issues are of importance for regional RTD. Firstly, the CRIPREDE research teams acted as neutral moderators and created “new” settings within the regions, thus facilitating an open and unbiased exchange of ideas and visions concerning regional development. Secondly, international meetings of project teams and regional stakeholders contributed to facilitating the development of weak ties beyond the regions.

However, a successful network needs both strong and weak ties. Strong ties tend to bind individuals with similar or complementary interests in longer-term and intense relationships,

thus adding to the identity of networks, while simultaneously providing shortcuts to information and knowledge (Elfring and Hulsink 2003). Uzzi (1997) pointed out that such strong ties contribute to “economies of time” as they add to an individual’s capability to quickly capitalize on market opportunities. This might be of particular value in commercialising R&D results and gaining (technical) advantages. Regarding regional RTD networks, their emergence and sustainability therefore also needs social and personal interactions as a basis for strong, trust-based relations (Liao and Welsch 2005). Such trust building takes place mainly through familiarity arising from experiences from the past, repeated transactions, and face-to-face contacts (Welter and Kautonen 2005). Within a region individuals could build up reputations of trustworthiness, which is important information for other regional actors if those “trusted” persons participate in a newly emerging network. In this regard, Siegen-Wittgenstein (D) is a good example, as CRIPREDE could build on already existing and well working networks, which facilitated the emergence of a network based on strong ties (in the meantime, half a year after finalising the project, the regional network has been integrated into existing structures). Also in Stedendriehoek (NL) a working group had existed prior to CRIPREDE, which facilitated contact of the local research team with the “relevant” people. In South-East Ireland a high level of personal trust was apparent right from the beginning between the key actors; here, mutual ambitions and their joint drive fostered familiarity and network development.

Table 1 also indicates the important role(s) network actors play in and for network emergence and its further development. Several studies identified four distinct ideal types of “promoter roles”: promoter by power, promoter by know-how, process promoter, and relationship promoter. Koch, Kautonen, and Grünhagen (2006) showed that actors within networks often fulfil several promoter roles, mainly acting as process and relationship promoters. The authors furthermore demonstrated that different promoter roles and network positions go hand in hand. For example, relationship promoters often have a fulltime job and a central position within the network. They are persons, who promote inter-organisational innovation processes actively and intensively based on good personal relations to key actors that belong to the partner organisations and relevant third parties and also possess critical resources (Gemünden and Walter 1999: 122). In the CRIPREDE project, relationship and know-how promoters played an important role in developing and especially in sustaining the emerging RTD networks. Relationship promoters include, for example, the representative of the local development agency in Siegen-Wittgenstein (D); the representative of the Administrative Office in Stedendriehoek (NL); the County Council in Cumbria (UK) and both the CRIPREDE project leader and the representative of an enterprise organisation in South-East Ireland. The role of know-how promoters have been taken up by the research teams: they were responsible for translating research knowledge into practical implications, discussing this with their regional stakeholders and in relating the results back into the development process of the Adaptive Model. In short, they contributed process know-how, that is, know-how on how to facilitate and organize the process of developing regional RTD networks.

Obviously, the CRIPREDE project contributed to some extent to “institutional thickness” in most of its regions by bringing in local (and extra-regional) knowledge and the ability to access and link local capacity at different levels (Malecki 1997). In this regard, high communicators, that is individuals at the decision making level in several public and private organizations, play an important role for network development: They transmit information, speed up decision-making, and foster inter-organizational linkages (Fromhold-Eisebith 1995). These key individuals contribute to the development of “institutional thickness”. Within the CRIPREDE project this role has been taken over by the research teams that fostered the process and brought in both local and international knowledge, thus in a way also acting as regional antennae (Table 1). Moreover, the CRIPREDE project team were able to observe the regional differences in the

ways in which networks operate through shared experiences of delivering a similar process in different regional contexts.

Final Reflections

Overall, the CRIPREDE project, besides developing an Adaptive Model for fostering regional RTD (CRIPREDE 2007), succeeded in initiating and facilitating RTD-oriented networks at regional levels, thus fostering knowledge and RTD-related learning and also an exchange of ideas across countries and regions. However, the long-term sustainability of the process and the RTD networks remains an open question. In the long run, overly strong forms of interpersonal trust, arising from working together, might result in closed networks and inward-looking behaviour both on an individual and regional level. Consequently, entrenchment may result, and the performance of these networks may deteriorate. Moreover, the question arises of how to ensure sustainability of the process as such beyond the project (and, of course, also project funding). Important criteria include first of all the willingness of a region to continue supporting a process initiated by CRIPREDE. Looking back, in all regions participating in the CRIPREDE project, the project was the trigger for a process that had been deemed necessary, at least implicitly, by regional stakeholders. In this regard, we might assume that sustainability of such a network is given.

However, other important criteria refer to, at first glance, basic prerequisites such as having an infrastructure in place for the network to function in the long run, being able to access (additional) funding in case there are interesting projects to realise. Another critical factor determining the ongoing sustainability of these networks is to what extent members of the regional networks have taken on the roles of know-how promoter and process promoter, that is roles which have been performed by the CRIPREDE team, in their respective networks, over the last two years. It was important for the CRIPREDE team to be that closely involved in the regional networks, but we always have also questioned the extent to which we were probably over influencing the process, thus rendering the network over-reliant on the CRIPREDE team.

In this regard, although willingness and openness exist, experiences from our regions also demonstrate that such considerations may impede or slow down regional RTD processes, leaving the question of sustainability of the networks open. Only continuous joint efforts, aimed at identifying and implementing opportunities, will suffice to counteract such threats. A major challenge, accordingly, in our opinion, is to continue along the road towards real collaboration between all regional stakeholders, in order to make regions not only more innovative, but also to sustain collective learning processes. From a research perspective, our team of researchers is considering performing a longitudinal study on the various networks emanating from the CRIPREDE project over the next few years, in order to contribute new knowledge on how regions stay (more) innovative in the long run.

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