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Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases

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Abstract

The article presents a regional innovation policy model, based on the idea of constructing regional advantage. This policy model brings together concepts like related variety, knowledge bases and policy platforms. Related variety attaches great importance to knowledge spillovers across complementary sectors, possibly in a region. Then, the paper categorises knowledge into 'analytical' (science based), 'synthetic' (engineering based) and 'symbolic' (artistic based) in nature, with different 'virtual' and real proximity mixes. Finally, the implications of this are traced for evolving 'platform policies' that facilitate economic development within and between regions in action lines appropriate to related variety and differentiated knowledge bases.

Keywords; Related variety; Differentiated knowledge bases; Platform policy, Regional innovation policy

JEL: R11, R58, O38, B52

1. Introduction

Concepts like industrial districts (BECATTINI, 1990; BRUSCO, 1990), clusters (PORTER, 1990), innovative milieux (CAMAGNI, 1991), regional innovation systems (COOKE, 2001) and learning regions (ASHEIM, 1996) have stressed the importance of regions as key drivers of innovation. This body of literature claimed that knowledge externalities are geographically identifiable but also unbounded, because geographical proximity facilitates local and global knowledge sharing and innovation. Inspired by this literature, and forced by globalization, economic policy makers in many countries have reintroduced a regional dimension to their innovation policy (COOKE, 1985; FRITSCH and STEPHAN, 2005). But recent experiences have called into question the way this regionalization of innovation policy has been implemented. Technology and innovation policy have been, and still are, primarily focused on enhancing R&D, as if R&D policy will benefit every region. Copying of best practices, as identified by benchmarking studies, is popular amongst policy makers but failing because of ‘knowledge asymmetries’, as illustrated by regional policies aimed at creating new growth sectors or imitating successful models like Silicon Valley (BOSCHMA, 2004; COOKE, 2007a). There is increasing awareness that ‘one-size-fits-all’ regional policy models do not work, because these are not embedded in their spatial settings (TÖDTLING and TRIPPL, 2005). Another reason for these policy failures is that there is little understanding of how regions diversify into new growth paths, and to what extent public policy may affect this process (BOSCHMA, 2005).

This article will present a policy framework that takes up this challenge, building on new theoretical concepts. The objective of the paper is to provide an alternative regional innovation policy model, based on the idea of constructing regional advantage (EUROPEAN COMMISSION, 2006). We bring together three key notions that have recently been introduced in the literature. One is ‘related variety’ that is a key concept in Evolutionary

Economic Geography (FRENKEN *et al*., 2007). We explain what its meaning is for regional growth. The second is the issue of 'differentiated knowledge bases' (ASHEIM and GERTLER, 2005; ASHEIM and COENEN, 2005; ASHEIM *et al*., 2007). The third is about the concept of 'policy platforms' (COOKE 2007c; COOKE *et al*; 2007). Each of these notions will be successively dealt with in the following sections. In the end, we integrate these notions and present an alternative framework of regional innovation policy.

2. Related variety and regional development

Currently, the literature on agglomeration economies is preoccupied with the question of whether knowledge spillovers are geographically bounded (FELDMAN, 1994), and whether specialized regions are more conducive to innovation and growth, as compared to regions with more diversified industrial structures (GLAESER *et al.*, 1992). Agglomeration externalities based on regional specialization may arise from a thick and specialized labour market, local access to specialized suppliers and large markets, and the presence of local knowledge spillovers. This idea of localization economies dates back to MARSHALL's ideas on districts developed in the early twentieth century. Others have emphasized the virtues of diversified economics or Jacobs' (1969) externalities. They argue that the more diversified the regional structure, the better it is, because diversity triggers new ideas, induces knowledge spillovers, and provides valuable resources required for innovation.

However, this literature suffers from two shortcomings. First of all, one can question whether knowledge spillovers are expected to take place between sectors that are unrelated, as the literature on Jacobs' externalities suggests. For example, it is unclear what a pig farmer can learn from a steel company despite the fact they are neighbours. Knowledge will only spill over between two sectors when the cognitive distance is not too large (NOOTEBOOM, 2000). Secondly, a diversified economy may also act as an absorber of a sector-specific or asymmetric shock. Accordingly, quite confusingly, the notion of Jacobs' externalities does not separate the knowledge spillover effect from the portfolio effect (FRENKEN *et al*., 2007).

Therefore, it is essential to distinguish between different forms of regional variety because they involve different economic effects. Knowledge will only spill over from one sector to another when they are complementary in terms of knowledge bases and shared competences. As such, it needs related variety, in order to enable effective connections. We define related variety as sectors that are related in terms of shared or complementary knowledge bases and competences[i]. In other words, there is some degree of cognitive proximity required to ensure that effective communication and interactive learning take place, but not too much cognitive proximity, in order to avoid cognitive lock-in (NOOTEBOOM, 2000). Thus, it is not regional diversity (which involves too large cognitive distance) or regional specialization *per se* (resulting in too much cognitive proximity) that stimulates real innovations, but regional specialization in related variety that is more likely to induce interactive learning and innovation. As such, the concept of related variety goes beyond the traditional dichotomy of localization economies and Jacobs' externalities.

The idea of innovations founded in related variety comes close to the definition of innovation proposed by Schumpeter, in which real innovations stem from the recombination of existing pieces of knowledge in entirely new ways (LEVINTHAL, 1998). Such a view leaves behind a traditional, narrow sector perspective. Instead, it is argued that innovation is driven by interaction and feedback mechanisms that cross boundaries of sectors (ROBERTSON and LANGLOIS, 1995). Thus, major innovations are more likely to occur when knowledge spills over between sectors, rather than within one sector, but only as long as the sectors are related in terms of shared competences.

The knowledge spillover effect based on related variety must be distinguished from another form of variety, that is, unrelated variety (FRENKEN *et al.*, 2007). When defined in economic terms, unrelated variety concerns sectors that have no substantial economic (input-output) linkages. In that case, a broad range of unrelated sectors in a region may be highly beneficial for regional growth, because unrelated variety spreads risks, dampens sector-specific shocks, and stabilizes regional economies on the longer term (ESSLETZBICHLER, 2005).

The notion of related variety builds on concepts like technology systems (e.g. ROSENBERG, 1982; CARLSSON and STANKIEWICZ, 1991; DAHMEN, 1991) that accounted for technological linkages and interdependencies between industries. BOSCHMA (1999) applied these concepts to identify clusters of innovative industries since the first Industrial Revolution, which were connected through dynamic processes of transfer and feedback of technology cut-crossing among a set of industries through different types of mechanisms. These mechanisms give insights in how related variety enhances knowledge spillovers across sectors, how new growth sectors come into existence, and how economies diversify in new directions now and then.

An example of how related variety may contribute to economic renewal and growth at the regional level is the post-war experience of the Emilia Romagna region in the northern part of Italy. Already for many decades, Emilia Romagna is endowed with a diffuse knowledge base in engineering. After the Second World War, a wide range of new sectors emerged out of this pervasive and generic knowledge base one after the other. As such, these new applications made the regional economy to diversify into new directions. Examples are sectors like the packaging industry, the ceramic tiles sector, luxury car manufacturers (Maserati, Ferrari, among others), robotics, agricultural machinery, among other sectors. These new sectors not only built and expanded on this extensive regional knowledge base, they also renewed and extended it, further broadening the economy of Emilia Romagna.

The relevance of related variety is also shown in old sectors giving birth to new sectors. When new sectors are rooted in related sectors, their survival is likely to increase. KLEPPER (2002) showed that prior experience in related industries (like coach and cycle making) increased the life chances of new firms in the new US automobile sector. BOSCHMA and WENTING (2007) could demonstrate empirically that new automobile firms in the UK had a higher survival rate during the first stage of the life cycle of the new industry when the entrepreneur had a background in these related sectors, and when the firm had been founded in a region that was well endowed with these related sectors. So, when diversifying into automobiles, these types of new entrants could exploit and benefit from the related competences and skills embodied in the entrepreneur and present in their location, which improved their life chances, as compared to start-ups with no related competences.

Another example of the economic power of related variety has been demonstrated by FRENKEN *et al.* (2007). Sectors at the 5-digit level were defined as related variety when they shared the same 2-digit category in the sector classification scheme, while sectors were identified as unrelated variety when they belonged to different sector headings at the 2-digit level. As expected, regions with a high degree of related variety showed the highest employment growth rates in the Netherlands in the period 1996-2002. These results tend to suggest the importance of knowledge spillovers across related sectors at the regional level.

In addition, new and related variety may also be brought into the region through (inter-sectoral) linkages with other regions. As such, sectoral lock-in at the regional level may be counterbalanced by the inflow of a high variety of knowledge through inter-regional connections. Making use of trade data, a study on regional growth in Italy at the NUTS 3 level demonstrated that the inflow of a high degree of variety of knowledge *per se* does not affect economic growth of regions (BOSCHMA and IAMMARINO, 2007). The same was true when the extra-regional knowledge was similar to the knowledge base of the region: there is not much to be learnt from knowledge the region is already familiar with. However, the more related the knowledge base of the region and the extra-regional knowledge was, the more it contributed to regional growth. These results suggest that related variety in extra-regional connections is required to ensure that the knowledge flow will spark of learning and innovation *in situ*. Thus, a region might benefit especially from extra-regional knowledge when it originates from sectors that are related or close, but not quite similar to the sectors present in the region.

In sum, related variety may be a powerful concept which links knowledge spillovers to major innovations, economic renewal, new growth paths and regional growth. If a pervasive feature, it implies that the long-term growth and development of regions depends on their ability to diversify into new applications and new sectors while building on their current knowledge base and competences (BOSCHMA, 2004). As related variety has systemic and intangible features, it is almost impossible to copy or imitate new sectors that are strongly embedded in, and depend on region-specific related variety.

3. Differentiated knowledge bases

When one considers the actual knowledge bases and competences of various industries and sectors of the economy, it is clear that knowledge creation and innovation processes have become increasingly complex, diverse and interdependent in recent years. There is a larger variety of knowledge sources and inputs to be used by organisations and firms, and there is more collaboration and division of labour among actors (individuals, companies, and other organisations). NONAKA and TAKEUCHI (1995) and LUNDVALL and BORRÁS (1998) have pointed out that the process of knowledge exploration and exploitation requires a dynamic interplay between, and transformation of, tacit and codified forms of knowledge as well as a strong interaction of people within organisations and between them. Thus, these knowledge processes have become increasingly inserted into various forms of networks and innovation systems – at regional, national and international levels. However, the binary argument of whether knowledge is codified or tacit can be criticized for a restrictively narrow understanding of knowledge, learning and innovation (JOHNSON *et al*., 2002). Thus, a need to go beyond this simple dichotomy can be identified. One way of doing this is to study the basic types of knowledge used as input in knowledge building (creation) and innovation processes. By way of suggesting an alternative conceptualization, this article makes a distinction between 'synthetic', 'analytical', and 'symbolic' types of knowledge bases (the SAS model).[ii]

Following received wisdom from the philosophy of science, an epistemological distinction can be identified between two more or less independent and parallel forms of knowledge creation, 'natural science' and 'engineering science' (LAESTADIUS, 2000). JOHNSON *et al.* (2002, p. 250) refer to the Aristotelian distinction between on the one hand 'epistèmè: knowledge that is universal and theoretical', and 'technè: knowledge that is instrumental, context specific and practice related'. The former corresponds with the rationale for *'analysis'* referring to understanding and explaining features of the (natural) world (natural science/know-why), and the latter with '*synthesis'* (or integrative knowledge creation) referring to designing or constructing something to attain functional goals (engineering science/know-how) (SIMON, 1969). A main rationale of activities drawing on *symbolic* knowledge is creation of alternative realities and expression of cultural meaning by provoking reactions in the minds of consumers through transmission in an affecting, sensuous medium.

The distinction between the knowledge bases takes specific account of the rationale of knowledge creation, the way knowledge is developed and used (e.g. the exploration, examination and exploitation process (COOKE, 2007b), the criteria for successful outcomes, and the strategies of turning knowledge into innovation to promote competitiveness, as well as the interplay between actors in the processes of creating, transmitting and absorbing knowledge. The knowledge bases contain different mixes of tacit and codified knowledge, codification possibilities and limits, qualifications and skills required by organisations and institutions involved as well as specific innovation challenges and pressures, which in turn help explaining their different sensitivity to geographical distance and, accordingly, the importance of spatial proximity for localised learning. The typology is further specified below.

An analytical knowledge base refers to economic activities where scientific knowledge based on formal models and codification is highly important. Examples are biotechnology and nanotechnology. University-industry links and respective networks are important and more frequent than in the other types of knowledge bases. Knowledge inputs and outputs are in this type of knowledge base more often codified than in the other types. This does not imply that tacit knowledge is irrelevant, since there are always both kinds of knowledge involved and needed in the process of knowledge creation and innovation (NONAKA *et al.*, 2000, JOHNSON *et al.*, 2002). The fact that codification is more frequent is due to several reasons: knowledge inputs are often based on reviews of existing studies, knowledge generation is based on the application of scientific principles and methods, knowledge processes are more formally organised (e.g. in R&D departments) and outcomes tend to be documented in reports, electronic files or patent descriptions. These activities require specific qualifications and capabilities of the people involved. In particular analytical skills, abstraction, theory building and testing are more often needed than in the other knowledge types. The workforce, as a consequence, needs more often some research experience or university training. Knowledge creation in the form of scientific discoveries and (generic) technological inventions is more important than in the other knowledge types. Partly these inventions lead to patents and licensing activities. Knowledge application is in the form of new products or processes, and there are more radical innovations than in the other knowledge types. An important route of knowledge application is new firms and spin-off companies which are formed on the basis of radically new inventions or products.

A synthetic knowledge base refers to economic activities, where innovation takes place mainly through the application or novel combinations of existing knowledge. Often this occurs in response to the need to solve specific problems coming up in the interaction with customers and suppliers. Industry examples include plant engineering, specialized advanced industrial machinery, and shipbuilding. Products are often 'one-off' or produced in small series. R&D is in general less important than in the first type (especially 'R'). If so, it takes the form of applied research, but more often it is in the form of product or process development. University-industry links are relevant, but they are clearly more in the field of applied research and development than in basic research. Knowledge is created less in a deductive process or through abstraction, but more often in an inductive process of testing, experimentation, computer-based simulation or through practical work. Knowledge embodied in the respective technical solution or engineering work is at least partially codified. However, tacit knowledge is more important than in the analytical type, in particular due to the fact that knowledge often results from experience gained at the workplace, and through learning by doing, using and interacting (LUNDVALL and LORENZ, 2006). Compared to the analytical knowledge type, there is more concrete know-how, craft and practical skills required in the knowledge production and circulation process. These are often provided by professional and polytechnic schools, or by on-the-job training. Overall, this leads to a rather incremental way of innovation, dominated by the modification of existing products and processes. Since these types of innovation are less disruptive to existing routines and organisations, most of them take place in existing firms, whereas spin-offs are relatively less frequent.

Symbolic knowledge is related to the aesthetic attributes of products, to the creation of designs and images and the economic use of various forms of cultural artefacts. The increasing significance of this type of knowledge is indicated by the dynamic development of cultural industries such as media (film making, publishing, and music), advertising, design or fashion (SCOTT 1997; 2007). These industries are innovation and design intensive since a crucial share of work is dedicated to the 'creation' of new ideas and images and less to the actual physical production process. Competition thus increasingly shifts from the 'use-value' of (tangible) products to the 'sign-value' of (intangible) brands (LASH and URRY 1994, 122). In the cultural industries in particular the input is aesthetic rather than cognitive in quality. This demands rather specialized abilities in symbol interpretation than mere information processing. Symptomatically, the knowledge involved is incorporated and transmitted in aesthetic symbols, images, (de)signs, artifacts, sounds and narratives with strong semiotic knowledge content. This type of knowledge is often narrowly tied to a deep understanding of the habits and norms and 'everyday culture' of specific social groupings. Due to the cultural embeddedness of interpretations this type of knowledge base is characterized by a distinctive tacit component and is often highly context-specific. The acquisition of essential creative, imaginative and interpretive skills is less tied to formal qualifications and university degrees than to practice in various stages of the creative process. The process of socialisation (rather than formal education) in the trade is not only important with regard to training 'know how', but also for acquiring 'know who', that is knowledge of potential collaborators with complementary specialisation through informal interpersonal (face-to-face) interaction in the professional community (ASHEIM *et al*., forthcoming; CHRISTOPHERSON, 2002).

Table 1: Differentiated knowledge bases: A typology

Analytical (science based)	**Synthetic (engineering based)**	**Symbolic (artistic based)**
Developing new knowledge about natural systems by applying scientific laws; *know why*	Applying or combining (in novel ways) existing knowledge; *know how*	Creating meaning, aesthetic qualities, affect; *know who* critical
Scientific knowledge, models, deductive	Problem-solving, inductive, custom production	Creative process
Collaboration within and between research units	Interactive learning with customers and suppliers	Learning-by-doing in studio, project teams
Strong codified knowledge content, highly abstract,	Partially codified knowledge, strong tacitness,	Strong semiotic knowledge content, some forms highly context-specific
Drug development	Mechanical engineering	Advertising

Source: ASHEIM and GERTLER, 2005; ASHEIM *et al*., 2007; GERTLER, 2007

Table 1 provides a summary of the main differences between the knowledge bases. As this threefold distinction refers to ideal-types[iii], most activities are in practice comprised of more than one knowledge base. The degree to which certain knowledge bases dominates, however, varies and is contingent on the characteristics of the firms and industries.

The underlying idea behind the differentiated knowledge base approach is not to explain the level of competence (e.g. human capital)[iv] or the R&D intensity (e.g. high tech or low tech) of firms but to characterise the nature of the specific knowledge on which the innovation activity is based (hence the term 'knowledge base') (MOODYSSON, 2007). According to LAESTADIUS (2007) this approach also makes it unnecessary to classify some types of knowledge as more advanced, complex, and sophisticated than other knowledge, or to consider science based (analytical) knowledge as more important for innovation and competitiveness of firms, industries and regions than engineering based (synthetic) knowledge or artistic based (symbolic) knowledge. This is once more a question of contingency with respect to the firm, industries, and regions in focus.

While ASHEIM and GERTLER (2005) and ASHEIM *et al.* (2007) have introduced and used this distinction between different knowledge bases on a macro- and meso-level to explain different geographies and types of innovation processes of firms belonging to various industries, it has also been developed further to unpacking learning processes *within* firms in an industry – e.g. biotechnology – by referring to the different acts of 'analysis' and 'synthesis' in specific innovation projects (SIMON, 1969), and, thus, take more explicit account of the knowledge content of the actual interactions that take place in networks of innovators (ARCHIBUGI *et al*., 1999). However, both these *modes of knowledge creation* appear in different mixes in most firms and industries with different intensity in different phases of product and process innovation processes, and with different spatial outcomes (MOODYSSON *et al*., forthcoming). Such a micro-oriented analytical approach is welcome according to FAGERBERG (2006), who in an analysis of topics studied in the EU Framework programs concludes that:

> '….what was most striking was that hardly any projects focused on innovation processes in firms. Given the importance of innovation for economic and social change, and the role of firms in innovation, this must be seen as a glaring omission' (FAGERBERG, 2006, 21).[v]

As a result of the growing complexity and diversity of contemporary knowledge creation and innovation processes, firms being part of such network organised innovation projects increasingly need to acquire new knowledge to supplement their internal, core knowledge base(s) – either by attracting human capital possessing competences based on a different knowledge base or by acquiring new external knowledge base(s) by collaborating with external firms through R&D cooperation, outsourcing or offshoring of R&D, and/or with research institutes or universities, which underline the importance of firms' absorptive capacity. The strategy of acquiring and integrating external knowledge base(s), therefore, implies that more and more a shift is taking place from firms' internal knowledge base to increasingly globally 'distributed knowledge network'[vi] and 'open innovation' (CHESBROUGH, 2003). This is manifested by the increased importance of and attention to clusters, innovation systems (regional, national and sectoral), global production networks and value chains for firms' knowledge creation and innovation processes, demonstrating that 'the relevant knowledge base for many industries is not internal to the industry, but is distributed across a range of technologies, actors and industries' (SMITH, 2000, 19).

Thus, there seems to be a generic and global trend towards integration and collaboration in firms' knowledge creation and innovation processes. The development towards more and more distributed knowledge networks can, for example, be traced in several biotechnology clusters over the last 10-15 years. In fact, due to the strong growth of potential biotechnology applications, particularly in life science, it has been increasingly hard for firms as well as regions to host all necessary competences within its boundaries. This has resulted in a local node, global network geography of the life-science industry (COENEN, 2006; COENEN *et al.*, 2006; GERTLER and LEVITTE, 2005).

Two points are of relevance here. First, it is worth pointing out that knowledge flows can - and often do - take place between industries with very different degrees of R&D-intensity and different knowledge base characteristics. An example of this is when food and beverages firms (predominantly drawing on a synthetic knowledge base with a very low R&D intensity) produce functional food based on inputs from biotech firms (high tech firms predominantly drawing on an analytical knowledge base). This shows that the increased complexity and knowledge intensity in firms' knowledge creation and innovation processes imply that the distributed knowledge networks transcend industries, sectors and the common taxonomies of high or low tech. Instead of these traditional means of classification we argue that it is more useful to speak of how different knowledge bases are combined and intertwined in a dynamic manner between firms and industries of related variety. This example provides an excellent illustration of how knowledge spillovers happen in distributed knowledge networks between firms with complementary knowledge bases and competencies (i.e. related variety). It also demonstrates the point made earlier that major innovations are more likely to occur when knowledge spills over between related industries. This is especially facilitated where the knowledge spillover takes place between industries involving generic technologies (such as IT, biotech and nanotech) (FRENKEN *et al*., 2007).

Secondly, connecting to the different modes of knowledge creation, the dominance of one mode arguably has different spatial implications for the knowledge interplay between actors than another mode of knowledge creation. Analytical knowledge creation tends to be less sensitive to distance-decay facilitating global knowledge networks as well as dense local collaboration. Synthetic knowledge creation, on the other hand, has a tendency to be relatively more sensitive to proximity effects between the actors involved, thus favouring local collaboration (MOODYSSON *et al*., forthcoming).

4. Towards a platform approach to regional innovation policy

The article aims to incorporate related variety and differentiated knowledge bases for constructed advantage in regional innovation policy (COOKE and LEYDESDORFF, 2006). Here, we explain what potential advantages might be attached to such a policy approach.

There is often a tendency to select sectors/regions *a priori* as target for policy making at the national level. Some regions are identified as innovation hotspots or brainports, which are considered the drivers of national economic growth. However, such a ‘picking winners’ policy at the national level is not consistent with the objective of regional innovation policy based on related variety, that is, to broaden the regional economic base while building on existing region-specific resources.

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.

Secondly, ‘picking winners’ policy overlooks the fact that is hard to predict which will be the growth regions and sectors in the near future. 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 (LAMBOOY 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.

Such policy based on related variety should capture the importance of making connections between related sectors, fostering knowledge spillovers. To enhance 'related' entrepreneurship or spin-off dynamics may be one of these, because spin-off companies reflect the importance of related variety at the micro level. Spin-off companies often perform better than other types of entrants because they build on relevant knowledge and experience acquired in parent organizations in related industries (HELFAT and LIEBERMAN, 2002). Regional innovation policy could also play a role in encouraging labour mobility or exchange between related sectors, in which skills and experience are transferred from one company to another in a related sector. Networks also provide effective settings through which knowledge circulates and interactive learning takes place. Policy may act as an intermediary here, enabling knowledge to spill over and diffuse from one sector to a related one.

Pursuing such region-specific policy is not to say that regional policy should rely on the region itself. Knowledge relationships may cross over regional and national boundaries, as they do over sector boundaries. Network linkages in general, and non-local linkages in particular are often found crucial for learning and innovation, in order to avoid cognitive lock-in. For firms, being connected may be as important, or even more so, than simply being co-located (GUILIANI, 2005). AMIN and COHENDET (1999) have claimed that non-local networks are more crucial for more path-breaking innovations, while local learning results more in incremental innovations. This has implications for regional innovation policy. For instance, one needs further understanding of how knowledge networks evolve, why some (but not all) local organizations are able to connect, and in what way non-local connections play a key role (MOODYSSON *et al.*, forthcoming).

In sum, the idea that is possible to design 'one-size-fits-all' regional policies is no longer valid. Copying of best practices is almost impossible when it comes to intangible regional assets that are the results of long histories in particular regional contexts. Therefore, local solutions have to be inspired by endogenous capacity, as embodied in related variety, which might increase the probability of effective policy.

5. Platform Based Policies

A frequent finding of research that focuses on innovations in firms and organisations is that the public development agency or administration is one of the least influential actors assisting firms in accessing the knowledge that helped bring forth the innovations. The exception variable in this is perhaps an increase in ranking for public agencies arising from the disbursement of a capital grant that helped purchase of some equipment or add an extension to the building. This is puzzling for three reasons: first public agencies are huge funders of basic research from which many innovations ultimately arise (GOOZNER, 2004). Second, numerous government programmes also exist that assist innovative firms to conduct early stage technological development. A case in point is the way the globally-leading Danish wind energy industry was subsidised to the hilt until about 2000 by the Danish government, ultimately due to a national protest movement against building a nuclear power station in the

1970s (JØRGENSEN and KARNØE, 1995). Pre-competitive technology schemes number at least nine for start-up firms alone in the UK, for example, and total schemes supporting enterprises can usually be numbered in the hundreds for most advanced economies. Third, apart from schemes *per se* most countries and even regions have a panoply of services and advice to offer firms through economic development agencies and the like. Yet firms seem to undervalue all this public largesse or worse, not even acknowledge it. Why is this? Is it a case of forgetfulness? Partly, but interviewers of such firms usually remind them and they still rank it low compared to the role of customers, suppliers, consultants and, for some industries more than others, university research laboratories (COOKE, BOEKHOLT and TÖDTLING, 2000). Or is it that firms genuinely do not consider that public agencies of the third type generate policies that firms value? It seems that the latter explanation may be the stronger. Consider the following précis of explanations for low valuation of standard policies aimed at supporting enterprise and innovation.

‘.......I had an idea for a software applications business, then MS Windows came along and I could see it was time to do it. I needed cash and talked to the bank. They said get K£50 first and we’ll ‘put in’ (i.e. lend) K£100, they wanted somebody else to do their due diligence for them. We went to the public agency they recommended, who took so long the bank suggested we build a co-funding pool of small investments, you know ‘friends, family and fools’ to spread the risk. When I went back to the public agency the desk officer ‘went ballistic’. You’re *my* client and you’re letting *me* down. He seemed like he’d just lost a job and was desperate to hang on to ‘a client’ as long as possible in case he lost his present job....they seem to be obsessed with targets rather than actually doing things........’

(*Super7* ICT firm, July 2005).

‘.......we have moved away from the traditional sectoral perspective often associated with economic development agency thinking, we adopt a thematic approach to our technology promotion activities. This means that the focus is upon ‘platform technologies’ having qualities of ‘ubiquity’. This means they are likely to be pervasive in their impact rather than being confined to a sector. Thus Broadband Wireless Technologies , Content Creation Tools, Human-Computer Interfaces, and Networked Sensor Technologies have wide potential application. Networked Sensor Technologies, for example, allow remote monitoring of animals, wind farms or even personal healthcare. We had to escape from the widely emulated ‘key sectors’ view of public innovation support targets, which is widely perceived in today’s innovation discourse to entail possibly debilitating policy rigidities’[vii]

(head of Scotland’s *TechMedia Intermediary Technology Institute*, June 2005).

‘.......the cluster perspective looks to us like a policy retro-model, meaning it is based upon ‘a compartmentalised 1980s picture’ rather than a future-shaping one. Thus in life sciences, software is seen as a pervasive platform technology. But policy reality here has software currently being subsumed under ‘e-learning’ which is frankly bizarre given ‘e-learning’ is something that from a market perspective has zero profile. Platform technologies like software, displaying pervasive characteristics, don’t fit the cluster idea as practised in regional economic development because of the diverse interactions involved in complex, multi-use systems beyond more conventional sectoral-spatial notions such as clusters.’

(head of Scotland’s *Life Sciences Intermediary Technology Institute*, June 2005)

It seems ironic therefore but the strongest message from these diverse respondents, all with recent or current business management knowledge, is that while businesses in these sectors typically think in complex or multidimensional terms about how they relate to challenges or their business environment, policy makers think in simplistic and/or individualistic terms that make sense only to their own performance measures. Thus 'having a client' is good, so hanging on to her for a long time is rational in public terms but not for the firm that needs a quick decision. A second problem is the way in which passing populist political fads like 'e-learning' or 'clusters' subvert and subsume the logically prior category of a key industry like software in economic development strategy. Finally, the lack of flexibility and reliance on a notion of 'key sectors' rather than a more informed understanding of deeper technological interactions and potential relationships attests to the negative power of mental rigidity in much contemporary policy thinking.

Thus we have identified the *complexity problem* at the heart of policy formulation. But of course the important question is how, short of a misguided neoconservative impulse to dismantle all instruments of enterprise and innovation support, to improve upon the inherited position? This involves three key elements. The first, and possibly most tricky, relying on joined-up thinking procedurally across policy responsibilities, is having policy mechanisms that, as far as possible, mirror the 'related variety' that such entrepreneurs and business intermediaries (both with a business background) envisioned in the cases noted as important for the future. The start of such a process would involve engaging in interface 'conversations' and introducing other, external expertise to 'triangulate' the validity of their views, and if necessary update them in terms of agreed 'megatrends.' The second – 'linkage' - will also be hard but there is evidence that it can be made to work. This is where policy cleverly seeks to achieve more than one outcome with a single instrument. In COOKE and MORGAN (1998) we wrote of instances in a 'good governance' regime where, for instance, a policy to conserve heritage buildings could be justified and incentivised by converting them to older citizen housing which elevated their sociability opportunities while diminishing transportation energy use, minimising already moderate emissions and creating new care jobs that raised female labour market participation. This is clearly more substantive than procedural and works by exploiting spillovers among apparently diverse spheres, but with a single lead policy field that radiates laterally in a platform-like manner. We might think of 'joined-up' policies as 'platform policies' and 'linkage' policies as 'policy platforms.'

Hence, as shown, rather than think this new approach out *in vacuo*, it is somewhat easier to observe critically a live example that sought to overcome the scenarios sketched in based on the three interview responses. We now refer to a case of the evolution of a regional 'platform policy' as elaborated for Finland by HARMAAKORPI (2006). However this approach is generalisable, either in the 'platform policy' or 'policy platform' requirement outlined above, indicating that elements of both may, not infrequently, intertwine. At any rate, it is theoretically and methodologically informed and has the advantage of having been implemented in the Lahti region of Finland, though too recently to be *ex post* evaluated yet. There are thus three key segments expressing these phases: theory; methodology; and implementation outlined as follows. The context is one of deindustrialisation in a furniture-production region centred on a formerly quite tightly-integrated 'industrial district' mode of industry organisation. Numerous 'conversations' were, accordingly, set in motion regarding what to do. Out of these emerged policies to build 'Clean Technology' and Healthcare equipment platforms.

Briefly, three other as yet unpublished cases of regional platform policy thinking include the following:

- Around the University of Leuven in Flanders, Belgium a series of six 'related variety' clusters has been constructed, mainly since 1998 in which knowledge centres, entrepreneurs, seed funders, capital markets players, infrastructure (incubators, science parks), role models, cluster policy, international companies, networks, government and quality of life are combined in multi-actor networks around six innovative fields that combine into a regional 'related variety' platform consisting of mechatronics, e-security, telematics, microelectronics and nanotechnologies, life sciences and agro-food biotechnology. The *digital signals processing* expertise of this platform now comprises a cross-border innovation system linked to Philips at Eindhoven, Netherlands and the Technical University at Aachen, Germany for R&D outsourcing by Philips.

- At Linköping, Sweden on the Berzelius science park, cyclical military technology downsizing by Saab led the company to evolve a medical technology capability to offset the profit slump. However it failed to compete with GE & Siemens in Medical Technology. Nevertheless a local 'stakeholder platform' replaced Saab as a new managerial regime "governing" the medical cluster, provides resources for new science park innovation platform with central government support (FELDMAN, 2007).

- Finally, in a rural context the constructed regional advantage approach and regional policy platform methodology were applied in the Preseli district of West Wales. Here envisioning of a high quality, national park landscape with Neolithic archaeological monumentality was exposed to 'related variety' conceptualisations constructed upon high quality food production, gourmet consumption, artistic and musical cultural production and tourism, textiles, sustainable farming, production of biofuels, construction and maritime activities and research in an innovative synthesis. This in turn has stimulated designer textiles, ceramics and food production and branding, with at least one entrepreneur evolving a platform arts facility combining an art gallery, music chamber and bistro in a single building and elsewhere a ‘conversation’ to seek to secure a regionally identified art gallery (unlike Guggenheim or even the Tate at St. Ives, Cornwall) in the ancient cathedral town of St. David’s (COOKE, 2006).

6. Conclusions

We have argued that regional innovation policy has typically proceeded on a vertically configured sectoral and, more recently, cluster basis that is inappropriate for the more lateral, pervasive perspective firms typically project nowadays. This is dependent upon the integration of key concepts aimed at securing constructed advantage, through the interaction of public and private economic forces, rather than predominately private ones as in notions of ‘comparative’ and ‘competitive’ advantage. ‘Related variety’ or the recognition that over-specialization of economies is as potentially debilitating as over-diversification. This critiques the philosophy of past regional policy, particularly, which advocated, influentially, the diversification of what were normally *failing* regional economies. Accordingly, industrial facilities were encouraged to depart from their often related variety contexts to wholly non-related variety regional contexts as a defensive measure to prop up the latter. Not surprisingly, many stayed only a short time before moving back or going bankrupt. Moreover, the skills profiles of traditional industry employees and the new jobs associated with transplants were imbued with sufficient ‘cognitive dissonance’ that few were taken up by those being made redundant from pit, steelworks or shipbuilding closures. But ‘related variety’ involves transitioning from the waning into the waxing opportunity by ‘constructing advantage’ through engaging ‘differentiated knowledge bases’ in the moulding of regional platform policies and even more localised policy platforms at, say, local level.

Thus the foundation a platform policy represents a strategy based on related variety, which is defined on the basis of shared and complementary knowledge bases and competences. Moreover, this approach also clearly illustrates that knowledge is distributed across traditionally defined sectors in distributed knowledge networks. But it also recognizes that modern policy-making, by being more relational in the horizontal dimension than either perception or aspects of reality may have been in the past, requires interaction with externalized knowledge of specific not general expertise that can assist in the process of managing aspects of knowledge spillovers that market failure may have hitherto blocked. Thus, by inquiring about the nature of regional economic assets in a collectively knowledge-sharing manner *in the context of* a new and different perception and eventually vision of the future can in itself be innovative. Thus a rising consciousness of the importance of minimizing greenhouse gas emissions and curtailing emissions that contribute to climate change can in itself bring out into the open distinctive potential contributions to that new, knowledge based vision focused upon, say, clean technologies. Even markets do not necessarily seamlessly shuffle such points of knowledge and expertise swiftly into functioning supply chains; it takes acts of collective imagination. Even though the pig-farmer may not have much to talk about with the steel producer, it is noticeable that 'conversations' between automotive industry associations and agricultural associations have risen in the context of 'peak oil' and climate change threatening associated long-term rises in fossil fuel prices (KUNSTLER, 2005).

Finally, to exemplify the importance in 'constructed advantage' of a revitalized public-private interaction in the regional innovation policy arena, two types of horizontally dimensioned policy in support of related variety, with its rapid lateral absorptive capacity and potential for multiple innovation applications, are proposed. Then in a synopsis of HARMAAKORPI'S (2006) account of the Lahti regional development platform method a 'how-to-do-it' guide was proffered and reference made to other relevant instances in evolution or in position to be *ex post* assessed. The two approaches to intelligent policy-making of this kind are those that, fundamentally facilitated interactively through peak governance bodies due to the need for leadership by legitimate administrative authority, refer to the 'joined-up' platform policy model and the more linked policy platform model in which something like the 'triple bottom-line' remains in profit on the social, sustainable and economic balance sheets. In both cases, evidence exists that such achievements are practicable. The test now is to see if there is willingness to utilize this analysis and prescriptive contribution to the achievement of constructed regional advantage or at least to be in a position for judgement of the argument that it cannot be done, or done with greater effect than present methods, to prove irrefutable.

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[i] Related variety is thus not defined in terms of sectors having input-output linkages. It is relevant to make this distinction between the cognitive and economic dimension, because business networks are not necessarily the same as knowledge networks (see e.g. GIULIANI, 2005).

[ii] The distinction between analytical and synthetic knowledge bases was originally introduced by LAESTADIUS (1998, 2007) as an alternative to the OECD classification of industries according to R&D intensity (e.g. high, medium and low tech). It has been further developed in ASHEIM and GERTLER (2005) and ASHEIM and COENEN (2005) to explain the geographies of innovation for different firms and industries. The distinction was later expanded with a third category, symbolic knowledge base, to cater for the growing importance of cultural industries (ASHEIM, COENEN, MOODYSSON and VANG, 2007). We acknowledge our debt to the above mentioned colleagues in the process of developing the concepts and analytical approaches.

[iii] Ideal types are a mode of conceptual abstraction where the empirical input constituting the ideal types exists in reality, while the ideal types as such do not.

[iv] GUILIANI (2005) and GUILIANI and BELL (2005) confusingly refer to 'level of competence' as 'knowledge base' instead of using the term 'competence base' to avoid misunderstandings.

[v] This approach may resemble BERG JENSEN *et al.* (2007) reference to 'forms of knowledge and modes of innovation'. Their 'Science, Technology and Innovation' (STI) mode of innovation, based on the use of codified scientific and technical knowledge' could broadly be associated with the analytical knowledge base, while the 'Doing, Using and Interacting' (DUI) mode, relying on informal processes of learning and experience-based know-how, would mostly resemble the synthetic knowledge base.

[vi] A globally distributed knowledge network is 'a systemically coherent set of knowledges, maintained across an economically and/or socially integrated set of agents and institutions' (SMITH, 2000, p. 19).

[vii] Thus, as a case in point, the *OECD STI Outlook 2004* reports that the following are the R&D Priorities of several OECD members: Canada – Biotechnology, ICT, Nanotechnologies; Japan – Life Sciences, ICT, Nanotechnology; S. Korea – Electronics & Biotechnology; Mexico – ICT, Biotechnology; New Zealand – Biotechnology, ICT and Creative Industries. Meanwhile in the USA, more 'pervasive' R&D Priorities have been set such as 'Networking IT' involving large-scale networking; high confidence software systems; software design productivity; social, economy & workforce applications; and human-computer interaction. Other 'pervasive' priorities include; complex systems, climate, water and hydrogen, homeland security, and long term nanotechnology applications, e.g. in information processing.