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Constructing Regional advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases — Source link

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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 importance to knowledge spillovers across complementary sectors. The paper categorises knowledge into 'analytical' (science based), 'synthetic' (engineering based) and 'symbolic' (arts based) in nature, with different requirements of 'virtual' and real proximity mixes. The implications of this are traced for evolving 'platform policies' that facilitate economic development within and between regions in action lines appropriate to incorporate the basic principles behind related variety and differentiated knowledge bases.

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

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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 (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. 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.

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, and which is basically about the economic importance of bringing together different but complementary pieces of knowledge (FRENKEN *et al.*, 2007; BOSCHMA and FRENKEN, 2010). We explain what its meaning is for regional development. The second is the issue of 'differentiated knowledge bases' (ASHEIM and GERTLER, 2005; ASHEIM and COENEN, 2005; ASHEIM *et al.*, 2007), which accounts for different types of knowledge that predominate in people, firms, sectors and regions. The third is about the concept of 'policy platforms' (COOKE 2007; COOKE *et al*; 2007), which attaches great importance to relational and collective types of policy arrangements. 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

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). Following MARSHALL's ideas on districts developed in the early twentieth century, agglomeration externalities based on specialization may arise from a thick and specialized labour market, the presence of specialized suppliers and large markets, and regional knowledge spillovers. 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.

Following FRENKEN *et al.* (2007), one can question, however, whether knowledge spillovers are expected to take place between any sectors, as the notion of Jacobs' externalities suggests. For example, it is unclear what a pig farmer can learn from a steel company despite the fact they are neighbours. There is increasing evidence that knowledge will only spill over from one sector to another when they are complementary in terms of competences. NOOTEBOOM (2000) has claimed that some degree of cognitive proximity is required to ensure effective communication and interactive learning. However, NOOTEBOOM (2000) also stressed that too much cognitive proximity may hamper interactive learning and real innovations, because not much learning will take place when actors have identical competences, which might even lead to cognitive lock-in.

When applying these ideas to agglomeration economies, one can state that it is neither regional diversity (which might involve a too large cognitive distance between local firms) that stimulates regional development, nor regional specialization *per se* (which might imply excessive cognitive proximity between local firms), but regional specialization in technologically related sectors that is more likely to induce interactive learning and regional innovation. So, regional development is more likely to occur when knowledge spills over between local sectors, rather than within one sector, but only as long as the sectors are technologically related. In addition to that, the higher the number of technologically related sectors is in a region (i.e., the higher the degree of variety in related sectors), the more learning opportunities will be available, and, thus, the more knowledge spillovers are expected to take place, boosting regional development.

FRENKEN *et al.* (2007) have estimated the economic effects of related variety on regional growth in the Netherlands. In their study, sectors at the 5-digit level were defined as related when they shared the same 2-digit category in the Standard Classification of Industries. As expected, regions with a high degree of related variety showed the highest employment growth rates in the Netherlands in the period 1996-2002. Such an effect has also been found in studies in other countries (ESSLETZBICHLER, 2007; BISHOP and GRIPAIOS, 2009). These results tend to suggest the importance of knowledge spillovers across related sectors at the regional level. In addition to that, BOSCHMA and IAMMARINO (2009) have made a first attempt to assess the economic effects of related variety through (inter-sectoral) linkages with other regions, because related variety may also be brought into a region through knowledge flows from elsewhere. Making use of trade flows data, their study on regional growth in Italy at the NUTS 3 level tends to demonstrate that the inflow of a high degree of variety of knowledge *per se* did not affect regional growth, while inflows of knowledge that was already present in the region (as proxied by intra-sectoral flows across regions) had a negative impact. However, the more related the knowledge base of the region and the extra-regional knowledge was (as proxied by trade flows between related sectors across regions), the more it contributed to regional employment growth. This result suggests that a region might benefit especially from extra-regional knowledge when it originates from sectors that are related or close, but not identical to the sectors in the region. However, more research is needed that measures more directly the impact of knowledge flows, by means of labour mobility flows, for instance (see e.g. BOSCHMA et al., 2009)

In other words, related variety affects the extent to which knowledge spillovers occur within regions. What is more, related variety might also affect the opportunities of regions to diversify into new industries over time. There is increasing evidence that new industries are deeply rooted in related activities that are present in a region, and which set in motion a process of regional branching (BOSCHMA and FRENKEN, 2010; NEFFKE, 2009).

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 and pervasive 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. Examples are sectors like the packaging industry, the ceramic tiles sector, luxury car manufacturers, robotics and agricultural machinery. As such, these new applications made the regional economy of Emilia Romagna to diversify into new directions.. 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.

There is also increasing systematic evidence that countries and regions are indeed more likely to expand and diversify into sectors that are closely related to their existing activities (HAUSMANN and KLINGER, 2007; HIDALGO et al. 2007; NEFFKE, 2009; NEFFKE, HENNING and BOSCHMA 2009). HAUSMANN and KLINGER (2007) investigated how countries have diversified their economies (as proxied by their export mix) in the period

1962-2000, making use of UN Commodity Trade Statistics. Their main finding is that there is a strong tendency of the export mix of countries to move from current products towards related products, rather than goods that are less related. In other words, a country's current position in the product space determines its opportunities for future diversification. NEFFKE, HENNING and BOSCHMA (2009) have determined the degree of relatedness between sectors by means of product combinations frequently found at the plant level. Based on a regional study of Sweden, they found evidence that unrelated sectors had a higher probability to exit the region than related sectors, while sectors that are related to other sectors in the regional portfolio are more likely to enter the region, as compared to unrelated sectors. So, regions might change their industrial profile over time, but they tend do so in a very slow manner, and when they diversify, it is strongly rooted in their existing industrial profile. However, this is not to say that every country or region has the same probability to diversify successfully into related activities. This may depend on regional related variety, as HAUSMANN and KLINGER (2007) have observed on the country level. Looking at the position of countries in the product space, they could show empirically that rich countries specialised in the more dense parts of the product space (where many products are related), had more opportunities to sustain economic growth: poorer countries had less potential to diversify successfully into related activities.

So, there is some evidence that countries and regions are more likely to diversify into related activities. This regional branching process most probably occurs through knowledge transfer mechanisms like spinoff activity, firm diversification, labor mobility and social networking. All these knowledge transfer mechanisms tend to have a local bias: most spinoffs locate in the same place as their parent firm, most new divisions of firms are created inside existing plants at the same location, most employees change jobs within the same labor market area, and knowledge networks are often (but not exclusively) driven by socially proximate agents at the same location (BOSCHMA and FRENKEN, 2010).

Regional branching through spinoff activity is already quite well documented. This occurs when new firms in a newly emerging industry are set up by entrepreneurs who had previously acquired knowledge and experience (as an entrepreneur or as an employee) in an existing sector in the same region. What is crucial is that when new sectors are rooted in related sectors through entrepreneurship, their survival is likely to increase. KLEPPER (2007) has demonstrated empirically 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 show empirically that new automobile firms in the UK had a higher survival rate during the first stage of the industry life cycle 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 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 such related competences.

In sum, related variety is a concept that links knowledge spillovers to economic renewal, new growth paths and regional growth. If pervasive, it implies that the long-term development of regions depends on their ability to diversify into new applications and new sectors while building on their current knowledge base and competences. As related variety has systemic and intangible features, it is almost impossible to copy new sectors in a region that are strongly embedded in, and depend on region-specific related resources and assets elsewhere.

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 creation and innovation processes. As an alternative conceptualization, this article makes a distinction between 'synthetic', 'analytical', and 'symbolic' types of knowledge bases[i]

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. These inventions may 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 knowledge or inventions.

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'), and normally 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, however, at least partially codified.

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 creation of meaning and desire as well as aesthetic attributes of products, producing designs, images and symbols, and to the economic use of such forms of cultural artefacts. The increasing significance of this type of knowledge is indicated by the dynamic development of cultural production such as media (film making, publishing, and music), advertising, design, brands and fashion (SCOTT 1997; 2007). Such production is innovation intensive in its own way as 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 cultural production in particular the input is aesthetic rather than cognitive in quality. This demands rather specialized abilities in symbol interpretation and creativity than mere information processing. Symptomatically, the knowledge involved is incorporated and transmitted in aesthetic symbols, images, (de)signs, artifacts, sounds and narratives with a strong cultural 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 usually 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 and HANSEN, 2009; CHRISTOPHERSON, 2002; COENEN 2006).

- here Table 1 -

Table 1 provides a summary of the main differences between the knowledge bases. The knowledge bases contain different mixes of tacit and codified knowledge, codification possibilities and limits, qualifications and skills which represent specific innovation challenges and pressures as well as strategies of turning knowledge into innovation to promote competitiveness. The distinction between knowledge bases takes account of the rationale of knowledge creation, the way knowledge is developed and used, the criteria for successful outcomes, and the interplay between actors in the processes of creating, transmitting and absorbing knowledge. This in turn helps explaining their different sensitivity to geographical distance and, accordingly, the importance of spatial proximity for localised learning. As this threefold distinction refers to ideal-types[ii], 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 firms and industries as well as between different type of activities (e.g. research and production).

The underlying idea behind the differentiated knowledge base approach is not to explain the level of competence (e.g. human capital) or the R&D intensity (e.g. high tech or low tech) of firms but to characterise the nature of the specific (or critical) knowledge input on which the innovation activity is based (hence the term 'knowledge base') (MOODYSSON, 2007). According to LAESTADIUS (2007) this approach also makes it less relevant 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 and regions than engineering based (synthetic) knowledge or arts based (symbolic) knowledge. This is once more a question of contingency with respect to the firm, industries, and regions in focus[iii].

While ASHEIM and GERTLER (2005) and ASHEIM *et al.* (2007) have introduced and used the differentiated knowledge base approach on a macro- and meso-level to explain different geographies and types of innovation processes of firms dominated by different knowledge bases, 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.*, 2008). 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).

As a result of the growing complexity and diversity of contemporary knowledge creation and innovation processes, firms being part of 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'[iv] 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; GERTLER and LEVITTE, 2005; MOODYSSON, 2007).

So, 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, 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 illustrates how knowledge spillovers happen in distributed knowledge networks between firms with complementary knowledge bases and competences (i.e. related variety). It also demonstrates 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 across industries involving generic technologies (such as IT, biotech and nanotech) (FRENKEN *et al.*, 2007).

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.*, 2008).

4. Towards a platform approach to regional innovation policy

Since related variety and differentiated knowledge bases are considered crucial for constructing regional advantage, we incorporate these notions into a regional innovation policy framework that embraces a platform approach (COOKE and LEYDESDORFF, 2006).

In many countries, there is a tendency to select sectors and regions *a priori* as target for policy making at the national level. However, one can question the relevance and effectiveness of such a 'picking-the-winner' policy at the national level (LAMBOOY and BOSCHMA, 2001). First, it is impossible to predict which will be the growth sectors and winning regions of the future. For instance, new industries are often the result of spontaneous processes (like the spinoff activity mentioned earlier), rather than the outcome of orchestrated policy interventions, although the globally-leading Danish wind energy industry seems to be an exception to that rule (JØRGENSEN and KARNØE, 1995). Second, 'picking-the-winner' policy tend to result in picking the same winners like biotech or gaming, no matter what country or region is involved. When all regions are targeting the same sectors, one can easily predict that the overwhelming majority of regions will fail to develop these industries, leading to a huge waste of public resources. Third, 'picking-the-winner' policy denies the fact that almost all regions have growth potential in the knowledge economy in one way or another. Therefore, regional innovation policy purely based on R&D potential is too narrowly focused: innovation should not simply be equated with R&D (RASPE et al., 2004). Therefore, it would be wrong to exclude regions from policy action from the very beginning.

Regional innovation policy based on related variety and differentiated knowledge bases may avoid such dangers of 'picking-the-winner' policy, because it is primarily focussed on bringing together different but related activities, instead of promoting particular sectors and regions. While almost each region has innovation potential, the nature of it differs greatly between regions, due to different cognitive and institutional structures laid down in the past. There is a strong need to account for such a variety of regional innovation potentials, and one should acknowledge that industries based on different knowledge bases innovate in different ways, or what is called different 'modes of innovation' (BERG JENSEN et al., 2007; LORENZ and LUNDVALL, 2006)[v] . Therefore, it would be wrong to apply a 'one-size-fits-all' policy, such as copying best practices like Silicon Valley (with a strong dominance of an analytical knowledge base) or neo-liberal policies (as if countries and regions operate in identical institutional contexts) (see HOWELLS, 2005; TÖDTLING and TRIPPL, 2005).

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 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 action (LAMBOOY and BOSCHMA, 2001). This implies that 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 industrial activities. As a consequence, the question whether policy makers should intervene in a regional economy should be based on the institutional history of a region and which type of intervention fits better a region's situation, rather than abstract theoretical or ideological accounts (FROMHOLD-EISEBITH and EISEBITH, 2005). Accordingly, there is a need for tailor-made policy strategies, geared towards specific potentials, and focused on tackling specific bottlenecks in regions that occur over time. As a result, regional policy needs to evolve, capitalising on region-specific assets, rather than selecting from a portfolio of policy recipes that owed their success in different environments.

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 within distributed knowledge networks 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 and BELL, 2005), especially for firms dominated by analytical knowledge bases. AMIN and COHENDET (1999) have precisely claimed that non-local networks are crucial for more path-breaking innovations (i.e. based on analytical knowledge), while local learning results more in incremental innovations (synthetic knowledge). In this respect, our platform approach is especially focussed on making connections between different but related activities. 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, to what extent related variety is crucial for the success of knowledge networks (GILISING et al., 2007), and in what way non-local connections play a key role (MOODYSSON *et al.*, 2008; MOODYSSON, 2008).

In sum, the idea that it 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 and distributed knowledge networks, which might increase the probability of effective policies.

How could such a policy framework work in practice? The first, and possibly most tricky, relying on joined-up thinking, is having policy mechanisms that, as far as possible, mirror the related variety that 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 (see the application of such a policy framework in the Lahti region in Finland, HARMAAKORPI, 2006). 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. COOKE and MORGAN (1998) 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.'

There are some examples of regional platform policies that have only recently been implemented in various countries. Around the University of Leuven in 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. In Linköping, Sweden, on the Berzelius science park, a local 'stakeholder platform' governs a medical cluster that 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 have been 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 an arts facility platform combining an art gallery, music chamber and bistro in a single building.

Another way of implementing regional policy based on related variety is to stimulate the knowledge transfer mechanisms that connect related sectors and foster knowledge spillovers. To enhance 'related' entrepreneurship may be one policy option. As noticed before, experienced entrepreneurs often perform better than other types of entrants because they build on relevant knowledge and experience acquired in parent organizations in related industries. Since experienced entrepreneurs may lay at the roots of new sectors, and they tend to locate near their parents, they may provide a basis for regional innovation policy that aims to diversify regional economies. Targeting these experienced entrepreneurs would not only increase the likelihood of successful policy (as contrasted by policy that supports just any entrepreneur), but would also contribute to the process of regional diversification and real long-term regional advantage. But regional innovation policy could also play a role in encouraging labour mobility between related sectors, which makes skills and experience move around across sectors. Since most labour mobility takes place at the regional level, policies promoting it will enhance transfer of knowledge between related sectors in regions. In addition to that, labour inflows from elsewhere might bring in new and related knowledge into the region, from which local firms might benefit economically, as BOSCHMA et al. (2009) have demonstrated empirically. Last but not least, networks also provide effective settings through which related knowledge circulates and interactive learning takes place. Policy may act as an intermediary here, enabling knowledge to spill over and diffuse across sectors. For instance, policy could consider supporting those research collaboration networks that consist of partners with different but related competences. This is in line with recent findings like GILSING et al. (2007) who found an inverse U-shaped function between technological distance across firms active in alliance networks in high-tech industries on the one hand, and the exploration performance of those firms on the other hand

5. 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. 'Related variety' or the recognition that over-specialization of economies is as potentially debilitating as over-diversification represents critiques of 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 the regional level.

Thus, the foundation of 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, 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. 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, in this case, 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. The test now is to see if there is willingness by policy makers and other regional stakeholders to utilize this analysis of the achievement of constructed regional advantage to promoting innovativeness and competitiveness in the varieties of European regions.

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	Analytical (science based)	Synthetic(engineering based)	Symbolic (arts based)
Rationale for knowledge creation	Developing new knowledge about natural systems by applying scientific laws; *know why*	Applying or combining existing knowledge in new ways; *know how*	Creating meaning, desire, aesthetic qualities, affect, intangibles, symbols, images; *know who*
Development and use of knowledge	Scientific knowledge, models, deductive	Problem-solving, custom production, inductive	Creative process
Actor involved	Collaboration within and between research units	Interactive learning with customers and suppliers	Experimentation in studios, project teams
Knowledge types	Strong codified knowledge content, highly abstract, universal	Partially codified knowledge, strong tacit component, more context-specific	Importance of interpretation, creativity, cultural knowledge, sign values; implies strong context specificity

Importance of spatial proximity	Meaning relatively constant between places	Meaning varies substantially between places	Meaning highly variable between place, class and gender
Outcome	Drug development	Mechanical engineering	Cultural production, design, brands

Table 1: Differentiated knowledge bases. A typology. (Source: ASHEIM and GERTLER, 2005; ASHEIM et al, 2007; ASHEIM and HANSEN, 2009; GERTLER, 2008).

[i] The distinction between analytical and synthetic knowledge bases was originally introduced by LAESTADIUS (1998, 2007) as an alternative to OECD's classification of industries according to R&D intensity (e.g. high, medium and low tech) arguing that knowledge intensity is more than R&D intensity. For instance, engineering based industries such as paper and pulp can also be considered knowledge intensive even if they do not show up as high-tech industries in statistics. 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 using knowledge bases to show the broader organisational and geographical implications of different types of knowledge (e.g. how innovation processes are organised, and what is the importance of proximity). The third category, the symbolic knowledge base, was added to cater for the growing importance of cultural production (ASHEIM, COENEN, MOODYSSON and VANG, 2007). We acknowledge our debt to the above mentioned colleagues.

[ii] 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.

[iii] This differentiated knowledge base approach has been used in several empirical studies (ASHEIM and COENEN, 2005; MOODYSSON et al. 2008; ASHEIM and HANSEN, 2009), but still more work is needed to develop methods for measuring the concept. Various strategies have already been applied (especially qualitative approaches) and more are under construction: Analytical knowledge base can be identified in general purpose technologies (no one-one relation), and measured by e.g. scientific publications and patents; synthetic knowledge base is more direct product/process oriented, and can be measured both by patents and trademarks, while symbolic knowledge base manifest itself in context-specific products and performances, and can be measured by copyrights and brands. On the level of firms and organisations the patent/publication ratio could be applied making use of keywords in the analyses (a high share of publications indicating an analytical knowledge base); furthermore patent citations could be used where the differentiation between analytical and synthetic knowledge bases would refer to the patent citing other patents (synthetic) or scientific publications (analytical); if the impact of patterns are generic (analytical knowledge) or specific (synthetic); and lastly more qualitative approaches (which have been mostly applied so far) such as innovation biographies and interviews and surveys could be

used. Finally, on a regional level, in addition to using interviews and surveys, register based statistics could be applied. In ASHEIM and HANSEN (2009) occupation-based data categorized by the Swedish nomenclature on occupational codes (ISCO) was used to classify occupations into analytical, synthetic and symbolic knowledge bases. While occupational data helps us to identify people with different knowledge bases, it does not allow to differentiating among industries in which these people work. Thus, ISCO data combined with data on industrial groups (NACE) on a detailed level (a three-digit level or more) would be ideal to construct a knowledge base index. Having NACE and ISCO data separately would not provide the opportunity to upgrade the quality of such data by testing ISCO for NACE. In any case such an index could so far probably only be constructed in countries with a well-developed tradition for statistical information (e.g. the Nordic countries), but would be well worth of trying out to see if it would be possible to transcend the traditional statistics in use today.

[iv] 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).

[v] BERG JENSEN et al. (2007) and Lorenz and Lundvall, 2006 refer to 'forms of knowledge and modes of innovation' distinguishing between the 'Science, Technology and Innovation' (STI) mode of innovation, based on the use of codified scientific and technical knowledge, and the 'Doing, Using and Interacting' (DUI) mode, relying on informal processes of learning and experience-based know-how. In contrast to common understanding, the STI mode cannot only be limited to basic research using analytical knowledge, but must also include synthetic and symbolic knowledge bases (i.e. applied research at (technical) universities), and the DUI mode is not only found in industries based on synthetic or symbolic knowledge as also dominantly analytical based industries (e.g. pharmaceutical and biotech industries) make use of synthetic knowledge and interactive learning in specific phases of their innovation processes (MOODYSSON et al., 2008).