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Regional Innovation Policy

Analytical Compendium

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(A) State of the Art

One aspect is initiatives to support the creation of clusters and the regional aspects of innovation supporting measures since they are of particular relevance for SME's. In this perspective, innovation policy became a tool in regional policy - or to put it in another way, **regional policy adapted innovation policy as an integrated part of business development policy**. Innovation as tool requires an effective system of knowledge dissemination. On the institutional level the **mushrooming of business incubators, Science Parks and Technology Centers** is the best proof of this tendency. (*Aims and strategies in regional innovation and growth policy – A Danish perspective, pg. 7*)

The **NUTS nomenclature** was created and developed according to the following criteria. (Eurostat 2005):

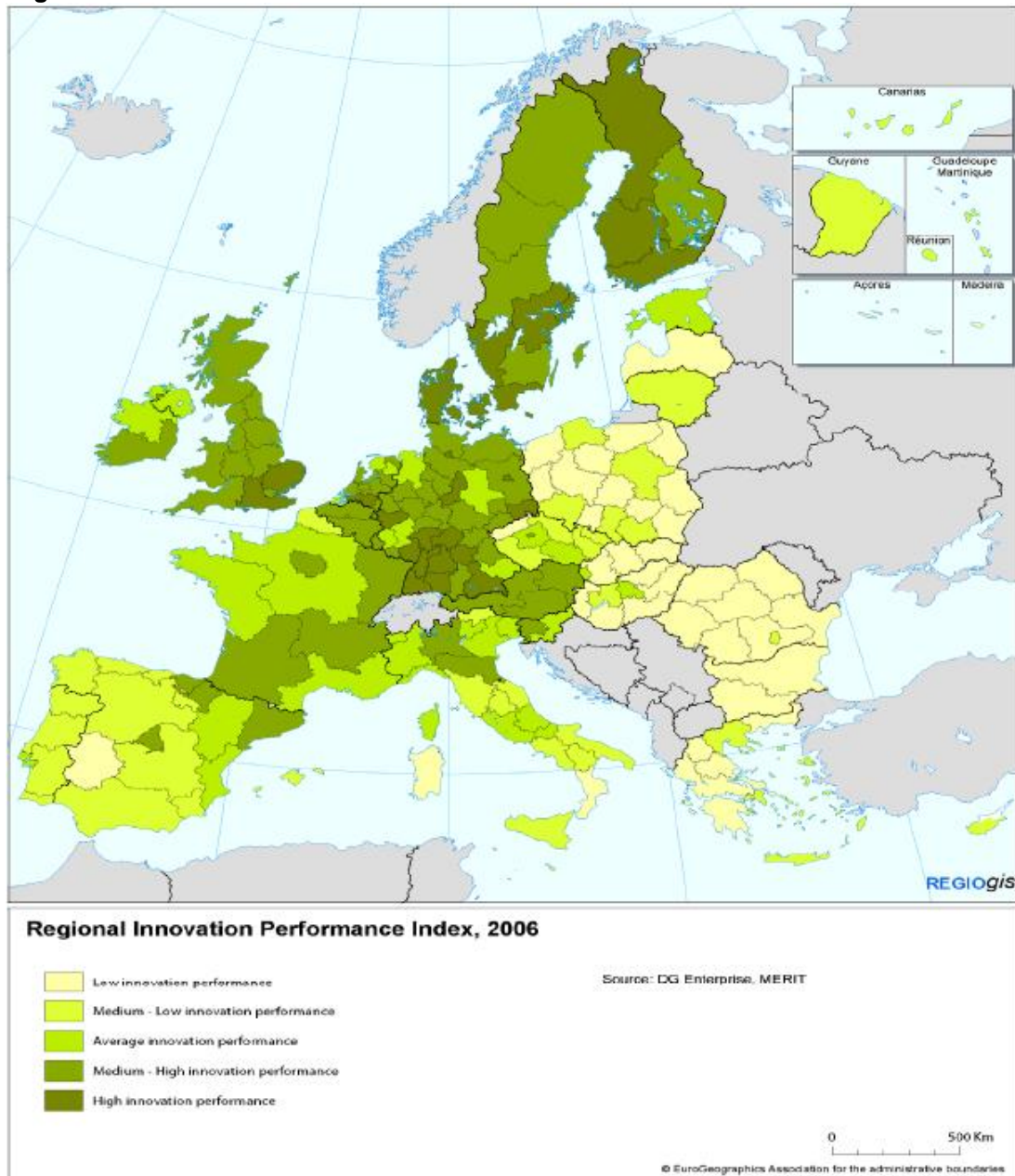
1. *The NUTS favors **institutional breakdowns***. Subdividing a national territory into regions is normally done according to **normative** or **analytical criteria**. **Normative regions** are the expression of a **political will**; their limits are fixed according to the tasks allocated to the territorial communities, according to the sizes of population necessary to carry out these tasks efficiently and economically, and according to historical, cultural and other factors. **Analytical regions** are defined according to analytical requirements, e.g. **geographical or socio-economic criteria**. Practicality favours institutional divisions currently in force in the Member States (normative criteria).

2. *The NUTS favors **regional units of a general character***. Territorial units specific to certain fields of activity (mining regions, rail traffic regions, farming regions, labour-market regions, etc.) may sometimes be used in certain Member States. NUTS excludes specific territorial units and local units in favour of regional units of a general nature.

3. *The NUTS is a **three-level hierarchical classification***. The NUTS subdivides each Member State into a whole number of NUTS 1 regions, each of which is in turn subdivided into a whole number of NUTS 2 regions and so on. The minimum and maximum thresholds for the average size of the NUTS regions are set by the NUTS Regulation. In the near future, the question of extending NUTS to a **fourth level** will be discussed in the Commission. (Eurostat 2005) (*Banking regional innovation policies: DEA-based benchmarking in a European setting, pg. 13*)

One intangible aspect that defines regional competitiveness is the **attractiveness of the region** both to external parties (e.g. foreign investors, mobile workforce) and to internal parties (e.g. deterring regional companies' interest to move operations elsewhere) (Raunio 2001; Sotarauta, Mustikkamäki & Linnamaa 2001). Etzkowitz and Klofsten (2005, p. 243) suggest that the common objective of knowledge-based economic development everywhere in the world is the creation of an '**Innovating Region**'. According to them, an innovating region has the capability to move across technological paradigms and periodically renew itself through new technologies or products and firms generated from its academic base. These points combined, it can be argued that **innovations act as generators of regional competitiveness**, which is in turn partly measured by **ability to facilitate innovational activity in the region**. (*Op.cit, pg. 20*)

Regional Innovation Performance Index



(Regional policy contributing to smart growth in Europe 2020, pg. 4)

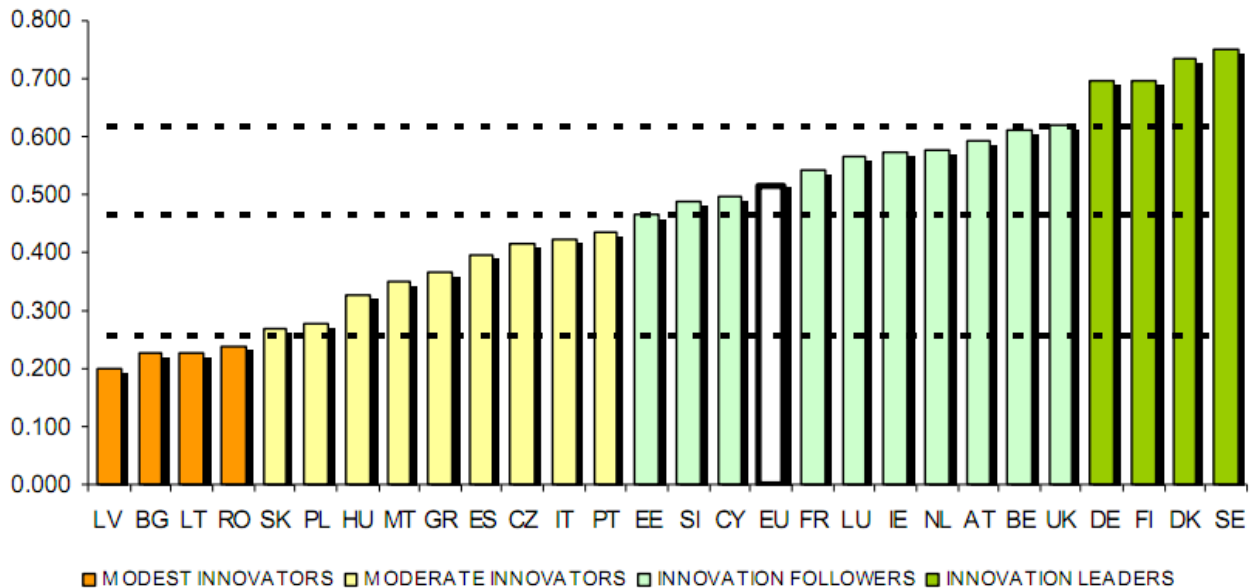
Regional Innovation and Technology Transfer Strategies (RITTS), funded through the Innovation and SMEs programme, and Regional Innovation Strategies (RIS), funded through the ERDF, have been jointly managed by Enterprise DG and Regional Policy DG. Because of the different sources of funding RITTS projects can be located throughout the EU and EEA while the RIS projects are confined to those regions entitled to ERDF assistance. The Regional Policy DG has invited all current RIS and eligible RITTS regions to submit proposals for ERDF assistance (as mentioned above this now has a strong innovation focus), in a RITTS/RIS+ initiative. A review of the RITTS projects, saw the programme as achieving a positive impact in four areas:

- “It encouraged a much needed move towards strategic thinking for innovation-orientated regional development.

- It offered mechanisms and incentives to create regional dialogue in geographically, institutionally or culturally fragmented regions.
- It promoted the development of a concept of innovation broader than linear technology transfer, and it helped to raise this higher on the agenda.
- It assisted many regions to clarify the components of their innovation support infrastructures, and to develop actions to rationalise them and augment their visibility.”

A further policy initiative that has both regional and innovation components has been the Community network of Innovation Relay Centres (IRC) that is part of the Innovation/SMEs programme. The Relay Centres have "become a leading European network for the promotion of technology partnerships and transfer between SMEs". The centres are technology advisory centres staffed by business and technology specialists. They are regionally based and hence there is no standard 'centre' as they are designed to fit the needs of the region. (*Innovation Tomorrow*, pg. 156)

EU Member States' Innovation Performance



(*Innovation Union Scoreboard 2010*, pg. 4)

There are **many tools** available to **stimulate innovation in the Nordic countries**. Most tend to be directed towards metropolitan/growth areas, but there are also **now some instruments specifically designed for the periphery**. In general, regional policy tends to be characterized by increasing “regional blindness. This means that there are few specific measures addressing weaker regions and, in principle, all regions have the same tools available for use. Another general trend here is that regions are increasingly encouraged to utilise their own strengths. **The measures available in respect of innovation policy tend to favour already strong and competitive regions**. This statement is based on the fact that many programmes are designed as competitions, where the “best” proposal receives the funding.

Common to all the countries discussed here is the desire to **encourage networking and partnership** in one way or another. As with Finland, Norway and Sweden have each adopted the idea of having “**Centres of Expertise**” (CoE in Finland, VINNVÄXT in Sweden, NCE in Norway and to some extent this can be seen also in the context of the **RTC’s in Denmark**) which have a **central role to play in developing regional innovation systems**. These programmes have been concentrated in regions with good potential to become leading growth centres. The programmes have thus made these regions more attractive to business and have helped develop strategic planning in the regions.

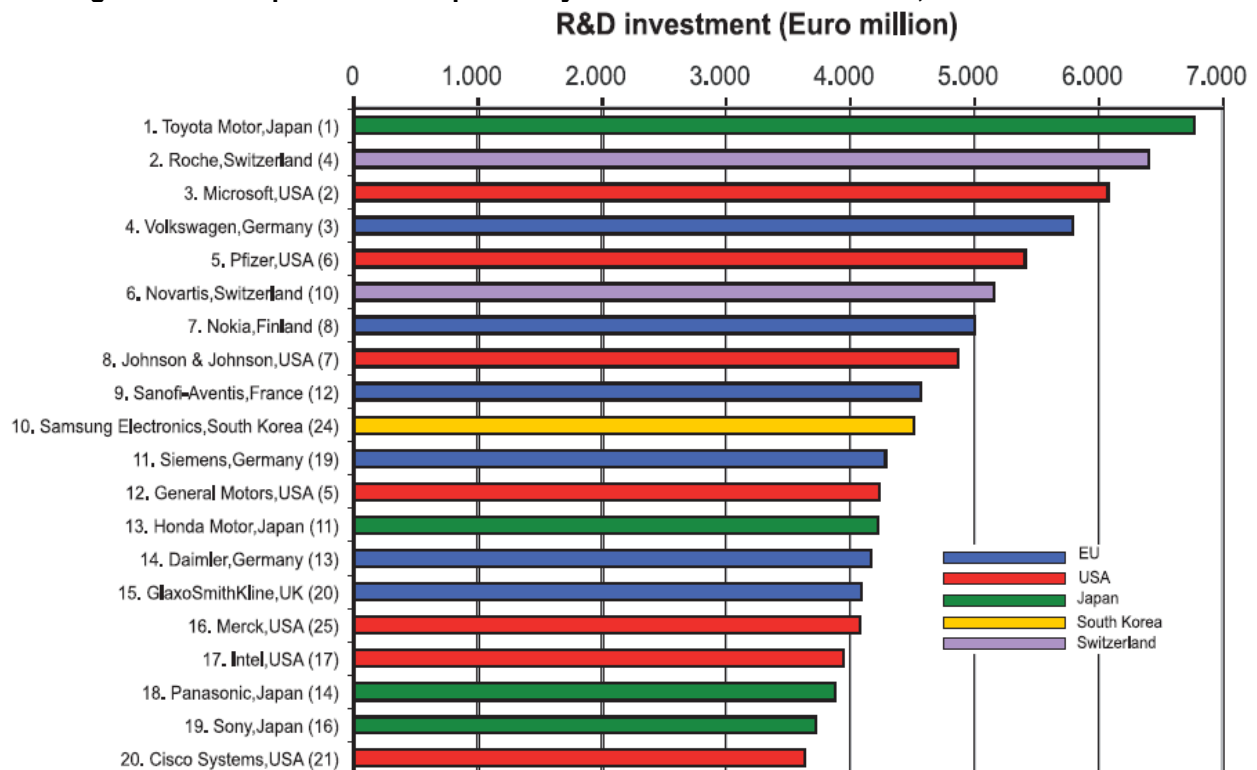
The partnership idea is clearly implemented in the context of national regional policies and innovation policies. New cooperation forums for actors have also been established – the **Danish Innovation Council** is a good example here of a forum that has members from many different sectors. In the context

of the policies themselves there is also a demand for joint financing from the state, regional and to some extent also the **local level** as well as from **private actors**. The **'triple helix' concept** is used across all the Nordic countries. (*National overviews of regional innovation policies and case studies in the Nordic countries*, pg. 110)

The European Commission estimates that **differences in innovative performance** account for over **40% of regional variation in per capita income**. It is widely recognised that innovation is a key driver of productivity and innovation is said to account for around **80% of productivity growth** in advanced countries. (*Northwest regional innovation policy*, pg. 6)

Informal and formal networks combine regional innovation system building with inter-regional cooperation: For example, ERISA (European Regional Information Society Association), IANIS (Innovative Actions Network for the Information Society), IRE (Innovating Regions in Europe), ERIK (European Regions Knowledge based Innovation Network), CoordInnA (Coordination of Italian Innovative Actions), Innovation Relay Centers, Innovation Regions in Europe network, PAXIS program, and so on. These networks **facilitate exchange of good practices between regions**, and give their members opportunities to share new ideas and tools. Besides, more direct and bilateral arrangements between regions such as study visits and twining of regions, within the framework of the RIS-NAC initiative, are made to help interregional learning. (*Regional innovation policy of South Korea*, pg. 13)

Ranking of world's top 20 R&D companies by their total R&D investment, 2010



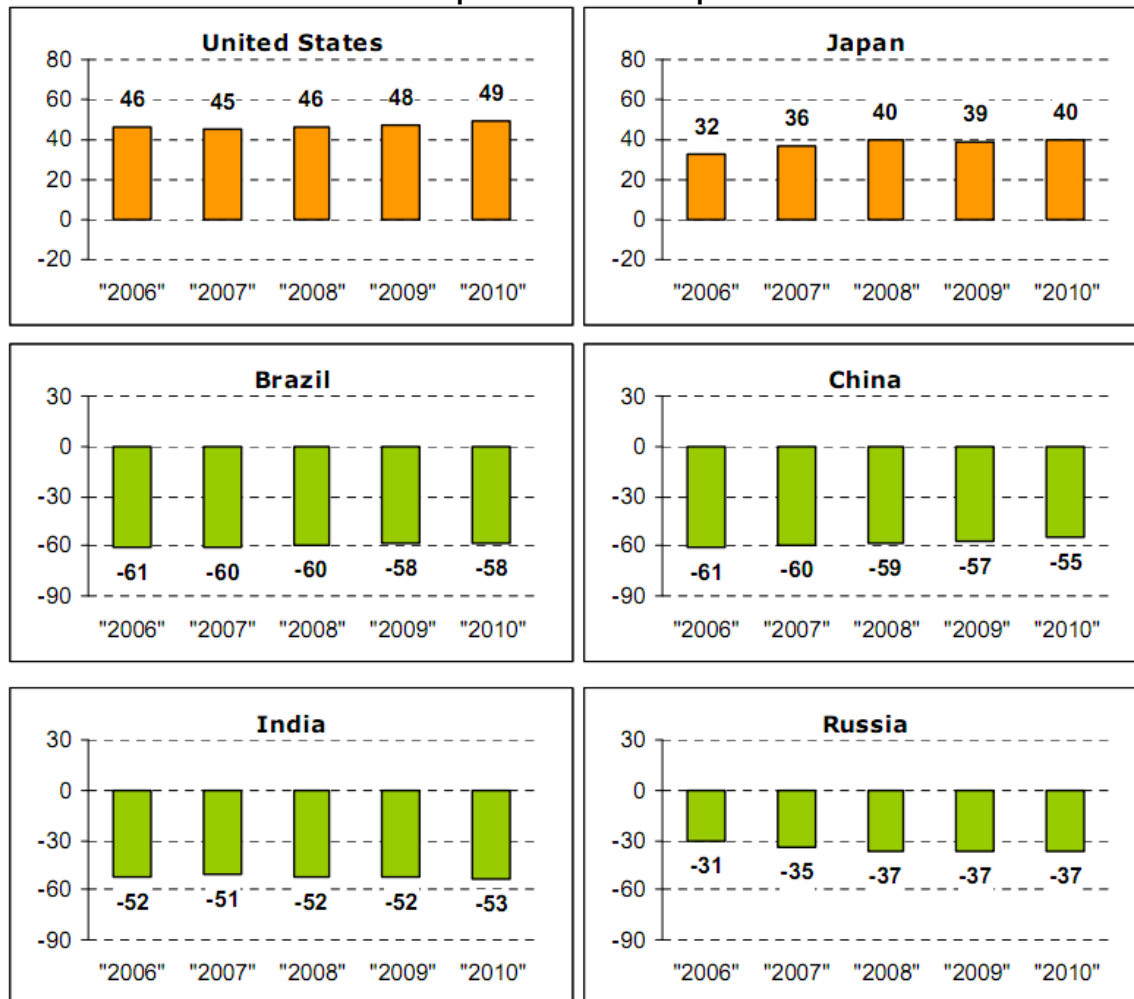
(*The 2010 EU industrial R&D Investment Scoreboard*, pg. 25)

The relevant linkages in the innovative process are not necessarily spatial or geographical bounded. Therefore, a **cluster-oriented business development policy** has to be **wider in scope than geographical based**. In particular business service agencies or **innovation mediators have to serve as local knowledge anchors** (i.e.) to transmit new technology and procedures into the local business community. In this perspective it seems relevant to quote a phrase used by Steiner (2002, p. 19), 'we need the support of clusters by policy', a challenge at least to some extent met by the Danish policy the last couple of years (Ministry of Industry 2001). This is actually what a **holistic oriented modern business development policy should be**. Another precondition is to have in-depth knowledge of the

innovative system and behaviour in the particular region to be able to provide appropriate support. (*Aims and strategies in regional innovation and growth policy – A Danish perspective, pg. 9*)

Functionally, the responsibilities will be shared between the ministry of business and economics, the new enlarged municipalities and the five regions. On the **regional level** the so-called **growth forums** will become the **anchor of public policy**, and they will include representatives of business and industry, knowledge institutions and the public sector. On the **national level** in particular, the **Innovation council**, a semi public advisory board is of relevance, aiming to secure that innovation becomes an integrated part of all industries, and to stimulate a society of knowledge and entrepreneurship. An example of this policy is the recently founded **International Danish Entrepreneurship Academy** (IDEA 2006), (*Op.cit, pg. 12*)

EU-27 Innovation Performance Compared to Main Competitors



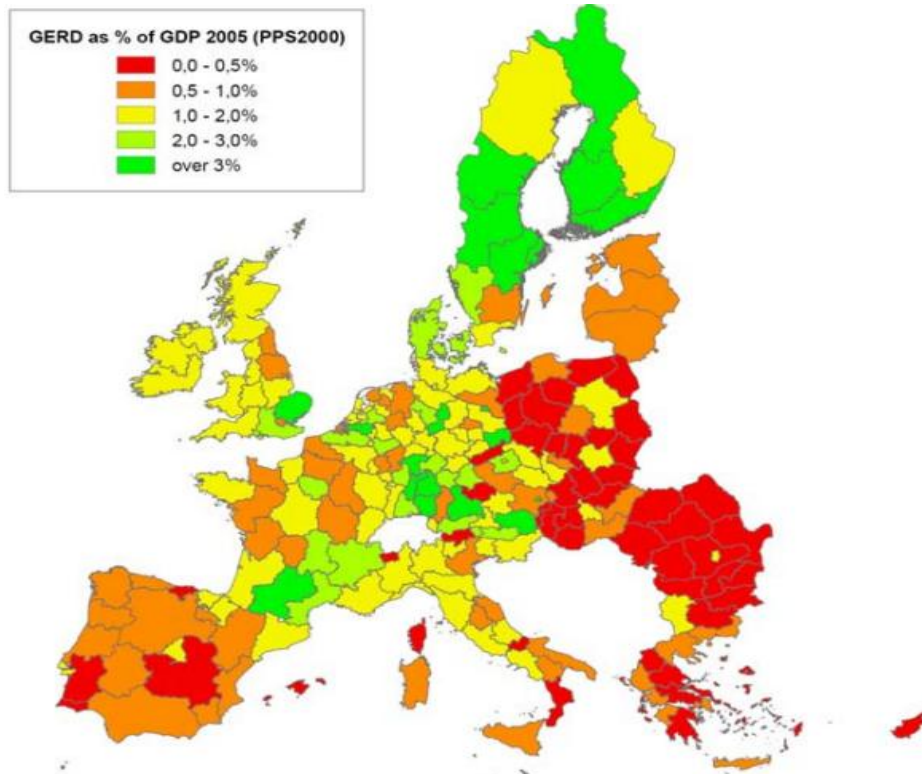
The values in the graphs should be interpreted as the relative performance compared to that of the EU27. E.g. the US in "2010" is performing 49% better than the EU27 and China in "2010" is performing 55% worse than the EU27. (*Innovation Union Scoreboard 2010, pg. 6*)

In comparison, in both the EU and Korea, **innovation is regarded** not just as a productive factor but the **most important factor, the driving force for growth** in the era of globalization, and **regions, not nations, are recognized as the appropriate site for cultivating and realizing innovative potentials**. The concept of "dynamic balance" is very similar to that of "dynamic cohesion." Both try to overcome the bipolar distinction between equity and efficiency by contributing to the overall competitiveness of the

economy as a whole. Regional policy and innovation policy come together in both the EU and Korea in a mutually reinforcing relationship. It seems that while the potential contradiction between these two policy goals has sometimes come to the attention of policy-makers and commentators in Europe, it goes yet unnoticed in Korea. An important implication of the bottom-up approach in Korea, though, is that **local actors themselves are responsible for the inequalities between regions resulted from the self-innovative strategies and efforts of regions.** (*Regional innovation systems in small & medium-sized regions*, pg. 20)

In 2006, only the two Nordic countries Finland and Sweden exceeded the defined 3 % target of R&D investment in relation to gross domestic product. These two countries stand out since the closest followers, Denmark, Germany and Austria, only have R&D intensities of about 2.5 % of their respective GDP. France invested 2.09 % of its GDP in research and development activities, while all other European Union Member States spent less than 2 % of their GDP on research and development. On the EU27 level, this share was 1.83 %. Among the "more than 2 % investors", Finland and also Denmark realised strong increases between the mid-1990s and the beginning of the 2000s (Finland), or 2003 (Denmark), respectively. The Finnish share of R&D expenditure increased further until 2005, albeit with slower growth rates, whereas the Danish share decreased slightly between 2003 and 2006. In Germany, the share of R&D investment (slowly) increased until the beginning of the 2000s and has stagnated since. Starting from a slightly higher position than Finland in 1995, the French share of R&D investment in relation to GDP has strong increasing trend during this dropped in recent years. A fairly ten-year period is witnessed by Austria, where R&D intensity was raised from 1.54 % in 1995 to 2.49 % in 2006, now placing this country in the group of Member States which invest between 2% and 2.5 % of their GDP in R&D activities. (*An analysis of the development of R&D expenditure at regional level in the light of the 3% target*, pg. 7)

The regional distribution of R&D expenditure development: The continued importance of national framework conditions



(Op.cit, pg. 21)

(B) Doctrine and Problems

Different Types of Regional Innovation Systems

The previous section focused on what may be called **complete RIS**. However, it is important to recognize that a RIS may be more or less complete. A region (or cluster) that has not all the characteristics listed in Figure 3.2 may still be referred to as a RIS. Thus, there are different types of RIS. Asheim & Isaksen (1996, 2001) distinguish between three broad groups of RIS, **(1) territorially embedded regional innovation networks, (2) regional networked innovation systems and (3) regionalized national innovation systems**. These differ mainly in terms of their connection to knowledge-providers and actors outside the region as well as the form of co-operation in the innovation process.

For the **first type of RIS, territorially embedded regional innovation networks, proximity** (both geographical and relational), is the **main stimulus for firms' innovative activities**. **Interaction with knowledge providers** and their presence tends to be **very modest**. Probably the best examples of this kind of systems are **"...networking SMEs [small and medium-sized enterprises] in industrial districts, which build their competitive advantage on localized learning processes"**, (Asheim & Isaksen, 1996, p.14). Firms in territorially embedded regional innovation networks rely upon locally developed knowledge and the **untraded interdependencies** discussed above **tend to be strong**. It seems therefore natural to suggest that learning-by-doing and learning-by-using are the key knowledge-generating mechanisms in these systems and that the innovations achieved are mainly **incremental innovations**. But these systems hold different types of knowledge, (Asheim & Isaksen, 1996). While learning-by-doing and learning-by-using are primarily based on informal, practical and tacit knowledge, there is also a specific kind of knowledge that stems from "disembodied technical knowledge", which is mastered by firm-groupings through untraded interdependencies as well as formal exchange with other firms, (Asheim & Isaksen, 1996). This kind of knowledge is not mainly based on tacit knowledge. It is instead referred to as **localized, codified knowledge**. It may constitute the basis for interactive learning. Furthermore, "...according to modern innovation theory, **interactive learning has the potential to produce radical innovations in addition to incremental ones**", (Asheim & Isaksen, 1996, p.15). However, the probability for these systems to produce radical innovations is low due to the **lack of knowledge providers**. (*Regional innovation systems in small & medium-sized regions, pg. 13*)

There are several reasons to assume that to **regionalize innovation policy may have advantages**:

- **First**, innovation processes are **not spread** evenly across space, **but they are concentrated in certain areas** while being more or less absent in other regions. It is, therefore, quite likely that national innovation policies have a **regional impact, whether intended or not**. Due to the pronounced regional dimension of innovation processes, it may be advantageous to give national policy a regional orientation in order to achieve national-level goals more effectively.
- **Second**, there are not only **regional differences** with regard to the amount or share of innovation activity, but also **in the way in which regional innovation systems function**. For this reason, 'best practice' policy measures that apply to all regions may not exist so that **different strategies and instruments are needed for achieving a given goal**. Hence, a one-size-fits-all approach to innovation policy that treats all regions in a similar way is not appropriate and probably not efficient.
- **Third**, since innovation activity is of key importance for economic development, it may constitute an important starting point of a policy that is aiming at stimulating regional development. Hence, innovation promotion measures, which are focused on a certain region, could be instrumental for regional growth policy. If the primary goal of such a policy is to promote regional development it may, however, be in conflict with the growth objective at the national level.
- **Fourth**, a variety of policy approaches in different regions is a necessary precondition for comparison and benchmarking. It allows the actors to learn from experience made with different approaches and to identify and adopt superior solutions. However, as far as variety causes additional effort, it could also be a source of inefficiency. (*Regionalization of innovation policy, pg. 1*)

The regional research cluster initiative

Two different clusters are analysed: **one addresses a research field of engineering science**, where researchers have traditionally counted on resources from the Region. The **other aims at a very cost-**

intensive research field of the natural sciences, where researchers are highly interwoven with national and international research networks.

The integration of research groups into regional research clusters crucially depends on financial requirements and network opportunities. A regional cluster indeed takes shape in the field of engineering science. Here, the cluster regroups researchers from different research sites in various projects. Researchers from four or more different research sites take part in single projects (Cluster 2007b). However, the cluster does not only function as a platform for internal but also for external cooperation. Successful cluster organisation pays off with generally better positioning of rhône-alpine researchers with regard to funding. (***Taking up a new role, regional innovation policy in France, pg. 17***)

While there is no **single methodology** outlining how a regional innovation strategy should be taken forward, there is an underlying **common philosophy**. This is illuminated in the methodological guides published in the Innovation regional strategies website.

The process of forming the regional innovation strategy can in general be divided into three phases [17]:

Phase 1:

Consensus-building – the establishment of managing and executive units of the project, an information campaign, achieving the consensus between those involved in the regional and innovation development, establishing coordinated cooperation with the project partners, specifying the project goals and preparation of the detailed working plan.

Phase 2:

Analysis – a detailed analysis of the regional innovation system; an analysis of the enterprises' innovation needs, an analysis of services and institutions for supporting and financing innovation, an analysis of a technological offer, the identification of shortcomings and barriers, SWOT analysis.

Phase 3:

formulating the regional innovation strategy – draft of strategic fields of the regional innovation strategy, of priorities and measures, the formulation of the Action plan and a set of pilot activities, draft of principles for the regional innovation strategy implementation, working out the monitoring and evaluation system. (***The process of forming the regional innovation strategy, pg. 8***)

The systemic dimension of the Regional Innovation Systems derives in part from the **associational character of innovation networks** (Cooke and Morgan, 1998). Such relationships, to be systemic, must involve some degree of interdependence, though to varying degrees. Likewise, not all such systemic relations need to be regionally contained, but many are. As the interactive mode of innovation grows in importance, these relations are more likely to become regionally contained, for example, in the case of specialised suppliers with a specific technology or knowledge base. Such suppliers often depend on tacit knowledge, face-to-face interaction and trust-based relations and, thus, benefit from cooperation with customers in regional clusters, while capacity subcontractors are increasingly sourced globally.

Further reinforcing the systemic character of the RIS is the prevalence of a set of attitudes, values, norms, routines and expectations—described by some as a distinctive 'regional culture'—that influences the practices of firms in the region. It is this common regional culture — itself the product of commonly experienced institutional forces—that shapes the way that firms interact with one another in the regional economy. (***Knowledge bases and regional innovation systems, pg. 6***)

To summarize, the main argument that this paper puts forward is that there are **different logics behind constructing regional innovation systems** contingent on the knowledge base of the industry it addresses as well as on the regional knowledge infrastructure which is accessible. In a territorially embedded regional innovation system, the emphasis lies on the **localised, pathdependent inter-firm learning processes often involving innovation-based on synthetic knowledge**. The role of the regional knowledge infrastructure is therefore mainly directed to industry-specific, hands-on services and concrete, short-term problem solving, i.e. **ex-post support to the cluster**. In a regionalised national innovation system, R&D and scientific research take a much more prominent position. **Innovation builds primarily on analytic knowledge**.

Linkages between existing local industry and the knowledge infrastructure are, however, weakly developed. Instead it holds the potential to promote new industries at the start of their industrial and technological life cycle. In this, the role of the regional(ized) knowledge infrastructure is a very central one as it provides the cornerstone for **cluster development (through the precarious task of commercialising science)** and can thus be called **ex-ante cluster support**. The **regionally networked innovation system can be considered as an ideal type RIS**. Similar to the regionalised national innovation system, the knowledge infrastructure plays an indispensable role. But in contrast to it, the **cluster is not science-driven but market-driven**. In comparison to the **territorially embedded regional innovation system**, the **networked RIS** often involves more advanced technologies combining analytic and synthetic knowledge. While territorially embedded RIS are often found in mature industries and regionalised national innovation systems found in emergent industries, networked regional innovation systems are typically found in the growth phase of an industry. **Firms and knowledge infrastructure form a dynamic ensemble, combining ex-post support for incremental problem solving and ex-ante support to counter technological and cognitive lock-ins.** (*Op.cit*, pg. 8)

First of all, 'picking winners' policy denies the fact that, in principle, almost all regions have growth potential. Regional innovation policy purely based on R&D potential is too narrowly focused: **innovation should not simply be equated with R&D**. Growth potentials or **innovation potentials** can be measured in many ways. Indicators like R&D, creative workers, high-tech, innovative firms, knowledge-intensive services identify some but not similar aspects of the knowledge economy. When drawing a map of the Netherlands for each of these indicators, each of these reveals a different spatial pattern (RASPE et al., 2004). When all the maps are overlaid, it is almost impossible to identify regions that lack innovation potential. That is, most of the Dutch regions participate in the knowledge economy in one way or another. Therefore, it would be wrong to exclude regions from the beginning, because it would leave regional potentials untouched. (**Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases**, pg. 16)

There are numerous reasons for this variance. Concepts like the **innovative milieu** and **regional innovation system** particularly stress that some regions benefit from **collective learning processes** among regional organizations (see, e.g., Aydalot and Keeble, 1985; Cooke, 1992). These regional learning processes involve intensive knowledge sharing and collaboration, which stimulate innovation. Moreover, it is not only intra-regional collaboration that matters: **Firms need to be embedded into different types of knowledge networks that may or may not be geographically structured**. Bathelt et al. (2004) argue that it is the **simultaneous participation in "local buzz" and "global pipelines of knowledge"** that determines **innovative success**. In addition, it is crucial with whom firms collaborate is only access to "related variety" fosters innovation because some overlap in knowledge is necessary for effective communication, while there needs to be enough variety for the creation of novelty (Frenken et al., 2007).

Policy responds to these scientific insights in multiple ways. For example, **regionalized policy programs are frequently designed to stimulate intra-regional cooperation**. In Germany, programs like the BioRegio, InnoRegio, or InnoNet belong to this category. In such programs, public support is granted to self-organized cooperation in R&D among organizations located within a particular region (Eickelpasch and Fritsch, 2005). While this type of support still has some drawbacks \it goes into the right direction by **taking the regions seriously and giving prominence to the well-functioning interplay of the various elements of regional innovation systems"**. (*Do cooperative R&D subsidies stimulate regional innovation efficiency*, pg. 3)

Due to the tacit nature of knowledge, **firms can only understand, absorb and implement external knowledge that is close to their own knowledge base** (Cohen and Levinthal, 1990). Effective transfer of knowledge requires absorptive capacity of firms and cognitive proximity, that is, firms need to share similar knowledge and expertise to enable effective communication (Nooteboom, 2000). This implies, for instance, that it is not sufficient to have local access to information through the provision of ICT infrastructure: a firm needs to be in a position to take advantage of the opportunity new knowledge is providing (Perez and Soete, 1988). In combination with geographical proximity, the need for cognitive

proximity may well explain the spatial concentration of tacit knowledge. Once a **region specializes** in a particular knowledge and competence base, this will act as an **incentive, offering opportunities to local firms for further improvements** in familiar fields of knowledge on the one hand, and as a **selection mechanism, discouraging knowledge creation that does not fit into the regional knowledge base** on the other hand (Boschma, 2004). As a result, the regional accumulation of tacit knowledge provides an intangible asset for local firms that is hard to grasp for non-local firms, because spatial distance forms a barrier for the transfer of tacit knowledge (Gertler, 2003). There are various mechanisms through which **knowledge spills over from one local firm to the other**, and which contribute further to **knowledge accumulation at the regional level**. These are the spinoff process, labor mobility and networks. *(Evolutionary economic geography and its implications for regional innovation policy, pg. 5)*

The “classical” globalization literature expects that the smaller and the more open an economy is, the more it is exposed to pressures from globalization, and thus to global competition. On the other hand, it could be expected that **decentralized political systems are better suited to implement regional innovation policies**, since the subnational territorial entities have their own legal competences, autonomy and financial resources as well as adequate institutional environments in terms of a decentralized distribution of research and science organizations. Thus, the **territorial division of power** is expected to **play an important role** regarding the extent to which regional innovation policies are implemented.

Consequently, it could have been expected that innovation policies converge especially in the case of small open economies. However, the paper showed that the intensity of regional measures varies to some extent. Thus, the paper has first refuted expectations of equal intensity by arguing that the **intensity of regional innovation policies** depends heavily on the **concentration of the science system**, the **fragmentation of the political system**, the **degree of Europeanization**, and the **endowments of the regions**. *(Explaining varieties of regional innovation policies in Europe, pg. 18)*

Upgrading to higher value activities in global value chains seems possible when there is an **environment that supports interactive learning and innovation**. **Firms’ isolated efforts to make this transition tend to fail** in the longer term. Activities at the higher end of the product range involve a high degree of innovation and interaction with customers, other firms and organisations. In the case of SMEs, the literature argues that the interaction best takes place with other firms and organisations co-located in the same regional area (Lundvall and Borras, 1999). The importance of the **local interactions for SMEs** holds for developed (Asheim et al., 2003; Cooke and Morgan, 1998; Cooke and Will, 1999; Schmitz, 1992) as well as developing countries (Albu, 1997; Giuliani, 2004; Giuliani and Bell, 2005; Pietrobelli and Rabellotti, 2007; UNIDO, 1997, 2004). Moreover, this literature explicitly finds that **SMEs’ external relations are more confined to the region than those of large firms** (Asheim et al., 2003; Cooke and Morgan, 1998). One of the reasons for this is that SMEs are more dependent on complex, tacit knowledge and less capable of searching for and using codified knowledge. This forces them to rely more on personal ways of transferring (tacit) knowledge and on learning-by-doing and interacting as opposed to relying on globalized (and more codified) modes for knowledge acquisition. *(Globalisation of knowledge production and regional innovation policy, pg. 5)*

Interactive learning might also take place when firms collaborate with the knowledge creating and diffusing organizations of the regional innovation system such as universities and research centres and other institutions like business services, entrepreneurial associations, etc., particularly for certain industries. Universities are often described as engines of growth, particularly at regional level. Yet despite the large amount of research on university-industry interactions (Mansfield 1991, 1998; Meyer-Krahmer and Schmoch, 1998; Salter and Martin, 2001) the **direct effects of the universities and research centres on the innovative performance of firms has proved difficult to trace** (Fagerberg 2005; Laursen and Salter, 2004). Universities play a double role as the providers of qualified human resources (needed to build absorptive capacity) and as the providers of R&D. As R&D providers, universities and research centres are believed to be especially relevant for certain sectors (Pavitt, 1984) such as the pharmaceutical industry (Mansfield, 1995) or biotechnology (Asheim and Coenen 2005), while appearing to be almost irrelevant for some others such as furniture (Klevorick et al., 1995; Laursen and Salter, 2004). As in any form of interactive learning the absence of absorptive capacity among the firms,

organizations or limited generalized social capital might seriously hamper the collaboration between the different institutions. (*Op.cit*, pg. 9)

A constitutive requirement for a working regional system for growth and development is an **institutional set-up able to deal with regional development and change, regional governance, innovation management and knowledge spread**. The actual actors taking part in the specific action define a partnership of innovation. A partnership can be defined as a regional framework based on a voluntary commitment (or initiated by financial incentives from the business development system) to co-operate to start and promote special initiatives. A **partnership is based in a region, but includes often partners located outside** the region due to the functional nature of innovative processes.

With regard to the actors in regional innovation partnerships it is needed to take point of departure in specific activities to define the partners involved. From a principal point of view it seems useful to distinguish between **partners of the innovative activity** per se, and the **regional knowledge management system** in a more narrow sense. The actors in the former can usually be identified by a cooperative agreement or an (ad hoc) organizational set up. From a regional development and growth perspective, the activities within the above sketched network are the most important. Innovation and dissemination of the results are the main drivers behind economic development within a firm and in the regional context. One of the core-problems to solve in this process is the built in contradiction between **innovation as a private good** and the **societal demand for accessibility of new knowledge** to increase regional competitiveness. This is probably the most important gap to bridge by a regional knowledge management system.

In this perspective a partnership is a **forum for exchange of knowledge** for the mutual benefit of the involved partners. On the basis of sharing knowledge the partnership creates a basis for learning, both in the partnership and by each single participant in order to create innovation and to spread new processes and competences. (*Aims and strategies in regional innovation and growth policy – A Danish perspective*, pg. 11)

Innovation emerges when economic agents, for instance firms, individual researchers, R&D institutes or universities, **implement novel combinations**. Innovation policy addresses all actions of policy makers that are intended to influence the processes connected with the generation and diffusion of innovation. These processes go hand in hand with the complexity and uncertainty inherent in changing socio-economic systems. Innovation policy can be designed for the regional, for the national or for the supranational level, e.g. for EU level. By region we understand every entity that comprises a sub-national geographic unit smaller than a country. These units are normally closely interconnected with the national and global level and develop dynamically in this context. Nevertheless, they can be self-sustained, open and inter-dependent sites of economic activities and development (cf. Moulaert/Sekia, 2003). **Regions can be characterized by internal coherence and can to some extent act as a collective entity**. Aiming innovation policy for the regional level means focusing on emerging novelty, changing behaviour of innovative agents and changing institutions on the regional level.

It makes sense to **regionalize innovation policy** for the following four reasons (cf. for the following Fritsch/Stephan, 2005): **First** of all, innovation processes are **taking place unevenly in geographic space**. This is partly due to the variety in endowment with production factors and with industrial sectors. **Second**, innovation **networks function differently in various regions**. **Third**, innovation activity is crucial for economic development and growth on the regional as well as on the national level. It is important to realise that **economic development and growth on the two different levels might conflict**. **Fourth**, using various policy approaches in different regions enables countries to **gain much more varied experiences**, thereby enabling regions to learn from one another. (*An Assessment of the Regional Innovation Policy by the European Union based on Bibliometrical Analysis*, pg. 4)

Whereas, traditionally, the larger corporates behaved almost like self-sufficient islands, sourcing internally, abiding to the closed innovation model and competing on a stand-alone basis with little regard

for the “soft infrastructure” of the host location, today all that is changing (Cooke 1998a). Innovation is not an isolated process and **a continuously innovating enterprise is not a secluded island of knowledge production**, instead it is just the opposite. This leads to establishing a systematic perspective to innovation. (*Banking regional innovation policies: DEA-based benchmarking in a European setting*, pg. 9)

Ohmae (1993) argues that (especially the more dynamic) regions represent authentic communities of interest, define meaningful flows of economic activities and are advantaged by true synergies and linkages between economic actors. According to de Vet (1993) what gives **a region a strong identity, is the institutional capacity to attract and animate competitive advantage**, often by promoting cooperative practices among economic actors, thus creating networks that strengthen the regional identity even further.

Notionally, regions can be defined in terms of shared normative interests, economic specificity and administrative homogeneity. In addition to these there may be such criteria as non-specific size; particular homogeneity in terms of criteria such as geography, political allegiance and cultural or industrial mix; ability to distinguish from other areas by these criteria at issue; and occupancy of internal cohesion characteristics. (Cooke 1998a, p. 15) (*Op.cit*, pg. 12)

In each country or region the specific content and nature of the system can differ. The degree of formalization can vary from **formal agreements** to **informal or ad hoc co-operations**, like partnerships of innovation. It has to be stressed that these functional linkages do not necessarily always take place within the same regional (geographical) context. In this perspective we are dealing with flexible and open systems, but at least the particular regional policy set up has to be specified, as well as the involved actors. Finally a successful implementation of a regional development strategy based on the above sketched approach depends on the dissemination of the results of the policy measures into the regional economy and in particular business and industry. (*Aims and strategies in regional innovation and growth policy – A Danish perspective*, pg. 4)

The assessment of regional innovation policy based on the structural regularities means that measures of innovation policy **have to be in line with these structural regularities**. It does not mean that policy makers are required to carry out specific measures. It means that the goals of innovation policy are assessed in the light of the structural regularities found. In particular the approach recommended here is by no means part of a technocratic approach where social scholars take over policy making. The structural regularities only serve the purpose to avoid the impression that for every policy measure you can find scientific reasons. When looking into the findings of this paper it becomes clear that there are quite a number of issues on which scholars do agree and which give a clear direction for policy. There is in principle nothing wrong with politicians’ actions running against such an existing consensus among experts, because politicians have to take into account more aspects than just the narrow perspective that scientific experts have on a certain topic. However, politicians should have clear reasons for that other than some sort of one singular scholar’s opinion. So, the **purpose of this approach is to make it easier to control actions of politicians not to enable them to hijack public decision-making**. (*An Assessment of the Regional Innovation Policy by the European Union based on Bibliometrical Analysis*, pg. 8)

When assessing the EU regional innovation policy it becomes obvious that the ambiguity of the **Commission’s twin goals** of **global competitiveness** and of **cohesion** stemming from the Lisbon strategy form a severe problem. In fact, it means that EU policy is contracting the structural regularity, which finds that agglomeration of economic activities usually goes hand in hand with positive cumulative and selfreinforcing processes. Moreover, this is in line with our finding as there is no structural regularity on convergence. Despite the fact that there are a number of papers investigating the question of convergence **there is no consensus on whether or not regions converge** (cf. Aronsson et al., 2001, Cappelen et al., 2003, and Salinas-Jimenez, 2003). (*Op.cit*, pg. 17)

The degree of autonomy and political power wielded by regional authorities as governmental units vary between regions depending on the national governance structures. Keating (1998, pp. 26-27) classifies

policy-making capacity to be one dimension of the power of regions. Regions with a political system, a decision making capability and **ability to legitimately establish a “regional interest”** can gain from this feature compared to regions which lack this unity of action and are reduced to being simply relays of other systems of actions. Capability for more or less independent policy-making combined with an intimate knowledge of their own innovation system, and the regional specific traits and needs thereof, makes regions preferable governmental units for both the development and implementation of innovation policy. **(Banking regional innovation policies: DEA-based benchmarking in a European setting, pg. 18)**

Policy-makers should not focus uncritically, therefore, on creating regional systems to support firms’ innovation activity irrespective of local conditions. There may be a danger to generalise too broadly regarding the extent and potential of regional innovation systems or learning regions on the basis of only a few well-known empirical cases. Regional innovation policy seems to some extent to have emerged from experiences and policy instruments in ‘success stories’ like Italian industrial districts with their centres of real services, **Baden-Württemberg with its Steinbeis Stiftung and Silicon Valley with its Stanford University.** These examples have depicted the stimulation of local networking and the development of regional technology support infrastructure within the framework of a general model of local industrial policy, without assessing if the appropriate requirements (for really are present or readily created. These arguments point to the **need to adapt innovation policy instruments to take into account the specific problems faced by a regional economy.** There is no one set of policy instruments or a ‘one-size-fits-all’ policy portfolio that suit all types of region. From the systems perspective, innovation policy instruments must be adapted to distinctive characteristics in individual regions, building on analyses of regional innovation system barriers, e. g. factors which inhibit the regional industrial milieu, its institutional set-up, barriers related to attitude towards innovation and entrepreneurship, etc. **(Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy, pg. 8)**

A lack of collective learning may be a problem particularly in peripheral regions with small industrial milieus and located a long distance away from relevant knowledge organisations. However, organisational ‘thinness’ also points to the fact that **regions differ in their capacity to build organisations to stimulate firms’ innovation activity;** this lack of relevant organisations can be a consequence of a region’s decision-making powers, financial resources or policy orientation (Tödting and Kaufmann 1999).

Policy directed towards stimulating regional innovation systems is probably misguided in most organisationally ‘thin’ regions. A more adequate approach may be to link regional firms to relevant national and international knowledge resources and firms, and to make efforts to attract and retain innovative firms and highly skilled workers to the region. This points to the **need for broker organisations in the regional policy portfolio** (Nauwelaers and Wintjes 2000). The situation in organisationally ‘thin’ regions also emphasises the fact that **‘systems’** should be understood both from a **territorial and a functional perspective.** From a functional perspective firms draw on ideas, know-how and complementary assets from customers, suppliers, consultants, universities, funding and training organisations, independent of geographical location (Tödting and Kaufmann 1999). Thus, **firms may innovate successfully without belonging to a regional innovation system as long as they find relevant competence milieus in national or international innovation systems.**

In other areas the **relevant actors may be present without forming a working regional innovation system** (i.e. fragmentation). The region may have an industrial specialisation comprising many firms as well as relevant knowledge organisations. However, geographical proximity only creates a potential for interaction, without necessarily leading to dense local relations. The interactive practices of innovation nearly always involve some form of qualitative communication, i.e. interpersonal linkages. The existence of social institutions facilitates collaboration and the exchange of qualitative information between actors. Thus, ‘in networks and other kinds of “organised” market relations, people develop codes of communication, styles of behaviour, trust, methods of cooperation, etc. to facilitate and support interactive learning’ (Gregersen and Johnson 1997: 482). However, in some regions interaction is hampered, leading to a fragmented system. **(Op.cit, pg. 9)**

Given the rather positive role for innovation attributed to cooperation, it can be expected that **cooperative subsidies are particularly effective for stimulating innovation**. Accordingly, the more regional organizations engage in subsidized cooperation the more likely they profit from knowledge sharing, which gives them higher chances of innovative success. However, cooperation is not always beneficial. The establishment and maintenance of cooperation agreements require efforts and many cooperation fail (Bleek and D.Ernst, 1993). Free-riding is also a known problem (Kesteloot and Veugelers, 1995), so are "learning races between the partners [...], diverging opinions on intended benefits [...], and a lack of flexibility and adaptability" (Faems et al., 2005, p. 240) that can reduce potential positive effects. **(Do cooperative R&D subsidies stimulate regional innovation efficiency, pg. 4)**

This is not to say that geographical proximity is a prerequisite for knowledge diffusion and innovation. **Boschma (2005a) claims that geographical proximity is neither a necessary nor a sufficient condition for interactive learning and innovation**. This happens only when other barriers of knowledge diffusion are overcome, such as cognitive, social and institutional distance. These forms of proximity need to be secured between actors in order to make them connected, and to enable effective knowledge transfer. These other forms of proximity may even act as a substitute for geographical proximity. For instance, social proximity may provide a vehicle to connect agents and enable knowledge flows over large distances, because these agents share a past as former schoolmates or former colleagues working for the same organization (Agrawal et al, 2006). Nevertheless, **effective knowledge transfer may still be geographically localized when geographical proximity indirectly impacts on the establishment of the other forms of proximity**. For instance, **geographical proximity may encourage the creation of trust-based relationships that facilitate knowledge transfer between local agents** (Maskell, 2001). **(Evolutionary economic geography and its implications for regional innovation policy, pg. 5)**

'Picking-the-winners' policy at the national level is risky, as history shows, because one runs the risk of **selecting the wrong ones**. There is little understanding of how regions move into new directions or start up new growth paths (Iammarino and McCann 2006; Martin and Sunley, 2006). What has been observed is that **new industries are often the result of spontaneous processes, rather than the outcome of orchestrated policy interventions**. (Lambooy and Boschma, 2001). This is even true for cases like Bangalore where popular belief suggests otherwise (Pack and Saggi, 2006). This is not to deny, however, that governments often play a key role, as in Silicon Valley, where huge defensive expenditures by the US government gave the region an enormous boost. Secondly, 'picking-the-winner' policy often results in picking the same winners like biotech, no matter what country or region is involved. When all regions are targeting the same sectors, and it is likely that many of these industries will cluster in only a few regions in the world, one can easily predict that the overwhelming majority of regions will fail to develop these industries, with huge losses of public resources (Boschma, 2005b). An exception might be the public support of general purpose technologies (like the Internet): there is no doubt these will have long-term impacts, but it still remains uncertain which parts of the economy will be most strongly affected in the next decades. Thirdly, **'picking-the-winner' policy at the national level denies the fact that, in principle, almost each region has growth potential in the knowledge economy**. Growth or innovation potentials of regions can be measured in different ways. Indicators like R&D, creative workers, high-tech industries and knowledge-intensive services identify different dimensions of the knowledge economy, and reveal very different spatial patterns. **(Op.cit, pg. 16)**

'One-size-fits-all' policy. To say that almost each region has innovation potential is not to say that all regions are equal. There is **a need to account for a variety of innovation potentials between regions, because regions differ in terms of location, knowledge base and institutional structure**. Italy is a prime example: the North of Italy is strong in science-based organizations and R&D, the Third Italy is characterized by large numbers of industrial districts that are home of small and medium-sized organizations that have more informal and loosely structured relationships, while the South of Italy is characterized by a weak indigenous learning capability and weak networks due to poor institutions (Iammarino, 2005). Because of such regional diversity, it would be wrong to apply a 'one-size-fits-all' policy, such as neo-liberal policies or best practices like Silicon Valley, which is often found practice in regional policy (Todtling and Trippl, 2005). **(Op.cit, pg. 18)**

Finally, these findings have implications for European innovation policies, especially with regard to benchmarking and learning from best practice, which both are instruments of the open method of coordination in European innovation policy (cf. Kaiser/Prange 2004). The **high degree of variation in the development of regional innovation policies makes policy learning considerably difficult**. As can be seen from the cases in this paper, **there is no “master plan”** for such a development. Even if countries are willing to learn from each other and consensus has been reached upon “best practices” there remain **several impediments for policy transfer ranging from “uninformed transfer”, over “incomplete transfer” to “inappropriate transfer”** (cf. Dolowitz/Marsh 2000: 19ff). In the end this means that if a “national practice” should become a “European best practice” the solution has to be “generic”, i.e. independent of the institutional, sectoral and geographical context, “transferable”, i.e. it works well in many different contexts, and “robust”, i.e. it remains a “best practice” even if modes of production and innovation change. (*Explaining varieties of regional innovation policies in Europe, pg. 19*)

Meanwhile, with the goal for innovation policy of ensuring that the EU is more innovative, and ultimately more competitive, it could be argued that it would **be more beneficial to focus investment in regions that are already innovative**. A further issue concerns industrial clusters, for in attempting to generate clusters in particular regions it may be the case that firms are drawn away from other regions. **It is not realistic to expect every industrial cluster** in every region – or even that all regions have a firm hold on the industrial clusters that at present seem to top everyone’s priorities list (ICT, new media, biotechnology, new materials, etc.). Another potential problem concerns the **different needs of companies**. Regional **innovation strategies** tend to **emphasize priorities for the majority of enterprises**, or for the **strongest** and **weakest** aspects of the region. Some enterprises may need different kinds of support, such as better connectivity across Europe rather than associations within the region. Both of these aspects need to be recognised. (*Innovation Tomorrow, pg. 158*)

Regional resources and collaboration are of major importance in stimulating economic activity in the clusters. However, the survey found an increased presence of MNCs in many clusters, and also that firms in the clusters increasingly source major components and perform assembly manufacturing outside of the clusters (Isaksen, 2005). Also Todtling and Trippel (2005) found empirical support for clustering because of the importance of social interaction, trust and local institutions. Yet they also note that both local and distant networks are often needed for successful co-operative projects, in particular for projects of innovation and product development when it is usually necessary to combine both local and non-local skills and competences in order to go beyond the limits of the region. (*Knowledge bases and regional innovation systems, pg. 6*)

The Worry Report said that “... the output of **highly educated people** rather than research results is widely regarded as the most **effective knowledge transfer mechanism**”. The region needs to ensure that its highly educated people, stay within the region and pass on their knowledge to regional businesses to increase productivity and competitive advantage. This is an extremely broad problem which requires balancing supply and demand for skilled employees, exciting career prospects for newly qualified staff and an attractive quality of life. (*Northwest regional innovation policy, pg. 15*)

Although these conclusions point to a better practice case of Dortmund, this thesis **warns of any attempts to copy the examples of others without considering the endogenous strengths of the home region**. Therefore, it calls for a more analytical approach in applying cluster strategies by using ex-ante and ex-post evaluations and benchmarking tools (see also Jakoby, 2006) and for the allocation of a sufficient implementation capacity and commitment to make such a strategy work. It further indicates that there is potential added benefit in using external expert advice and studies to inform policy development as their (as ‘objective’ perceived) input can broaden acceptance of common strategies and policies. (*On the governance of regional innovation systems, pg. 457*)

Deficient institutional foundations have proven an obstacle for two different types of regions, both large and small. As to the latter, it is not surprising that low capabilities have impeded regional development given the small population of some of the RPP regions. Even the fact that **central government has provided a lot of guidance to regions, combining top-down and bottom-up elements in the RPP**

process, has not been sufficient to allow all regions to participate meaningfully in the programmes on offer. Several (although not all) small regions have struggled to come up with promising MRI initiatives and have also failed to obtain funding for firm-focused programmes.

This outcome poses difficulties for programme design, because it cannot be determined whether **low participation** has only been a function of **low capabilities** that **prevent regions from responding to economic opportunities** or whether it reflects the absence of such opportunities in the first place. Central government can address institutional weaknesses, for example by ensuring regional EDAs are well resourced and funded. However, it can do little to create economic opportunities where no comparative advantage exists - at least short of a fully-fledged state dirigisme that would run counter to the premise of regional development as a business-driven process. (*Regional development and regional innovation policy in New Zealand, pg. 13*)

Bigger regions present an even more serious policy challenge than small regions due to political pressures to produce tangible results. Failure to show evidence of success in Auckland, where 36% of businesses reside, is unacceptable in the long run, and there is a risk that political pressures will result in the dilution of programme criteria (e.g., by allowing local authorities to obtain funding for separate projects that would benefit them individually rather than the region). However, it has to be considered that **programme funding has provided asymmetric incentives for different regions**. If population figures or contribution to national GDP are taken into account, the Auckland region could arguably make claims for funding at multiple levels of what is currently on offer. What represents generous funding for some small regions may not provide sufficient incentives for businesses in Auckland.

It also raises issues over the **incentive structures of the current programme toolset**. Businesses are likely to find the **partnership approach cumbersome** at the best of times, but **compliance costs** incurred from extensive consultations will prove a **serious barrier to business participation** if the ultimate outcome does not promise clear (commercial) benefits from broader regional co-operation through the RPP. It may not be accidental that businesses in those large regions have participated in the comparatively poorly funded cluster programme but have shown little interest in the RPP. Initiatives that might be most acceptable to local authorities and can serve as a lynchpin for consensus may not be the kind of activities that can attract particularly those larger businesses whose presence would maximise the economic impact of partnerships. (*Op.cit, pg. 14*)

Closely interlinked in promoting regional innovation, though, the two policies may contradict each other. For, while the primary goal of regional policy is catching up and cohesion, the rationale of innovation policy is efficiency and competitiveness. "Inherently they comprise different policy positions: one is about winners and losers, while the other is about redistribution." This conflict between two rationales in a single program is often blamed for the **lack of clear success of the Structural Funds in fueling innovation** in lagging regions such as Burgenland, an Objective 1 region in Austria. Also, one may encounter the **fundamental dilemma of innovation, or "innovation/polarization dilemma."** That is, innovation may not only improve the employment and income opportunities, but also cause job redundancies which work against social cohesion.

The **potential conflict** between **regional policy** and **innovation policy** reveals more clearly in spatial terms. Whereas balanced spatial development is needed for a cohesion purpose, **innovation tends to require and give rise to spatial concentration**. That is, regional policy aims to balance spatial disparity by supporting innovative activities in lagging regions, yet innovation entails close interaction between the related actors to form "poles of excellence" and hence spatial concentration. An image of European space with **central nodes** and, in particular, the so-called "**pentagon**" of **London-Paris-Milan-Munich-Hamburg** as its competitive corners is therefore juxtaposed with an image of cohesive and balanced European space. The EU's efforts to strike a balance between the agglomerative pull of the "Pentagon" and the goal of territorial cohesion and balanced development by strengthening a "polycentric network," however, does not look promising. (*Regional innovation policy of South Korea, pg. 5*)

A danger with **territorially embedded regional innovation networks** concerns its ability to sustain the competitiveness of the firms in the system/region. For example, Asheim & Isaksen (1996) maintain that it

is doubtful whether a territorially embedded regional innovation network is capable of avoiding lock-in situations by breaking path dependency and changing technological trajectory. **Lack of co-operation** with knowledge organizations may result in that firms are unable to catch up with new technologies and new knowledge. **Close co-operation with research universities facilitates necessary industrial transformations when new technologies, etc, are introduced.** Similarly, Asheim & Isaksen (2001) stress that the majority of firms do need access to universal knowledge (from e.g. national systems of innovation). This is especially true for SMEs. Thus, **it is not possible to fully rely on localized learning and tacit knowledge** (as well as localized, codified knowledge) must in many cases be **complemented with formal R&D-competence**, (Asheim & Isaksen, 2001). This suggests that for this type of RIS, it is important that the regional actors develop external linkages and not only cooperate intraregionally. **(Regional innovation systems in small & medium-sized regions, pg. 14)**

Firstly, it seems clear that for **regional innovation policies** to be meaningful the regions in question must already have either one or several clusters of SMEs or one or several larger leading companies surrounded by clusters of suppliers and/or customers.

Secondly, since most small and medium-sized regions do not have public research institutions, developing strong **links to research universities in other regions** are of paramount importance.

Thirdly, for those small and medium-sized regions that have one or several institutions of higher education it is important to take special measures to **adapt the educational profile** to fit with the needs of the regional innovation networks.

Fourthly, problems to recruit qualified personnel seem to hamper the regional innovation systems in many small and medium-sized regions. **Special measures** may often be needed to **facilitate the recruitment of qualified personnel**.

Fifthly, since RIS to a large extent function via **collective learning** it is necessary to improve existing arenas and meeting places and also **create new arenas and meeting places**.

Sixthly, because many innovations are best realized within new firms it is vital for the regional innovation systems to offer broad **support to new entrepreneurial ventures**.

Seventhly, as conditions in **each region have unique traits**, it is necessary to base all regional innovation policies upon careful studies of the existing regional innovation systems, the way they function as well as their weaknesses.

Eighthly, administrative and functional regions normally do not coincide. Since the functional **region is the relevant region** from an economic point of view, it is therefore of great importance to see to it that regional innovation policies are formulated and executed for functional regions. **(Op.cit, pg. 21)**

There is a growing awareness among regional authorities that the economic growth and competitiveness of their regions depend largely on the **capacity of indigenous firms to innovate**. Offering the appropriate support to indigenous firms to become more competitive through innovation is a rising star on the regional policy agenda. Policy-makers at local and regional levels are formulating regional technology strategy, which sometimes is embedded in their economic development policies, and sometimes is separate from other policy domains. There is a clear need for support in the design of regional innovation policies, both from an analytical perspective and based on experiences and best practices in regions around the world.

There are several **issues at stake**.

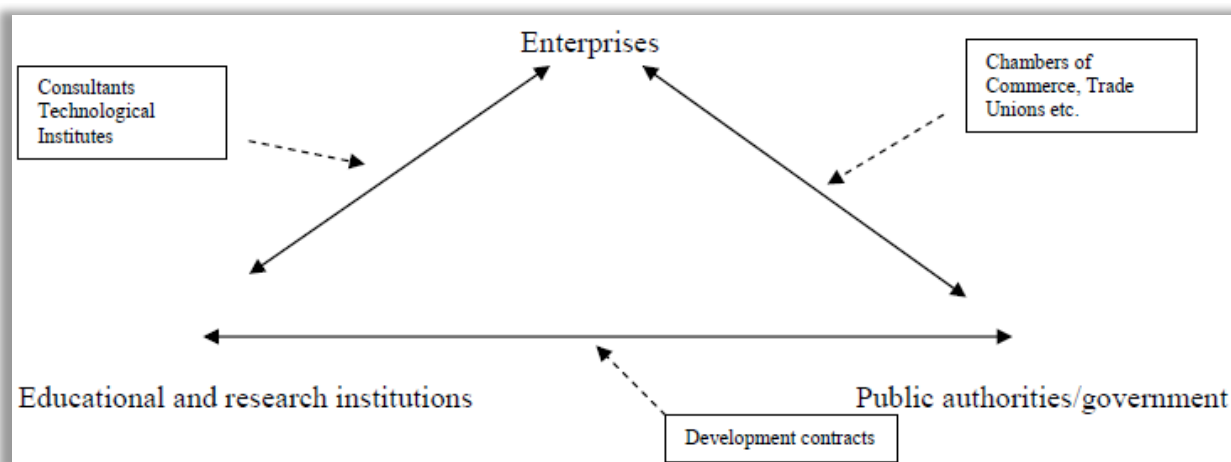
a. Regional authorities **do not have access to the full-scale innovation policy instruments** available on the national or supranational (e.g. EU) levels, because of limited budgets and responsibilities.

b. It is only a recent phenomenon that **regional policy-makers are developing strategic technology plans**, and so they have not been able to gain much experience or establish best practice yet. Many regional initiatives are individual projects, without a coherent policy back-up.

c. Very often the innovation needs of the firms in the region have not been systematically assessed. This results in an **insufficient interaction between industry and the innovation support system**. The effectiveness of the innovation support system, in terms of its economic contribution to growth, may be improved when this mismatch is overcome. **(Strategies for regional innovation systems, pg. 17)**

In this non-linear approach to economic growth, innovation and entrepreneurship has become one of the crucial growth-drivers, at least in a public policy perspective. Much attention has been on the nature of

innovation, on the conceptual frameworks of the systems of innovation, and on the most appropriate policy set up, but also policy initiatives to stimulate entrepreneurship has been taken. **A central part of the former is the business advisory systems**, since they are pivotal with regard to the transformation of innovations from the knowledge sector into innovative activities within the firms, in particular with special attention to small and medium sized enterprises. The main aspects addressed deal with entities and relations of the innovative environment. The focal point is the **interaction between the analyzed business entity and the external environment** as a part of a broader network of innovative relations covering intra-firm as well as extra-firm relations and processes. (*Aims and strategies in regional innovation and growth policy – A Danish perspective, pg. 2*)



Within the framework of the **above sketched triple helix**, special attention has to be on dissemination and in particular the ‘broker function’ of the advisory system as a ‘go between’ between the companies and the knowledge sector. A similar role is played by chambers and professional organisations (interest organisations) with regard to the business community and the public authorities on the national and regional/local level. Also within the third leg of the triple helix new modes of relations are appearing, i.e. development contract between universities and the government aiming to link funding to the fulfilment of negotiated performance benchmarks. (*Op.cit, pg. 8*)

The innovative capacity of the regional firm is related to the ‘learning’ ability of a region. That is, innovative capacity and the regional ‘learning’ ability associated with it are shaped by the density and quality of networking within the regional productive system. Inter-firm and public-private co-operation (particularly between research organisations, government and industry through complementary investment in R&D and innovation-related activity) and the institutional framework within which these relationships take place are assumed to be key sources of regional innovation. Innovation is viewed as the ‘end-product’ with regional learning dependent on the quality and density of the above relationships, being viewed as the ‘process’. **The ability of a firm or region to learn is also shaped by its absorptive capacity**, which may be defined as the ability of a firm or region to assimilate and utilise knowledge. Absorptive capacity depends on the internal capabilities of a firm and region and existing stocks of knowledge. Thus, absorptive capacity results in cumulative causation in learning and innovation. (*Innovation Policy Position Paper, pg. 9*)

PPP then can be an **expression of regional preferences and a manifestation of the political will of government authorities.** For each service, local and regional governments need to make pragmatic decisions based on their own circumstances. The principle of local and regional self-government enables local and regional authorities to decide democratically the best means of delivering local public services, including decisions to use companies they own or control. In such an environment regional innovation policy to a considerable degree means moderation and stimulation of processes and brokerage of ideas to give incentives for cooperation to the most important and competent agents in a region. To avoid competition-law issues which might be particularly severe at the local level a proper balance between, on

the one hand, local self-government and subsidiarity, and on the other, the rules of competition that need to apply in the European interest has to be found. A more decentralised approach to PPPs is expected to increase the focus and accountability and to involve agencies with a more narrow range of objectives (McQuaid, 2000). PPPs which are established at the regional level will favour interventions designed for specific needs of regions (or sectors) and will allow more targeted interventions (Silva and Rodriguez, 2004). In addition to catering different regional preferences, **decentralisation may also increase effectiveness and efficiency; accordingly, growth of PPP might occur mainly at the local and regional, rather than national levels. (The role of public private partnerships at the regional level of government and regional innovation policy in particular, pg. 6)**

(C) Recommendations

To achieve a sustainable regional development and growth most regions in Europe have to embark on a process to find a new place in the global division of labor. **Strategies may differ from region to region depending on regional and national peculiarities**, but a **common denominator** is that they have to **extent their value chain**, both **upstream** (i.e. production planning and management rather than physical production, or design of new products and services) and **downstream** with regard to marketing, sale and logistics. A sustainable strategy has to be comprehensive covering all four aspects of innovation. One way to enforce this process is to stimulate the linkages sketched in the 'Triple Helix model', in particular between the knowledge sector and the business sector.

Essential results are:

- **Integrated and holistic systems for regional growth** addressing all growth drivers are important for the implementation of a regional growth policy
- **Focus has to be on knowledge transfer and dissemination** addressing both existing form and new start up's
- Particularistic structures (both geographical and organizational) has to be avoided
- **Functional linkages** are more important than **geographical linkages**
- **Policy measures must fit customers** with regard to sector, size (SME) and experience of the target firms (i.e. new start up's). (*Aims and strategies in regional innovation and growth policy – A Danish perspective, pg. 19*)

Regional innovation policy is best based on the **knowledge stock** that is available to policy makers via the scientific knowledge provided in **publications on this topic**. In this paper, we showed how this published scientific knowledge could be put to use with the help of the concept of evolutionary innovation policy developed earlier. Regional innovation policy can improve a lot by using this method, as regions are parts of socio-economic systems, which evolve in ways that cannot be fully anticipated. These dynamics pose a challenge to policy makers, who have to devise a framework that needs to co-evolve with the regional socio-economic system. With the help of the method used here structural regularities in regional dynamics can be distinguished from chance elements and can be regularly updated. (*An Assessment of the Regional Innovation Policy by the European Union based on Bibliometrical Analysis, pg. 18*)

Innovation policy can be largely covered on the national and even supra-national level. The so-called **subsidiarity principle suggests that policy should take place as close as possible to the citizens, i.e. if possible and sensible on the regional level**. The discussion on regional innovation systems as well as the structural regularities found on regional dynamics provide another reason to implement innovation policy on the regional level. This is because distinct processes, which can be influenced by policy measures, can be identified on the regional level. Published scientific knowledge plays a pivotal role in implementing regional innovation policy in a dynamic context. Not only can structural regularities serve as a yardstick for policy but also can **policy makers update their policy based on newer findings in regular intervals**. We show by way of example with the help of EU regional innovation policy that structural regularities can serve as guidelines for actual policy – not in the sense that structural

regularities would suggest specific policy measures but in the sense that actual policy can be assessed. **(Op.cit, pg. 19)**

Even when modern ICT (electronic mail, video conferencing etc.) would allow for clusters that are not geographically defined, **most clusters tend to be spatially bounded and able to be defined as innovative regional clusters**. According to Cooke (1998b), “*the innovative regional cluster will consist of firms, large and small, comprising an industry sector in which network relationships exist or can be commercially envisaged, research and higher education institutes, private R&D laboratories, technology transfer agencies, chambers of commerce, business associations, vocational training organizations, relevant government agencies and appropriate government departments. This constitutes an integrative governance arrangement.*” This definition can be summarized into a general list of essential key features, the presence of which implies the existence of an innovative regional cluster:

- Public and private sector *R&D* in the industry,
- active *supply chains* from assemblers to systems and parts,
- public and private sector *training* centres and partnerships,
- demanding intermediate and final *customers*,
- a core industry *sector*,
- a public and private sector *support infrastructure*,
- *related industries* within the region,
- *support industries* within the region and
- *promotion* of the regional specializations. (Cooke 1998b)

(Banking regional innovation policies: DEA-based benchmarking in a European setting, pg. 15)

The role of universities is attributable to two key effects they have. **First of all, universities provide basic science, the research and technology to feed innovation** and often engage in cooperation with private businesses. **Secondly, they bring in talented students, building up a local competent workforce** to exploit meanwhile heightening the region’s attractiveness. While being ample sources of knowledge and R&D –assistance, the latter effect of universities is something that dedicated research institutes alone cannot provide. **(Op.cit, pg. 20)**

Innovation, especially pure technological innovation, requires a high level of understanding of the subject, which is provided by a functional education system that provides the region with a supply of highly trained professionals, constituting the **human resource base critical to innovation**. The level of renewal and adaptation of the regional skill base to shifting demands is measured by participation in life-long learning. To enable wide ranging technology transfer and education benefiting from cutting-edge science, a strong academic presence, depicted through the total amount of R&D personnel, is vital. **(Op.cit, pg. 39)**

Complete regional innovation systems also involve co-operation in innovation activity between firms and knowledge creating and diffusing organisations, such as universities, colleges, training organisations, R&D institutes, technology transfer agencies, business associations, finance institutions etc. These organizations house important know-how, train labour, provide finance etc. which support regional innovation. Thus, regional innovation systems consist of **(i) firms of region’s main industrial clusters**, including their support industries, **(ii) ‘supporting’ knowledge organisations**, and **(iii) interaction between these actors**. This conceptualisation of regional innovation systems corresponds with the one found in Cooke et. al (2000). In their words any functioning regional innovation system consists of **two sub-systems: (i) the knowledge application and exploitation sub-system**, principally occupied by firms with vertical supply-chain networks; and **(ii) the knowledge generation and diffusion sub-system**, consisting mainly of public organizations. **(Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy, pg. 7)**

The first step to strengthening firms’ innovation activity in ‘fragmented’ regions may be to improve relational assets that can lead to **closer collaboration between regional actors**. Asheim (1998) refers to empirical studies demonstrating that trust and co-operation between regional firms can be intentionally created. An important strategy in that respect may be the development of regional ‘club goods’, which are

assets that are accessible and beneficial to specific groups of firms and organisations in a locality, and which sustain the collective learning capability of regional clusters (Lagendijk 2000). Relevant policy tools may be to **invite and engage firms and knowledge organisations collectively in helping to formulate a regional innovation strategy, to create other nodes for local cooperation and collective organisation**, as well as to **provide bridges** between firms and technological and knowledge resources. (*Op.cit*, pg. 10)

At least two major policy initiatives may be important in order to enable 'fragmented' regional clusters like the Arendal ICT industry to 'climb up the hierarchy' in Table 1. A first proactive task is to increase co-operation between local firms in order to form regional innovation networks and increase collective learning and the competitiveness of local firms. When one or a few large firms dominate the local industry, this task may take the form of upgrading local suppliers from being 'jobbers', that produce according to detailed instructions, to being 'co-makers', that take part in the innovation and engineering process of their customer. As revealed by data from the **Eurostat Community Innovation Survey**, the most important external sources in firms' innovation performance are **partners along the value chain**, and in particular clients and customers. Thus, **inter-firm relationships** may be the best way to improve the **innovative capabilities of local firms**. This may, however, be a difficult task in areas dominated by TNCs. Indeed, corporate subcontractors are often assumed 'to develop no local collaboration that might inspire "learning" and instead remained tied to their partners in other locations. This analysis significantly undermines the idea of using corporate branches to kick start learning processes in backward and declining regions' (Vatne and Taylor 2000: 14-15). The Ericsson case reveals a need to qualify such a statement as a general conclusion as this corporate R&D department certainly is involved in local learning processes.

The next and more reactive task is to **bind the units of Transnational Corporations (TNCs) more strongly to a local industrial milieu**. The upgrading of local suppliers may also be important in this respect. **Deliberate initiatives to create and upgrade local knowledge organisations and develop regional 'club goods' may further embed units of TNC**. TNCs may then find it profitable to maintain some activities, and some innovative activities too, in what may become a dynamic regional innovation system. The local unit of a TNC may also have a stronger likelihood of **winning the intra-firm struggle for additional activities and investment when located in a knowledge-intensive cluster**. It will then have access to a competent work force and specialised local expertise, proximity to knowledge and training organisations, and new ideas and economically useful knowledge can come about through contact and co-operation between e. g. skilled workers, engineers and researchers. Corporations may **tap the knowledge base** of such a region, i.e. the knowledge intensive region becomes a **'listening post'** for relaying back product development and marketing information to the TNC. Such a role may be especially important in new industries and in unstable external environments since 'when the content of knowledge is changing rapidly only those who take part in its creation can get access to it'. (*Op.cit*, pg. 17)

Regional innovation policy based on related variety avoids such dangers of picking-the-winner-policy, because each region is made part of it. To say that almost each region has innovation potential is, however, not to say that all regions are considered equal. On the contrary, there is a strong need to account for a variety of innovation potentials between regions, as the Dutch study mentioned above confirmed. Therefore, it would be **wrong to apply a 'one-size-fits-all' policy, such as copying best practices like Silicon Valley or neo-liberal policies**. It would also be **wrong to start from scratch**: effective policy making requires localized action embedded in, and attuned to the specific needs and available resources of particular regions, as the concept of related variety emphasizes. It is the regional history that determines to a large extent available options and probable outcomes of policy making (LAMBOUY and BOSCHMA, 2001). It means one should take the knowledge and institutional base in a region as starting point when broadening the region's sector base by stimulating new fields of application that give birth to new sectors. Accordingly, there is a need for **tailor-made policy strategies, geared towards specific potentials, and focused on tackling specific bottlenecks in regions**. As a result, regional policy needs to evolve, capitalising on region-specific assets, rather than selecting from a portfolio of specific policy models and recipes that owed their success in different environments.

(Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases, pg. 17)

Long – term central government organization and attention

The central level innovation policy makers were able to organize a central (government) level network of interlocking ad hoc committees of central level actors (politicians and administrators). This continued central level organization enabled the push and guidance which was needed to keep the process going, and on the table of the government. In this way, the inherent weakness of the Norwegian policy-administrative system when it comes to central (government) level coordination, the weak position of the ministers within the ministries, and the strong position of public officials defending sectors, was successfully overcome. The manifestation of this success was the Government Conference February 10th 2004, where several ministers gave their own, personal interpretation of what innovation policy was to them, and their sectors. **(Development of the entire country: Regional and innovation policy coordination in Norway, pg. 14)**

The Bill emphasizes several regional policy strategies and the most important are:

- A stronger emphasis on regions and centres that display a potential for growth.
- Give priority to measures that can strengthen the capacity for innovation and enterprise in all parts of the country.
- Delegate and decentralize more responsibility for policy measures targeting regions and districts to the regional and local level.

The strategy will promote restructuring, innovation and entrepreneurship and specially pursue a policy that enables young people and women to make use of their resources. The main target group for measures focussed on the business sector is the potential entrepreneurs. The government has also attached importance to a development of regional business and innovative milieus, networks, co-operation between R&D institutions and business, to promote entrepreneurship, new business start-ups and spinoff firms. **A key strategy is to create an environment for regional interaction for business and industry and their customers, suppliers, labour supply and knowledge creators.** The basic idea is that **regional centres will act as hubs for regional networks and innovation** and those peripheral areas will be able to connect to these innovation systems. **(Op.cit, pg. 23)**

The study showed that R&D subsidies are a suitable policy measure for stimulating regional innovation efficiency. It provided empirical evidence that policy can help regions with low innovation capacities (rural regions) by subsidizing inter-regional cooperation involving partners with varying industrial and sectoral backgrounds. In contrast, **regions with large innovation capacities (urban regions) are best supported with continuous and moderately increasing grants for cooperative projects.** The choice of cooperation partners is also crucial in this respect inasmuch as cooperative R&D subsidies need to establish inter-regional links between organizations with related knowledge and skills.

While the study can be seen as complementary (regional) approach to firm-level studies, it highlights that there is **more to R&D subsidies than just the monetary benefits.** Interestingly, non-cooperative subsidies have not been found to impact regional innovation efficiency, which has similarly been reported by Fornahl et al. (2010) concerning firms' patenting activities. However, this differentiation between cooperative and non-cooperative R&D subsidies is rarely being made in studies investigating subsidies' effects. Even more important, with respect to the data used in this paper, **non-cooperative subsidies still account for about seventy percent of all granted projects and the sum spend for non-cooperative subsidies is about five-times larger than what is invested into cooperative projects.** However, while influential, cooperative subsidies are not solely beneficial but may induce negative effects as well. In this respect, the present study calls for more attention on this subject in future research. The latter point particularly applies to the impact of R&D subsidies on regional innovation performance. Although panel data was used, the empirical analyses cover only a limited time period. The emergence and evolution of regional innovation structures are long-term processes that may encompass different phases (Rees, 1979). Varying types of support programs might be crucial at particular phases ranking these developments. In light of the importance of informal networks in the early stages of

technology evolution (Niosi and Banik, 2005) a greater importance can be assigned to **policies focusing on intra-regional network building** in these phases. In later stages, the prevention of lock-ins might be the crucial issue (Grabher, 1993), which rather requires the support of inter-sectoral and inter-regional cooperation. **(Do cooperative R&D subsidies stimulate regional innovation efficiency, pg. 22)**

Strategic intelligence is needed to identify the **high value-added activities** which offer the best chance of strengthening a region's competitiveness. To have most impact, R&D and innovation resources need to reach a critical mass and to be accompanied by measures to increase skills, education levels and knowledge infrastructure. National and regional governments should, accordingly, develop smart specialisation strategies to maximise the impact of Regional Policy in combination with other Union policies.

Smart specialisation strategies can ensure a more **effective use of public funds** and can **stimulate private investment**. They can help regions to concentrate resources on few key priorities rather than spreading investment thinly across areas and business sector. They can also be a **key element in developing multi-level governance for integrated innovation policies**. Moreover they have to be closely linked with other policy domains and require an understanding of regional strengths relative to other regions⁵ and of the possible gain for inter-regional and trans-national cooperation. **(Regional policy contributing to smart growth in Europe 2020, pg. 7)**

Innovation clusters for regional growth

Clusters - geographic concentrations of companies, often SMEs, which interact with each other and with clients and suppliers and often share **a pool of specialist labour, business and financial services, R&D and training facilities** – are an important element in smart specialisation strategies. They provide a favourable environment to foster competitiveness and drive innovation. Support for their development needs to be concentrated on areas of comparative advantage. **(Ibid.)**

Innovation-friendly business environments for SMEs

A thriving SME sector is essential for growth, jobs and innovation and so for cohesion. SMEs are central to the EU economy: some 20 million of them account for almost 60% of value added and two-thirds of employment in the private sector. Over 92% are micro firms employing fewer than 10 people. Regional and national authorities should thus support innovation-friendly business environments to assist SMEs, R&D intensive ones especially, and the creation of new firms. The ex-post evaluation of the ERDF in 2000-2006 found that though support allowed creating at least one million jobs and increasing investment in research and innovation, there is **a need to make more extensive use of loans, equity finance and other forms of financial engineering.** **(Ibid.)**

Lifelong learning in research and innovation

Many universities in the EU are helping to commercialise research by **increasing the entrepreneurial mindset of students** and by **collaborating with regional firms** in innovation, so becoming more strongly involved in regional economic development. More cases of this kind are needed.

The **European Institute of Innovation and Technology** is the first initiative aiming to boost the EU's competitiveness by fully integrating higher education, research and business (the Knowledge Triangle) to generate and promote innovation of world-class level and impact. The EIT has thus an important contribution to play in the European innovation landscape. Education, training and lifelong learning, as referred to in the Europe 2020 flagship 'Youth on the Move' and in the "New skills for new jobs" initiative, are vital to developing regional capacity to innovate. Focusing school, vocational and higher education curricula on **transversal competences** like **creativity, entrepreneurship** and initiative will help young people to develop their full potential for innovation. More projects to support effective cooperation between all types of education, training institutions and businesses should be promoted by the ERDF. **(Ibid)**

Attractive regional research infrastructure and centres of competence

Research infrastructure is central to knowledge-based innovation systems. A three-pronged approach is needed to help regions to realise their full potential: **(i) develop world-class research** and ICT

infrastructure, building on existing regional scientific excellence through Structural Fund support, (ii) **establish networks of research facilities for less research intensive countries** and (iii) **develop Regional Partner Facilities (RPF)**. The further development and use of ICT-based e-infrastructure to interconnect and facilitate collaboration between geographically dispersed research teams and the sharing of scientific resources and knowledge is a key means of doing this. National and regional authorities should consider, in particular, how EU Regional Policy can contribute to the 2015 objective of the Innovation Union flagship of completing or initiating 60% of the research infrastructure currently identified by the European Strategy Forum on Research Infrastructures (ESFRI). (*Op.cit*, pg. 8)

Creativity and cultural industries

The capacity of the EU to recover from the crisis and meet longer-term challenges rests not only on a strong industrial base but on the creativity and skills of people, governance and strong social values – solidarity, respect for the environment, openness and cultural diversity. Cultural and creative industries, which flourish at the local and regional level, are in a strategic position to link creativity and innovation. They can help to boost local economies, stimulate new activities, create new and sustainable jobs, have important spill-over effects on other industries and enhance the attractiveness of regions and cities. **Creative industries are therefore catalysts for structural change** in many industrial zones and rural areas with the potential to rejuvenate their economies and contribute to a change of the public image of regions. They should be integrated into regional development strategies in order to ensure an effective partnership between civil society, businesses and public authorities at regional, national and European levels. (*Ibid.*)

Digital Agenda

The Digital Agenda aims to deliver sustainable economic and social benefits from a digital single market based on fast internet applications and open up access to content on line. Regional Policy support for broadband in 2000-2006 and 2007-2013 has helped to reduce the gap in take-up between sparsely and densely populated regions from 67% in 2004 to 24% in 2008 and the gap in broadband coverage between rural and urban regions from 33% in 2004 to 28% in 2007. But gaps still remain particularly in rural areas: 94% of Europeans are covered by broadband networks but only 80% of the rural population.

Many regions are **still struggling to invest ERDF funding allocated to ICT** (around 4.4% of the total) due partly to a lack of planning capacity. Greater leverage of private investment in ICT is also needed to offset budget constraints on public expenditure. With regard to the significance of ICT for the innovation system, member states should consider how to better use the ERDF to accelerate achievement of the EU 2020 objectives for broadband access including total coverage, making use of the different technologies (fibre, adsl, wireless, satellite) available to suit the diverse geographical needs and challenges of different regions across the EU. (*Op.cit*, pg. 9)

Public procurement

Public procurement is a key driver of innovation since it can help innovative firms speed up market introduction of innovations and return on investment. Innovative public procurement means the public sector taking on the role and risks of a lead customer, while improving the quality of its services and productivity. Procurement budgets should include pre-commercial type procurement as well as Innovation Partnerships. The Commission will provide guidance and support to stimulate the process, including a legal framework to facilitate joint procurement between contracting bodies from different Member States. Such processes are developing in regions included in the 'Regions for Economic Change' initiative and need to be mainstreamed into the Operational Programmes. (*Ibid.*)

Regional Policy addressing the grand challenges through European Innovation Partnerships

Some societal challenges make a major co-ordinated approach at EU level necessary in order to find and deploy effective solutions. Those identified in Europe 2020 include climate change, energy and resource efficiency, raw material scarcity and demographic ageing. The Innovation Union includes a number of **European Innovation Partnerships** to tackle specific challenges by providing the means of pooling resources and bringing together all key actors as well as relevant policy instruments at EU and national

level in pursuit of common goals. Regional Policy should continue to address these challenges and ways need to be found of integrating the Partnerships concerned into its implementation. (*Ibid.*)

In order to sustain long-term regional development, it is essential for **regions to transform and renew their economic base** (Pasinetti, 1981; Saviotti and Pyka, 2004; Martin and Sunley, 2006). One reason for this is that the regional knowledge base may become standardized (i.e. explicit and codified) and, therefore, may lose its unique value to local firms (Maskell and Malmberg, 1999). Another reason is that networks between (local) firms may become too close and inward looking, as explained above. Some claim that strong networks are beneficial for activities of exploitation, but may be less suited to exploration (Nooteboom et al., 2007). Regions may have a number of options to restructure their economies in the long run. A sustainable option is to diversify regional economies into new fields while building on regional assets. The long-term development of regions may depend on their ability to develop new sectors or new market niches that have their roots in the current regional knowledge base. It means that regional economies should branch into new directions rather than start from scratch when they diversify, and related variety may be a key source for that. (*Evolutionary economic geography and its implications for regional innovation policy, pg. 8*)

Knowledge will spill over more intensively when regions are endowed with related industries that share a knowledge base. Related variety favors economic branching in regions through spinoff dynamics, labor mobility and networks. Because these mechanisms **transfer knowledge across sectors and between old and new sectors** mainly (but not exclusively) **at the regional level**, they contribute to a successful process of regional diversification. Due to the systemic nature of innovation processes, regions also require a critical mass of organizations that meet the following conditions: (1) they have to be well connected, enabling flows of knowledge, capital and labor; (2) these ties should not be, however, too strong, and not too focused on the region, avoiding problems of lock-in; and (3) local organizations and institutions must be flexible and responsive to new circumstances, overcoming inertial tendencies due to habits, routines and path dependency. (*Ibid.*)

Regional innovation policy could also play a role in **encouraging labor mobility**. As noted before, it is a crucial mechanism through which skills and experience are transferred from one local company to the other (Camagni, 1991). Since most labor mobility takes place at the regional level, policy promoting labor mobility may enhance knowledge transfer and innovation at the regional level. Since labor mobility may take away the incentive of firms to invest in their personnel, **public policy should invest heavily in education and life-long learning**. Aghion et al. (2006) argue that flexible labor markets are required to lower the costs of the process of creative destruction. It should, however, be complemented by a policy of life-long-learning. If not, individuals do not have the capability to confront new changes and to move from one job to the other. (*Op.cit, pg. 22*)

Another crucial policy measure is to **encourage the immigration of skilled labor** because it may bring new ideas and related knowledge into the region. One way to achieve this is through international exchange programmes for students. Incoming students bring in new talents and skills from abroad, and combine these with new skills that are acquired in high education institutes in the host country. If the host country is capable of maintaining this group of high-skilled students after graduation (policy can most certainly play a role here), they will contribute to the economy as skilled employees or as founders of new firms.

Outgoing students will acquire new skills in research and education institutes abroad, and may return to their home region after a while, where they will exploit their newly acquired skills in an environment they are familiar with (Saxenian, 2006). Policy could target those outgoing groups and provide incentives to return to their home region.

Another policy option is to **stimulate networks as effective settings through which knowledge circulates and interactive learning takes place**. As stated before, policy makers may act as intermediaries or knowledge brokers, or establish policy platforms that facilitate knowledge to spill over and diffuse from sectors to related ones. In doing so, policy should avoid that vested interests of established firms take over and dominate these networks, and deny access to small firms and newcomers. In a similar vein, competition policy could aim at stimulating the establishment of network alliances or mergers

between related industries as a way of diversifying regional economies into new but complementary fields of activity. **(Op.cit, pg. 23)**

Defining an Innovation Strategy for a Region

Investment in innovation, education and resource-efficient technologies, will benefit traditional sectors and rural areas as much as it will high-skill service economies, and will therefore reinforce economic, social and territorial cohesion. The cities and regions should pursue smart and sustainable specialisation by defining a few innovation priorities based on the EU objectives and on their needs as their Regional Innovation Strategies. These priorities have to be identified with all social and economic partners. Coherent policy portfolios of policy instruments have to take into account both regional situations and specific SME needs in terms of innovation. The regions should always keep in mind their strength in order to make best use of the regions comparative advantage in a global competition. There is no “one size fits all” solution. Regional differences in innovation capabilities call for a tailored mix of policy instruments. **(Innovation policy at the regional level, pg. 3)**

Business Clusters and Networks for example encourage innovation in SMEs. The existence and the development of business clusters and networks with specific competences create positive spill-over effects for innovation, especially for smaller enterprises. The development of such clusters and networks should be managed by regional institutions and publicly supported by related training facilities. In areas that the different Member States cannot manage on their own or that have a European dimension (e.g. energy, climate, environment, space technology) the **Commission should bundle her resources and look for European wide solutions**. However, any support for such networks and clusters has to be designed in a way that also SMEs can profit from them.

The **added value of cohesion policy**, particularly to small and medium-sized enterprises, could be in offering **easily accessible support and the necessary infrastructure** as well as providing improved access to research and the transfer of technology and innovation, oriented towards practical application. The existence of high quality innovation support services is especially crucial for SMEs to increase their innovation capacity and has to become an integrated part of each regional innovation strategy. For example, accompanying innovative projects through intermediary organisations could offer advice and support for SMEs by specialised advisers, reinforcement the cooperation between the different actors at regional, national and EU level (SMEs, universities and research centres etc.) and encourage an innovative culture in SMEs. Examples can be found for instance in France. **(Op.cit, pg. 4)**

Regional innovation policy should, however, not be formulated based on off-the-shelf, ‘best-practice’ solutions drawn “from the experience of successful regions or some expert manual” (Amin, 1999, p. 371). But through the regionalization of innovation policy more accurate consideration can be paid to the region’s specific context and circumstances in terms of the industrial structure, institutional set-up and knowledge base. Thus, it contains the potential for innovation policy to be more focused by providing support that is needed given the demands generated by industrial specificities. In this the distinction between analytical and synthetic knowledge and its important consequences for innovation policy are an example of such sharper focus that can be catered for at the regional level. Notwithstanding this, regionalization should not be understood as regionalism by neglecting the embeddedness of regions in a national and trans-national framework. **(Knowledge bases and regional innovation systems, pg. 8)**

The **‘Open Innovation’ concepts** must be embraced by businesses in the region to increase productivity and also for competitiveness in global markets. The requirements for successful networking should not be underestimated and business to business cooperation (supply chains, customers and cross sector activity) needs to be fostered. Businesses need to extend their sources of new knowledge and this should be broad **‘Knowledge Exchange’** rather than just **‘Knowledge Transfer’**. Access to finance is a fundamental requirement for entrepreneurs and businesses to develop and market innovative concepts. There are many stages required in this development but ‘Proof of Concept’ funding is an essential early component.

Innovation is often the driver for business formation or for business growth both of which have particular demands on available finances. At this critical stage there can be a gap in understanding of businesses and fund managers perceptions of 'suitable' funding. Closing this gap is essential preparation for the business to be 'Investment Ready'. (*Northwest regional innovation policy*, pg. 25)

Regional Development Agencies (RDAs), the primary actors to promote regional economic growth and innovation, continue to evolve. The Sub-National Review of Economic Development and Regeneration (July 2007) proposes to strengthen the capacity of local governments to implement economic development with greater involvement in influencing, scrutinising and implementing the Regional Economic Strategies. There has also been a gradual transition of RDAs from a delivery vehicle for national programmes to strategy development bodies with, pending legislation, spatial planning responsibilities. RDAs and local partners should consider a programme to develop capacity and capability on innovation policy and support, and to learn from best-practice internationally. (*OECD Reviews of Regional Innovation: North of England*, pg. 3)

The current strategy development process is comprehensive with attempts to align innovation across different aspects of the Regional Economic Strategies. However, alternative mechanisms are required beyond the current structures to bring in more firm perspectives and to cultivate innovation leaders (both public and private).

Some considerations for current innovation strategies include:

- The **"narrow" science-focused definition of innovation** used in regional innovation strategies reflects the historical national approach, which has recently expanded to a "broader" definition. There may be opportunities to move beyond the current science-focused approach of the Science and Industry Councils (regional advisory councils) without diluting their role as a sub-national voice for supporting science.
- **Strengthening multi-disciplinary links given the nature of innovation** in the fields where the North has strengths. Several Scandinavian countries offer examples in this area.
- **Communicate more clearly to national and international stakeholders on niches of success.** This could be achieved through more national-level mechanisms for recognition, as described above, or through other regional vehicles.
- **Better serve firm needs by a greater focus on the demand side** for services to firms, as opposed to the supply side of higher education institutions (HEIs) which appears to receive a strategic over-emphasis in plans and instruments for increasing innovation activity and private R&D investment.
- **Include support for innovation in services not addressed in the Regional Innovation Strategies.**
- As the North is characterised by a high percentage of employment in public services, this theme could be addressed in the Regional Innovation Strategies. The proposed nationally designated **Innovation Partnerships** could offer interesting **demonstration projects for innovation** in the public sector.
- **Support integration of skills and innovation policy approaches at a regional level** through influence over national skills agencies as well as by helping to attract high-skilled talent in support of regional innovation goals.
- Consider some of the **lessons regarding innovation** and rural areas of relevance to the North, some of which are highlighted in a recent report to the Prime Minister by the Rural Advocate. (*OECD Reviews of Regional Innovation: North of England*, pg. 5)

This thesis has identified a number of enablers that are regarded as conducive to building systemic-ness of the governance dimension of innovation systems. These included the clear allocation of responsibilities; the setting-up of a **virtual one-stop-shop for signposting business support**; the presence of a **lead organisation**; regular **informal contact between stakeholders**; **involvement of external actors**; **diagnostic research**; the existence of a **critical mass of institutions**; and the **quality**

of staff. Yet, they should be read in connection with the case-studies. It is believed that, in particular, the case study of Dortmund entails several positive lessons learned in how an implementation capacity can be built and what different pillars a holistic cluster policy can entail at the sub-regional level of city-regions. **(On the governance of regional innovation systems, pg. 456)**

The presumed existence of a systemic-ness of governance within a regional innovation system gives the impression that the **mere existence of elements is enough**, and that there are no obstacles to the policy process. In reality, the presence of an innovation policy within a region does not mean that a (functioning) regional innovation system is present. Innovation systems must be built around the endogenous strengths of a region, largely by firms. In this respect, the implications are that institutional structures matter, and that, if institutions at the city-region level are provided with the implementation capacity, they can actually undertake a holistic cluster policy. However, **cluster support ought to be at least partly remain to be also regulated at the national or Land level in order to avoid duplication.** One measure to perhaps limit the emergence of too many aspirational cluster types (for fashionable growth sectors irrespective of endogenous strengths) is the organisation of competitive bidding for funding, **(Op.cit, pg. 461)**

Amalgamate Small Regions

There is evidence that the RPP partnerships in **some of New Zealand's regions are too small to be viable and that some partnerships would benefit from amalgamation with adjacent regions.** While this is an important issue going forward, no fundamental change should be imposed from central government, given the partnership development process and the importance of trust and stability. Instead, it is likely that New Zealand Trade and Enterprise (NZTE) – the agency responsible for the operational implementation of regional development programmes - will need to take an active brokering role in convincing partnerships of the merits of working across boundaries to achieve critical mass and a broad regional outlook. The key challenge for policy making is to determine how best to 'incentivise' larger regions. **(Regional development and regional innovation policy in New Zealand, pg. 18)**

Align Regional and National Strategies

Decision-making power as to the co-ordination of regional and national strategies should take place where the key inputs are provided. This would delegate decision making (and funding authority) to an entity at the level where knowledge of involved businesses is greatest. The cluster programme could be a prime example to illustrate this. For clusters that will predominantly have a regional impact and rely largely on regional inputs (skilled labour, business expertise, funding), decisions should rest largely with regional partners, although central government should retain some funding and co-ordination power to ensure national best practice standards are maintained. This would allow close tailoring of funding and skills initiatives (for example, polytechnic programmes) to regional business needs. At the same time, those clusters that are competitive internationally but need to rely on national-level inputs would be co-ordinated at the national level (increasing synergies) and provided with specialist inputs that are only available at the national level in a country of New Zealand's size (e.g., highly specialised research skills). **(Op.cit, pg. 19)**

Not just similar to regional experimentalism, the EU also explicitly urges regions themselves to experiment with new ideas and strategies. The Commission, for example, encourages member states and regions to experiment innovative ideas in building regional innovation system itself, by **spending relatively small amount of resources on an ongoing basis to test new ideas and approaches, and to include experimentation** in their operational programs. According to the Commission, regional experimentation can serve simultaneously as "example" and "catalyst." For regional authorities can persuade other local actors into the process of innovation, making most of the successful experimentation of other regions as examples and best practices. Thus, regional **innovation policy should take risk-taking rather than risk-averse posture**, and try and **support pilot actions** that otherwise would be considered too risky to be implemented. Notwithstanding an evaluation to the contrary, European co-financing and sharing of risk indeed entices regional authorities to instigate new actions on an experimental basis, which creates "an opportunity to open up an 'activity niche' outside traditional procedures and programmes." The inter-regional networks, mentioned above, certainly help share and

learn from each other these experimentation results. (*Regional innovation policy of South Korea, pg. 15*)

Even if the theory emphasizes the importance of knowledge spillovers, it is important that policy makers pay attention to the **balance between private and public dimensions of novelties and knowledge**, i.e. the free-rider problem. Based on a postal survey from 121 manufacturing firms in two Norwegian regions (More and Romsdal), Wiig & Wood (1995) found that the “fear of imitation/risk associated with being first to innovate” was the most restrictive factor to product and process innovations. This implies that too effective policies to generate spillovers can have negative effects on firms’ incentives to innovate. If newly created knowledge goes public after a short time, i.e. becomes freely accessible to everyone, which firm will be willing to bear the cost of developing it? Various rules for patent-regulations and property rights, etc, which prevent from too effective spillovers are most often determined at the national level, but an awareness of the issue at the regional level is nevertheless important.

In sum, a regional innovation policy directed towards the development and improvement of **regional innovation systems should include measures** that:

- **develop regional knowledge providers** and/or link the firms to external knowledge sources.
- **attract skilled labor** and **promote the education of labor**.
- develop an **institution responsible for scanning markets and technologies** for regionally important clusters.
- **promote interaction and collaboration between firms, knowledge institutions and governmental institutions.**
- **promote recurrent contact between businessmen, i.e. develop more formal and planned networking.**
- **secure the supply of venture capital.**

A final point to be made is that policies for regional innovation systems demand an extensive study of the regional economy. As mentioned earlier, each cluster in a region develops its own norms and informal routines. This implies that forms of collaboration and interaction are likely to be different between different clusters within and between regions. Careful considerations and **studies must therefore be made before establishing a general regional innovation policy**. Even if the aims should in many cases be the same, this may not be true for the instruments. (*Ibid.*)

Centrally designed, albeit locally customised, policies can bring about the local institutional and cultural change required for enhancing regional innovative performance. This premise is based, on the one hand, on the idea that the key to local transformation lies in the fields of local cognition, interaction and joint strategy-making. These characteristics can be moulded and nurtured by ‘soft’ measures oriented towards the formation of coalitions, communication structures, and shared visions (Cooke and Morgan, 1998). On the other hand, such ‘soft’ changes can be induced by a set of centrally defined and monitored set of policy measures. In this context, European policies attribute an important role is attributed to crossregional learning geared towards the dissemination and exchange of best practices and productive policy ideas. In the words of the Commission, “**adopting a single development model would be a mistake**. Nevertheless the adherence to some general development principles seems useful, particularly in relation to research and innovation policies”. (*Regional innovation systems in the Lisbon Strategy, pg. 5*)

Based on content analysis of those lists of programmes, a **list of "types of policy tools" relevant for the regional level** was developed which could then be assigned to the objective-based policy dimensions. Further structuring involved the identification of target groups at which the policy measures aim. Therefore, this framework provides a threefold overview of the major technology and innovation policies in Europe: **firstly**, it provides the reader with a **list of underlying policy objectives**, **secondly** it **links those objectives to relevant target groups** in the innovation process, and **thirdly** it **displays policy measures** which are **currently used in different regions throughout Europe**.

According to this toolbox, a distinction can be made between seven broad objectives:

- **Improve innovation governance and strategic intelligence for policy making**
- **Foster an innovation friendly environment**
- Higher education, **human capital development and gender issues**

- **Development of research infrastructure**

- Strengthen innovation including the **protection and commercialization of intellectual property** (including the sub-objectives: strengthen entrepreneurial innovation in the SME sector, industrial policy and strategic technology policy)

- **Encourage technology and knowledge transfer** to enterprises and development of innovation poles and clusters

- **Promote and sustain the creation and growth of innovative enterprises.**

The purpose of the toolbox is twofold: **firstly**, it should **enable policy makers and administrators to quickly and comprehensively assess the broad spectrum of measures under each objective for the different target groups**; **secondly**, it should **point to the necessity of strategic intelligence** (and thus policy learning) for policy making. Under this objective, policy makers are the most important target group. (*The uncertainty in regional innovation policy: Some rationales and tools for learning in policy making*, pg. 8)

We need to better understand and tackle some of the following aspects in order to improve regional policy making in the innovation field:

- **Improve evaluation methodologies of intangibles**, by focusing on the process rather than outputs and building indicators to measure the regional innovation system as a whole, including interactions and networks revealing the social and relational capital of regions.

- **Valorise and diffuse the “tacit knowledge”** on regional innovation policies through tools such as interregional networking (like the existing IRE – Innovating Regions in Europe network, workshops gathering academics, consultants and practitioners at EU, national and regional levels. Through face-to-face exchanges, this knowledge and practice could be shared between “thinkers” and “doers”.

- **Reflect on relevant specific follow-up activities for less favoured regions**, such as **tutoring agreements** with more advanced regions. (*Towards a different regional innovation policy*, pg. 26)