Entrepreneurship policies and the development of regional innovation systems: theory, policy and practice

by

Helen Lawton Smith
Department of Management
Birkbeck & Director of Research, Oxfordshire Economic Observatory, Oxford University
h.lawton-smith@bbk.ac.uk

Abstract:

The regional innovation systems (RIS) approach tends to be short in the coverage of the importance of agency in the dynamics of economic change. This paper addresses this by putting the entrepreneur, which Schumpeter (1911/1934) placed at the heart of the analysis of economic change, as the driving force of regional innovation systems and associated policies. This is consistent with work by Feldman and Francis (2006) who identified the entrepreneur as a regional agent of change.

The paper provides an appraisal and synthesis of the regional innovation systems approach in relation to entrepreneurship policies. It addresses a number of areas where theoretical, empirical and policy-based issues are currently under-developed in relation to entrepreneurship and entrepreneurship policy. There are three major themes. The first is the agency of both entrepreneurs and entrepreneurship policies in an RIS. The second is the rationale for entrepreneurship policies in an RIS. The third relates to what do entrepreneurship policies look like in RIS and how they might be evaluated as contributing towards an RIS.

1. Introduction

One of the greatest weaknesses of the regional innovation systems (RIS) concept, as of all other innovation system concepts, is its neglect of the determinant "entrepreneurship" as far as the actors and elements of an RIS are concerned (Sternberg and Muller 2005). Definitions of RIS stress the role of intra-regional networks and linkages between innovation actors (see for example Asheim et al., 2011a) but generally do not explicitly consider entrepreneurial activities of very young firms. Sternberg and Muller (2005) find this surprising as, citing Feldman

(2001), they point out that entrepreneurial activities are to a large extent a regional event. They argue that local conditions are more significant in whether an individual decides to be an entrepreneur and whether a firm survives and grows. Moreover, the agency of entrepreneurs as innovators is missing. It is a key driver of change (Schumpeter 1911/1934) and hence a driver of change of an RIS that incorporates entrepreneurship policies. Moreover, an RIS must have strength not only in innovation, but also the capacity to generate and attract entrepreneurship and talent (Cooke 2007).

The rationale for a focus on entrepreneurship therefore is that start-up firms have been proposed as 'the embodiment of innovation' (Feldman 2001, 861). Schumpeter (1911/1934) saw "entrepreneurs as innovators" as introducing new combinations such as new goods, new methods or processes, new markets, or the new organization of an industry (Malecki and Spigel 2013). Later Schumpeter (1942) saw large enterprises as sources of change and impact on innovation, having more resources for research and development. He failed to see, however, that entrepreneurial start-ups as well as large firms would continue to play a major role in economic development.

Indeed, as (Hekkert et al. 2007, 421) argue "There is no such thing as an innovation system without entrepreneurs. Entrepreneurs are essential for a well functioning innovation system". Earlier, Feldman et al. (2006) argued that entrepreneurs may act collectively and in so doing create economic competitiveness. They may then actively shape local environments by building institutions that further the interests of their emerging industry by building capacity that will sustain economic development (Feldman 2014). A tension here is that the role of policy-making. If it appears at all

then it is secondary to the agency of entrepreneurs to develop governance mechanisms that have reinforcing effects on entrepreneurial activity.

A rationale for entrepreneurship policy is that, as Malecki and Spigel (2013) point out, entrepreneurs have to learn more from their local environment and other actors within it than do large firms (Zahra et al. 2006). By implication, they can gain significantly from entrepreneurship policies which help them to learn. Moreover, the co-existence of larger (anchor firms) and smaller firms in a regional economy is a further tension in local policies designed to support entrepreneurship per se. Policies which support anchor firms and their networks as they 'affect not only the creation of new organisations but also the transformation of existing ones' (FRIDA project)[1] and support competition between anchors, might be more effective than entrepreneurship policies per se.

Thus, the argument for the importance of entrepreneurship policies in RIS is that business activity is embedded in a socio-institutional and economic context. In other words there is an interrelationship between context - the regional environment - and entrepreneurial activities. This regional environment includes policy frameworks (national, regional, local). As Iammarino (2005) notes, citing Feldman and Martin (2005), firms' success and regional economic growth are mutually dependent. Threefold theory approaches are in effect embedded in the notion of entrepreneurship policies in RIS: theories about entrepreneurs, theories of the firm (e.g. Penrose 1959), and theories of innovation.

[1] http://www.scoopproject.org.uk/1frida-anchor-firms-contribute-to-regional-development.aspx (accessed April 18 2017)

Against this context, the proposition being explored is that entrepreneurship policies themselves are a response to changes in an RIS. In effect a demand by entrepreneurs for policy has been created. In turn that collection of policies leads to further evolution of the RIS. This paper makes the case for entrepreneurs and hence for entrepreneurship policies in shaping RIS. The paper poses three questions. The first is why should the agency of both entrepreneurs and entrepreneurship policies be recognised in the RIS? The second is what is the rationale for entrepreneurship policies in RIS? The third is what do entrepreneurship policies look like in RIS? The focus here is on different stages in the emergence of RIS and of entrepreneurial firms, hence how a demand for policy changes over time. As Motoyama et al., (2014) recognise, entrepreneurs need different kinds of policy support at different stages in their development.

The paper proceeds by reviewing the literature in related to each of the three questions. This is in order to identify where there are gaps and inconsistencies in previous analyses and to provide evidence on both. The paper concludes that the lack of attention to entrepreneurs (and enterprises) and entrepreneurship policy means that the agency of both to bring about system change is underplayed in conceptualisations of RIS. However, recent evidence suggests that an increasing regional policy focus on entrepreneurship, enterprise and innovation in some places in Europe is bringing about beneficial systemic change.

2. Entrepreneurs in RIS

We first consider why the agency of both entrepreneurs and hence entrepreneurship policies should be recognised in the RIS literature. Since the RIS concept was developed by Cooke (1992) entrepreneurs and policy-making per are either implicit or explicit. In some formulations innovation policy implications are discussed.

Examples of where entrepreneurs are implicit in their analysis include Doloreux and Parto (2005) who identify three features of RIS. These are interactions between different actors in the innovation process, the role of institutions, and the use of regional innovation systems analysis to inform policy decisions. Asheim and Coenen (2005, 1174) also focus on interactions and define RIS as "interacting knowledge generation and exploitation subsystems linked to global, national and other regional systems" that may stretch across several sectors in the regional economy. Entrepreneurs are implicit as being part of knowledge exploitation – as well as knowledge generation systems. Later (Asheim et al. 2011a) defined RIS as 'encompassing all regional economic, social and institutional factors that affect the innovativeness of firms' (page 48). In this version there is a central role for innovation policy in shaping the conditions for innovation and constructing regional advantage, but the focus is on firms rather than from entrepreneurs.

Howells (1999) earlier included the role of the public sector and innovation policy as one of the nine characteristics of a top down RIS but also without reference to entrepreneurs. They are implicit, however, in the discussion of the interdependent

relationship between firms' business environments and their success – hence the importance of policy being based on the identification of localised patterns of economic change (Iammarino 2005). Iammarino (2005), adapting from Howells identified a bottom-up approach to RIS with localised intervention as one of its six characteristics. These are, however, not mutually exclusive and are often interactive and reinforcing.

This analysis points to problems in theory in such interpretations of RIS. As Asheim et al. (2016) point out, different types of region face different types of systemic problems. This is because of structural differences in different contexts (Asheim et al. 2011a) which present challenges for policy makers in formulating region-specific innovation policies. Differences include not only the primacy of the role of entrepreneurs, compared to other actors (e.g. large firms, the balance of large and small firms, universities see Braczyk et al., 1998) but also the extent to which they are Schumpeterian innovators or as is the case of most entrepreneurs, not innovative and likely to stay small (NESTA 2009, Storey and Greene 2010).

Further developments of the RIS concept in which entrepreneurs specifically have played a role in regional change have followed, either as advances in RIS thinking or as related concepts. Cooke (2004) focused on technological and political changes and associated market behaviour. He argued that the knowledge economy has posed new problems from the early model of three different RIS forms: grassroots, network and dirigiste. He distinguished an Institutional RIS from an Entrepreneurial RIS (ERIS). The latter offers good conditions for radical innovation and new industries to flourish, for example in countries such as the US and UK (Asheim et al., 2016). Cooke's ERIS

recognised the importance of entrepreneurs in the form of serial start-ups and by implication policy areas such as incubators and venture finance.

Institutional RIS (IRIS)	Entrepreneurial RIS (ERIS)
Research & Development Driven	Venture Capital Driven
User -Producer Relations	Serial Start -ups
Technology -Focused	Market -Focused
Incremental Innovation	Incremental& Disruptive
Bank Borrowing	Initial Public Offerings
External Supply - Chain Networks	Internal EcoNets *
Science Parks	Incubators

Table 1 Knowledge Economy Problem Tendencies: Co-ordinated markets to Liberal-markets
Source: Cooke 2004

The ERIS has a marked orientation towards individual actors and behaviour type of research, while the IRIS has more similarities with conventional innovation system research (Ylinenpas 2009). While the types of policy implications are different in building RIS, the two are not mutually exclusive and are not treated here as definitive types rather as an example of a conceptualisation of how RIS may change over time.

Cooke (2016) suggests that the most obvious RIS to transmute into an ERIS more successfully, already by now a platform of intersecting clusters, is Silicon Valley. This is because it does not directly rely on the kind of public regional innovation policy strategising that is found in Europe and many "developmental states" like Singapore and Taiwan in Asia where he suggests that the IRIS system is more pronounced.

Moreover, the emphasis on the entrepreneur may be misplaced. Cooke (2016) for example prefers an emphasis on the enterprise in systems approaches. Defining

entrepreneurship policy, however, is not straightforward as it overlaps with SME and enterprise policy (McCann and Ortega-Ariles 2015), discussed later. Further, while entrepreneurship is a local phenomenon it is subject to the influence of a multitude of policy measures that are either not local or are not identifiable as entrepreneurship policies (Acs et al. 2016).

Entrepreneurship policy, as Acs et al., argue, is often an outcome of other policies. These are often national but have geographical specific outcomes and are therefore not mutually exclusive with other policy scales. In the implementation of entrepreneurship policies, there further issues include whether new organisations are needed to fulfil new roles, whether ones that are seen to be lacking in the system need to be created or whether existing ones are adapted so that they address new realities (Uyarra and Flanagan 2013) and thus changing in the face of constantly evolving RIS (Tödtling and Trippl 2013). A further reality check is that most western policies for entrepreneurship have failed (Acs et al. 2016).

Later Isaksen et al. (2016), distinguished between organisationally thick and diversified RIS, organisationally thick and specialised RIS, and organisationally thin regions and RIS. In this conceptualisation, there is a different presence of entrepreneurs, their firms and activities and resources, available within a region. They make the distinction between system-based and actor-based policy approaches. They suggest that the former aims to improve the functioning of the RIS by targeting system failures, promoting local and non-local knowledge flows and adapting the organisational and institutional set-up of the RIS. This is through targeting improved coherence and communication within actor groups. Rather different are actor-based

strategies which support entrepreneurs and innovation projects by firms and other stakeholders such as universities. They argue that both strategies will have only a limited impact on regional economic change when applied alone. This relates to Hudson's (2011) experience of policies in the UK's North East (below). They also miss the agency of entrepreneurs who through their presence create a demand for policies.

Qian et al. (2013) develop the concept of regional systems of entrepreneurship. Their aim is to develop a systematic investigation of regional variation in knowledge-based entrepreneurial activity. Their 'model is built upon the absorptive capacity theory of knowledge spillover entrepreneurship that identifies new knowledge as one source of entrepreneurial opportunities and human capital as the major source of entrepreneurial absorptive capacity' (page 1). They propose a three-phase structural model for knowledge-based regional entrepreneurship systems, in which human capital attraction and knowledge production underpin a boom of new firm formation. Within this conceptual framework, they highlight regional factors that may interactively influence the creation, discovery and exploitation of entrepreneurial opportunities.

Spigel (2015) has sought to elaborate a related concept of entrepreneurial ecosystems. He argues that the attributes of entrepreneurial ecosystems are that they are combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures. He identifies 10 such cultural, social, and material attributes that compose entrepreneurial ecosystems that provide benefits and resources

to entrepreneurs and such that the relationships between these attributes reproduce the ecosystem. Cooke (2016) finds the focus on the entrepreneur and entrepreneurship atomistic, undifferentiated (except in terms of "high-growth") locked into a profit-motive driven perspective.

More recently Lindholm-Dahlstrand et al., (2016) developed the concept of entrepreneurial systems of innovation. This is an analytical and conceptual approach designed to understand the workings of entrepreneurial experimentation in innovation systems, as well as how this experimentation feeds the systems' capacity to generate innovations and economic growth. They argue that entrepreneurial experimentation comprises both 'technical' and 'market' experimentation, and that entrepreneurship must be conceptualized in terms of its function in innovation systems rather than as an outcome. The central function of entrepreneurial experimentation is to foster creation, selection and scaling-up of innovations at the systems level. Examples of micro-mechanisms that feed into system-wide entrepreneurial experimentation include spinoffs and acquisitions. Moreover, interaction between established organizations and new innovative entrants, through spinoffs and acquisitions, is an important characteristic of vibrant entrepreneurial systems of innovation. These characteristics tend not to be dealt with in detail in the RIS concept.

In sum, entrepreneurs have become to assume a more explicit role in conceptualisations of RIS and related systemic approaches. Alongside this focus are implicit and sometimes explicit implications for theoretical bases of policy formation. Next we examine the rationale for entrepreneurial policies in RIS.

3. Entrepreneurship policies in RIS: rationale

Policy is intended to be enabling, empowering, and sustaining of the roles of entrepreneurship and enterprise policies in RIS. The proposition is that the policy role changes as the entrepreneurial base of a region, including its entrepreneurs, as individuals and in aggregate, develops. This change means that the nature of RIS become more dynamic, interactive and sustainable as policy advances, in principle to reflect changes in the economic base of a region and in the mindset of its population. Acs et al. (2016) suggest that, if it is accepted that entrepreneurship is a deeply ingrained feature of many Western economies, then it would be no surprise that successful policy measures are likely to involve subtle and pervasive policy initiatives that have the unintended consequences of changing people's minds about the costs and benefits of entrepreneurship. However, in practice there is the issue of whether or not entrepreneurship policy is an add-on to other policies, such as SME policy or other industrial policy (Stevenson and Lundstrom 2002). A further complication is the pattern that those regions which are entrepreneurial persistently tend to stay so independently of policy intervention (Fritsch and Storey 2014).

To illustrate the overlap between entrepreneurship and enterprise policies, McCann and Ortega-Ariles (2015) classify entrepreneurship policy as applying to the creation of new enterprises while SME policy applies to existing enterprises.

Entrepreneurship policy	SME policy
Reducing administrative and bureaucracy burden to starting firms	Reducing administrative and bureaucracy burden to sustaining and growing firms
Access to micro loans and seed funds	Access to capital/financing (risk reduction tools)
Provision of information services about start-up	Provision of information services about growth
Highlighting entrepreneurs as role models – gender, ethnicity, age	Exporting and marketing services
Entrepreneurship education	Public procurement
Facilitating network services	Technology transfer and innovation
Incubators and mentoring	Incubators, accelerators, science parks and mentoring
	Value chain development – anchor firms
	Skills development
	Succession planning
Tax incentives for R&D	Tax reduction, tax incentives for R&D

Table 1 Entrepreneurship and SME strategic policy framework
Source: Adapted from McCann and Ortega-Ariles 2015.

Within this classification are different kinds of entrepreneurs which policy-makers might seek to target (see Acs et al. 2016). These include new entrepreneurs in particular sectors, female/male, academic, student, serial, high growth oriented (NESTA 2009). There is some common agreement in the literature as to areas where entrepreneurship policy might be targeted that would help develop and or sustain entrepreneurial regions. These include facilitating access to entrepreneurial resources which are assets, tangible and intangible and are mobilized by entrepreneurs in the process of building a business, organization, or other initiative key elements; finance; human resources including management skills; networks – contacts and advice, property and other infrastructure and equipment[2]. These must be instrumental in the development of a business. Another key target includes the fostering of an entrepreneurial culture. One interpretation of the role of policy is as a network broker to act as a facilitator and connector as in "entrepreneurial ecosystems" (Spigel 2015).

[2] https://www.reference.com/business-finance/examples-entrepreneurial-resources-8ffc0345a58512be# Accessed Jan 2 2017

Sternberg and Muller (2005) suggest that new firms should be a priority target as they are crucial for a self-perpetuating process of renewal and restructuring of the knowledge base (see also Feldman 2001). Agency of entrepreneurs is recognised but here the focus is on novel Schumpeterian entrepreneurs rather than on more routine entrepreneurs (Acs et al. 2016). However, policy choices will be informed by options created/limited by different kinds of knowledge bases (Asheim and Coenen 2005) as well as the profile of the enterprises in a region.

The reality is that most entrepreneurs are in the service sector and are unlikely to innovate or conduct R&D. Moreover, most new firms do not generate employment other than for the entrepreneur, and have no interest in expanding. Thus an enabling environment might not be enough to change behaviour. Moreover, Acs et al. (2016) also find evidence of policies for example on labour markets and capital markets, that have simply failed to correct the market failures that they were designed so to do. They suggest instead that the interventions required are likely not to sound like entrepreneurship policy.

An application of how entrepreneurs might be best supported based on both points comes from Nauwelaers and Wintjes (2003). It is to classify regional innovation policies into two core types: system orientated (regional) which principally concern network building and brokering, cluster development, innovation system development, cooperation and mobility; and firm-oriented which principally concern access to human capital (e.g. business support and advice, financial capital or physical capital), and are generally aligned with a range of policies focused on entrepreneurship in its broadest context (Huggins and Thompson 2016).

Of the variety of targets for entrepreneurship policy, three interlinked resources provide illustrations of why they are important in supporting entrepreneurs: networks and associated ideas of an innovation and entrepreneurial culture; human capital; and the actual importance of universities in technology transfer. The implications for how each might in turn shape an RIS are considered.

Networks assume a central importance in discussions of regional innovation systems analyses and those which deal explicitly with entrepreneurship in different types of system. Huggins and Thompson (2016) find that successful regional economies have efficient innovation systems resulting from high levels of entrepreneurship and effective network mechanisms. Those with weaker economies are those with failing innovation systems and lower levels of entrepreneurship and less well developed networks. They contend 'that the nature of knowledge networks held by entrepreneurial firms is a key driver of regional rates of innovation and subsequent growth' (page 14). They propose that a key determinant of regional innovation and growth is the capacity for entrepreneurial firms within regions to establish the network capital necessary for innovation. They point out that entrepreneurship has a regional dimension with differences in start-up rates, the success of start-ups and entrepreneurial attitudes. This suggests that the regional environment has a role in fostering entrepreneurship. Earlier Asheim and Isaksen (2003) had argued that policy could make a difference because endogenous regional development is unlikely to occur without policy intervention to stimulate network formation.

Nauwelaers and Wintjes (2003) suggest that there is a clear requirement to ensure sufficient absorptive capacity and human capital within the regional base of entrepreneurial firms. A policy application of this idea is that more could be done to educate firms in key principles of network management, including a widening regional focus and extending networks to more spatially extensive network systems. Regional policy can play a role in empowering entrepreneurial firms by supporting their being equally treated when establishing joint knowledge-based ventures and strategic alliances with larger firms (p.120).

Similarly Motoyama et al. (2014) advise that policymakers, entrepreneurship supporters, and entrepreneurs themselves should keep in mind the locally structured nature of entrepreneurial networks. Thus, it will be most effective to communicate with entrepreneurs within a local sphere. They suggest that when creating or promoting new entrepreneurship programmes, policymakers and entrepreneurship-supporters should consider what types of entrepreneur are already served by current existing programs and what types of entrepreneur are still under-served.

The location of high quality human capital is related both to the source of entrepreneurs and to performance of innovative firms, both of which have reinforcing effects. Growing firms create demands for labour which may or may not be supplied locally. However, the quality of labour markets for the highly skilled varies regionally, with some places more favoured than others. Lawton Smith and Waters (2011) for example, position the conceptualisations of the development and function of regional innovation systems with reference to flows of labour and individuals' knowledge and competences in and through geographical spaces.

Their empirical analysis, evidence from a study of scientific labour markets in Oxfordshire and Cambridgeshire in the UK, shows considerable mobility into each region. This supports the argument that the agglomeration of skills (Berry and Glaeser 2005) is the key component of the making of RIS. It is high levels of human capital that are found to be the source of entrepreneurship (Fritsch and Schindele 2011). The two counties – places which started with higher levels of human capital than most of the rest of the UK - have attracted more skilled people over the last two decades, with demand created by local entrepreneurs, thus creating RIS of particular kinds i.e. those based on analytic knowledge with strong accumulations of codified knowledge.

Other work on mobility, in particular that of return migration, has been identified as being significant in creating an RIS and crucially important in institutionally thin RIS, which are those mainly in non-Western industrialised economies (Sternberg and Muller 2005). These authors report on the case of the biotech sector in China. There, entrepreneurial return migrants enable regions to create high-tech industries and real RIS which are open to inter-regional forces, and are characterised by increasingly inter-regional linkages and networks.

Smilarly, Qian et al., (2013) conclude that human capital attraction and knowledge creation directly promote high technology entrepreneurship. This implies that public policies should be made to encourage the development of high technology industries. They also recognise that this might not be effective for many regions, at least from the cost-benefit perspective relating to the point made by Asheim et al. (2016) on different types of contexts.

The interdependence of processes, hence the problems facing policy makers, is given by Hudson (2011). He found that in the North East region of the UK, regional policy centred on entrepreneurship and the creation of small firms, but the strategy failed to ensure that the necessary skill base was created in the labour force and so failed to bring about significant regional development. In other cases, it is high levels of human capital that are found to be the source of entrepreneurship (Fritsch and Schindele 2011). As Lawton Smith and Waters (2011) point out, compared to the North of England the rest of the UK has attracted more skilled people over the last two decades, in response to a demand created by local entrepreneurs.

Universities sometimes appear as key organisations in the making of RIS (Brown 2016) and other systems that focus on the entrepreneur. Spigel (2016) for example, is clear that policy (economic policies and regulatory frameworks) and universities are important pillars of an entrepreneurial ecosystem which combines social, political, economic and cultural elements within a region. Brown takes issue with this policy emphasis. He presents empirical evidence suggesting the entrepreneurial spillovers from universities have been greatly exaggerated, especially in some peripheral regions. The explanation offered for this poor performance hinges on the substantive disconnect between universities and their surrounding local entrepreneurial and innovation ecosystems. Despite their marginal economic contribution, the author claims that 'policy entrepreneurs' play a powerful role in cumulatively reinforcing the dominant role of universities through a process of 'institutional capture', the outcome of which results in a form of 'policy lock-in'.

A number of issues revealed in this section relate to the rationale (theory and evidence) of entrepreneurs and entrepreneurship policies in RIS, and the subsequent reshaping of RIS relates to differing targets of policy. These include the kinds of knowledge bases, different targets of policy (entrepreneurs versus enterprises (McCann and Oretga-Ariles 2015) (and the overlaps of both); and whether policies are aimed at the individual entrepreneurs or firms, or are based on an entrepreneur or system (Nauwalers and Wintjes 2003) or system or actor based approaches (Isaksen et al., 2016). A further problem lies in the assumptions as to which organisations and organisational forms have the agency to bring about changes to RIS in relation to entrepreneurship, and the form that the choices then take.

4. Policy in practice

One of the difficulties in exploring the relationship between entrepreneurship, entrepreneurship policies and the shaping of RIS is, as Cooke (2003) points out, that the innovation needs of the firms in the region (or entrepreneurs) have not been systematically assessed. Cooke (2003) argues that this results in an insufficient interaction between industry and the (innovation) support system. The effectiveness of the innovation support system, in terms of its economic contribution to growth, may be significantly improved when this mismatch is overcome.

The need for such analysis is made by Carlsson et al., (1999) who asked what is the appropriate level of analysis?, how is a system delineated and which actors form the

components; what are the key relationships that need to be captured so that the important interaction takes place within the system rather than outside? The corollary is, how is the performance of the system to be measured? Is this measurement to be at system level rather than at the component level?

Some studies have attempted to measure entrepreneurial performance based on a theoretical underpinning of what contributes to performance. By implication they also consider the performance of entrepreneurship policies. General studies include Ahmad and Hoffman (2007) for the OECD[3] and the EU's Entrepreneurship indicator programme[4] (EIP) which 'aims to collect internationally comparable statistics to enable the "measurement" of entrepreneurship i.e. to measure entrepreneurial performance and its determinants and impact' and develop policy relevant indicators on entrepreneurship. Also providing detailed information and analysis on entrepreneurship is the Global Entrepreneurship Monitor[5]. GEM considers two elements: entrepreneurial behaviour and attitudes of individuals, and the national context and how that impacts entrepreneurship

Next two reports which examine entrepreneurial performance at the regional level are considered in the light of what they contribute to understanding of entrepreneurship policies and RIS. These are Santander (2014) and the European Entrepreneurial Regions project[6].

[3] http://search.oecd.org/std/business-stats/39629644.pdf (accessed April 23 2017)
[4] http://ec.europa.eu/eurostat/web/structural-business-statistics/entrepreneurship/indicators (accessed April 23 2017)
[5] http://www.gemconsortium.org/ (accessed April 23 2017)
[6] Another study have explored how to measure entrepreneurial ecosystems at the regional level https://www.henley.ac.uk/files/pdf/research/papers-publications/CFE-2015-02_Szerb_et_al.pdf (accessed April 23 2017).

Santander (2014) reports that entrepreneurial performance is driven by each of 'Attitudes', 'Ability', and 'Aspirations.' The Santander Enterprise Index (SEI) identifies bottlenecks to performance at regional level[7], thence the performance of RIS. Based on this, regions are benchmarked. The index shows how effectively entrepreneurship is supported across the country and shows that overall the UK performs well, at least in the EU context, with its regions ranked between 2nd and 59th of 125 EU regions.

The analysis, which assesses factors within categories of ability, attitude and aspiration, reveals large variations between the performances of the different UK regions. This is primarily due to a greater premium being placed on aspiration in certain areas of the UK. Santander believes that boosting aspirations in the lower ranked regions will be vital in encouraging enterprise in those locations. London's strong performance in the SEI ranking is due to its 'aspiration premium'. While societal and economic infrastructure in the rest of the UK is strong, entrepreneurs and potential entrepreneurs do not appear to be displaying the same confidence to take advantage of it as their peers in London; too few are getting new products to market, adopting new technologies, or exporting their products and services overseas. The Global Entrepreneurship and Development Institute (GEDI), which did the analysis, believes that this relative weakness in aspirations may be acting as a bottleneck that is preventing many UK regions from performing to their maximum potential.

---

7 http://www.santander.co.uk/uk/infodetail?p_p_id=W000_hidden_WAR_W000_hiddenportlet&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=3&_W000_hidden_WAR_W000_hiddenportlet_javax.portlet.action=EventLauncherIdContentAction&_W000_hidden_WAR_W000_hiddenportlet_base.portlet.view=ILBDInitialView&_W000_hidden_WAR_W000_hiddenportlet_cid=1324572409786&_W000_hidden_WAR_W000_hiddenportlet_tipo=SANContent (accessed January 11 2017)

The European Entrepreneurial regions (EER) project[8] identifies and rewards EU regions which show an outstanding and innovative entrepreneurial policy strategy, irrespective of their size, wealth and competences. A key element is the vision put forward by the region in being granted the label "European Entrepreneurial Region" for a specific year (see Lawton Smith 2016). Thus entrepreneurial policies in shaping an RIS are both part of its organisation, a response to perceived local need, and a reflection of stakeholder engagement in producing that vision.

An evaluation report divided the EER regions into two main groups. The first, 'Group A' includes regions in the 'Imitative innovation area' and in the 'Smart and creative diversification area.' They base their innovation strategy on addressing a regional need or weakness in order to improve regional creativity and attractiveness. These regions – Marche, Northern Ireland, the Region of Valencia, Nord Pas de Calais and the Region of Murcia – have a prevalence of traditional sectors.

The second, 'Group B', includes regions in the 'Smart tech application area', 'Applied science area' and 'European science-based area.' Their innovation strategies reflect their structural strengths. These regions - Brandenburg, Helsinki-Uusimaa, Lisbon, Southern Denmark and Styria - are comparatively better endowed with advanced clusters, research centres, a high level of R&D expenditure and an endogenous capacity of knowledge creation and receptivity, compared to the EU average.

[8] http://cor.europa.eu/en/documentation/studies/Documents/Forstering_innovation_EER.pdf (accessed January 12 2017

In relation to the one of the three areas of policies examined in section 3: networks and the associated idea of entrepreneurial culture, the finding is that they foster or address the ‘culture of innovation’. EER strategies emphasise the importance of innovation in stakeholders. The second aspect concerns the adoption of a ‘bottom-up’ approach. In order to stimulate R&D and raise awareness about the importance of innovation, both groups have focused on involving the relevant stakeholders from the start.

There is a common willingness of all the EER regions to improve and support the relationship between universities or research centres and SMEs. A further characteristic, which is common to both groups, is the idea that each policy initiative for innovation should enhance human capital. The next element of the EER regions' policy vision is creating new market opportunities for SMEs through innovation initiatives. The last characteristic is a structured and comprehensive innovation policy in which initiatives and projects are implemented. Most EER regions are including their initiatives under the RIS3 strategy, which guides and monitors regional innovation and entrepreneurship policies.

The main achievements of EER both at SME and territorial level, identified by Committee of Regions (COR) (2015) are shown in Box 1.

• The change in stakeholder behaviour.
- All the EER experiences demonstrate important changes in stakeholder attitude towards innovation and investment in R&D.
• An increase in R&D investment, especially among SMEs.
• An increase in employment.
• Better collaboration between the research sector (universities in particular) and enterprises.
• An increase in the number of innovative start-ups.
• The creation of new business opportunities.
• Positive externalities for the territories. Innovation initiatives are an important policy instrument to combat the negative effects of the financial crisis.

Box 1 Main outcomes of EER strategy in selected regions

Source: COR 2015.

These combine system elements (e.g. changes in attitude and aspirations, positive externalities, networks) and actor components (e.g. increase in the number of innovative start-ups). However, a tension between a conceptual and practical distinction between entrepreneurship, enterprise and innovation policies is clearly illustrated in the conclusions on the achievements of these policies.

Tödtling and Trippl (2013), like COR, identify how policy systems change alongside changing knowledge application systems, knowledge generation and supporting systems. In their framework, examples are given of new policy strategies which combine entrepreneurship and innovation foci e.g. promotion of networks, innovation policies, picking the winner approach e.g. BioRegio in Germany, to new funding agencies e.g. in Austrian regions, and reorganisation of existing policy networks e.g. in Styria.

Returning to Hudson (2011), this author effectively summarises key themes raised in the paper so far: the possibility of transformation of RIS through entrepreneurship and

entrepreneurship policies, the importance of different kinds of knowledge bases, changes in policy agenda over time, and the policy recognition of the interdependence between different kinds of entrepreneurial resources, hence for broader policy capacity.

The two cases of successful transformation that he discusses both depend on the development of *related varieties* of the region's knowledge base (see Asheim et al., 2011a). Hudson considers the changing character of knowledge in three phases of North East of England economy: (i) the creation of the workshop of the world; (ii) the branch plant economy; and (iii) the new-science-based industries and knowledge transfer from the region's universities. He argues that what is different is the changing significance of knowledge, the varying mixes and types of knowledge, and routes through which they flow into production of goods and services.

He argues that the potential lessons from the cases of successful transitions of the 1990s appear not to have played a major role in the development of the most recent strategy. The problem of transferring and translating analytic knowledge from the universities was not initially addressed, instead the strategy emphasised the promotion of Porterian clusters. Only later was the approach to technology transfer worked out. Hudson notes that it is too early to know how successful the strategy will be, not least because knowledge is only one form of capital and varieties of capital, most notably investment in fixed capital and human capital, are needed to sustain economic development and competitive advantage. As a consequence, entrepreneurship policy also needs to be sensitive to new demands and, following from Acs et al., (2016), they

also need to take account of what other de facto entrepreneurship policies exist in the vision of what the RIS policy aims to achieve.

5. Conclusions

The purpose of this paper is to explore a series of issues relating to the role of entrepreneurs in an RIS entrepreneurship policy framework, both theoretical and practical. A basic problem is as Asheim et al. (2016) point out, that different types of regions face different types of systemic problems. These arise from basic structural differences in different contexts (Asheim et al. 2011a) which present challenges for policy makers in formulating region-specific innovation policies.

To explore these issues, three main themes have been addressed. The first is why should the agency of both entrepreneurs and entrepreneurship policies be recognised in conceptualisations of RIS? An answer to this is that entrepreneurship is a regional event (Feldman 2001), and a significant one in economic development.

The second is the rationale for entrepreneurship policies in RIS. Here we suggest that policies are intended to be enabling, empowering and sustaining entrepreneurship, enterprise and innovation. We considered networking, human capital and technology transfer as three key elements in these processes. A related question is how entrepreneurship policies help build RIS and whether they are able to adapt over time? The evidence suggests that how RIS are shaped and reshaped relates to different targets of policy as well as policy assessment of what is needed to build on underlying knowledge bases.

The third issue relates to what do entrepreneurship policies look like in RIS and how are they evaluated as contributing towards an RIS? The focus here is on different stages in the emergence of an RIS and of entrepreneurial firms, and hence how the demand for policy changes over time, and how effective policy is. The proposition being explored is that entrepreneurship policies themselves are a response to changes in an RIS. As Motoyama et al., (2014) recognise, entrepreneurs need different kinds of policy support at different stages in their development. This aspect relates to the challenge for entrepreneurial policies of keeping up to date with developments thus possibly hindering the development of an RIS (Isaksen et al. 2016) that has entrepreneurship as a driving force. Their three RIS types require rather different combinations of actor-oriented and system-oriented policy measures.

A number of tensions have emerged in this brief summary. The first relates to defining entrepreneurs when they vary enormously (age, gender, sector and so on). A second is that there is the lack of a clear distinction between entrepreneur, enterprise and innovation policies in the literature and in policy documents e.g. EER. Third, enterprises vary considerable for example in the extent to which they are innovative and have intentions to grow (NESTA 2009, Acs et al. 2016).

Moreover, as Acs et al. pointed out, there is a problem in distinguishing entrepreneurship policies from other kinds of policy interventions. Evidence provided by Hudson (2011) highlights the problem of policy-makers needing to take account of the interdependencies between different kinds of policy processes. All of these lead to the problem of how such varied agenda on entrepreneurship can be successfully

incorporated into the several different models of RIS. Specifying which policies are actor-based or system-based policies is a further challenge (Nauwaelers and Wintjes 2003, Isaksen et al. 2016).

Lastly, Fritsch and Storey (2014) show that there is a pattern that some regions which are entrepreneurial stay so for some time independently of policy intervention. Thus entrepreneurship policy has been absent in shaping some kinds of RIS, particularly those based on high-tech entrepreneurship. Thus there is a link between entrepreneurship and RIS, as identified by Feldman (2014) but not necessarily that of entrepreneurship policies and RIS.

In others, evidence from the EER initiative indicates that in some regions, entrepreneurship policies do make a difference in how regions operate. They do this by tackling a combination of entrepreneurship, enterprise and innovation polices which encompass economic, social and institutional factors (Asheim et al. 2011a). These include entrepreneurial cultures and networks, human capital and technology transfer. It seems that a key factor in whether entrepreneurs shape an RIS is that of aspirations, both of individuals i.e. Schumpeterian entrepreneurs, and of the policy actors who are there to support them.

6. References

Acs, Z. J., Autio, E., & Szerb, L. (2014) National systems of entrepreneurship: Measurement issues and policy implications, *Research Policy*, 43(3): 476–494. doi:10.1016/j.respol.2013.08.016

Acs, Z.Astebro T, Audretsch, D. Robinson, D T (2016) 'Public policy to promote entrepreneurship: a call to arms' *Small Business Economics* 47:35–51

Asheim, B and Coenen, L (2005) Knowledge bases and regional innovation systems: Comparing Nordic Clusters *Research Policy* 34 8, 1173-1190

Asheim, B.T., Lawton Smith, H. and Oughton, C. (2011a) 'Regional innovation systems: theory, empirics and policy', *Regional Studies*, 45: 875-891.

Asheim, B Boschma, R and Cooke, P (2011b) 'Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases', *Regional Studies*, 45:7, 893-904, DOI: 10.1080/00343404.2010.543126

Asheim, B Grillitsch, M and Trippl, M (2016) Regional Innovation Systems: past – present – future Paper 2 in R Shearmur, C. Carrincazeaux and D. Doloreux (eds) *Handbook of Geographies of Innovation* Cheltenham: Edward Elgar 45-62

Berry C R. and Glaeser E L (2005) 'The Divergence of Human Capital Levels Across Cities' NBER Working Papers 11617, National Bureau of Economic Research, Inc. http://www.nber.org/papers/w11617 (accessed January 30 2017)

Braczyk, H., P. Cooke and M. Heidenreich (eds.) (1998), Regional Innovation Systems (London: UCL Press). Capra, F. (2002), The Hidden Connections (London: Harper Collins).

Brown, R (2016) Mission impossible? Entrepreneurial universities and peripheral regional innovation systems *Industry and Innovation* 23, 2 189-205

Carlsson, B Jacobsson, S Holmén, M and Rickne, A (1999) 'Innovation systems: analytical and methodological issues' http://www.druid.dk/conferences/summer1999/conf-papers/carlsson.pdf (accessed January 30 2017)

Cooke, P. (1992), "Regional Innovation Systems: Competitive Regulation in the New Europe", *Geoforum*, 23, pp. 365-382.

Cooke, P. (2003), 'Editorial: the evolution of biotechnology in three continents: Schumpeterian or Penrosian?', *European Planning Studies*, 11 (7), 757–63.
Cooke P (2004) Regional Innovation Systems – an Evolutionary Approach. In Cooke, P., Heidenreich, M. and Braczyk, H-J. (eds.) *Regional Innovation Systems: The Role of Governance in a Globalized World*. London New York: Routledge

Cooke, P (2006) *Regional Innovation Systems as Public Goods* http://www.unido.org/fileadmin/import/60022_04_regional_innovation_systems_public_goods.pdf (accessed may 15 2016)

Cooke, P. (2007) 'Regional innovation, entrepreneurship and talent systems', *International Journal of Entrepreneurship and Innovation*, 7: 117-139.

Cooke, P (2016) 'The virtues of variety in regional innovation systems and entrepreneurial ecosystems' Journal of Open Innovation: Technology, Market, and ComplexityTechnology, Market, and Complexity2016 **2**:13 **DOI:** 10.1186/s40852-016-0036-x https://jopeninnovation.springeropen.com/articles/10.1186/s40852-016-0036-x (accessed January 13 2016)

COR (2015) Fostering innovation at regional level: lessons from the European Entrepreneurial Region (EER) experience http://cor.europa.eu/en/documentation/studies/Documents/Forstering_innovation_EER.pdf (accessed Jan 13 2017).

Doloreux, D and Parto, S (2005) 'Regional innovation systems: Current discourse and unresolved issues' *Technology in Society* 27 133–153

Etzkowitz, H (2008) *The Triple Helix: University–Industry– Government Innovation In Action* London: Routledge.

Feldman, M (2001) The Entrepreneurial event revisited: firm formation in a regional context' *Industrial and Corporate Change*, 10, 861–891

Feldman, M.P. (2014) The character of innovative places: entrepreneurial strategy, economic development, and prosperity *Small Business Economics* 43: 9. doi:10.1007/s11187-014-9574-4

Feldman, M.P. and R. Martin. (2005). "Constructing Jurisdictional Advantage." *Research Policy*, 34(8): 1235-1249.

Feldman, M and Francis, J. L. (2006) 'Entrepreneurs as agents in the formation of industrial clusters' Paper 6 in B.Asheim, P.Cooke and R Martin (eds) *Clusters and Regional Development* Abingdon: Routledge

Fritsch, M and Schindele, E (2011) 'The Contribution of New Businesses to Regional Employment—An Empirical Analysis' *Economic Geography* 87, 2 153–180

Fritsch, M and Storey, D J (2014) Entrepreneurship in a Regional Context: Historical Roots, Recent Developments and Future Challenges *Regional Studies*, l. 48, 6, 939-954

Fritsch, M and Wyrwich, M (2014) 'The Long Persistence of Regional Levels of Entrepreneurship: Germany 1925 to 2005'. *Regional Studies*, 48 (2014), 955-973

Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S. and Smits, R.E.H.M. (2007) 'Functions of innovation systems: a new approach for analysing technological change', *Technological Forecasting and Social Change*, 74: 413-432.

Howells J, 1999, "Regional systems of innovation?", in Innovation Policy in a Global Economy Eds Archibugi D, Howells J, Michie J (Cambridge University Press, Cambridge) 67-93

Hudson, R. (2011) 'From knowledge based economy … to knowledge based economy? Reflections on changes in the economy and development policies in the North East of England' *Regional Studies* 45 997-1012.

Huggins, R and Thompson, P (2016) 'Entrepreneurial networks and open innovation: the role of strategic and embedded ties' *Industry and Innovation*. ISSN 1366-2716

Iammarino, S (2005) 'An evolutionary integrated view of regional systems of innovation: concepts, measures and historical perspectives' *European Planning Studies* 13 (4), 497-519

Isaksen A Tödtling, F and Trippl, M 2016 'Innovation policies for regional structural change: combining actor-based and system-based strategies' paper given at ERSA conference, Vienna August 2016

Lawton Smith, H (2016) Entrepreneurial regions in theory and policy practice Ch 20 in R. Shearmur, C. Carrincazeaux and D. Doloreux (eds) Handbook of geographies of Innovation Cheltenham:Edward Elgar 334-355

Lindholm Dahlstrand, Andersson, M and Carlsson, B (2016) 'Entrepreneurial experimentation: A key function in Entrepreneurial systems of innovation' Papers in Innovation Studies Paper No 2016/20

McCann, P and Ortega-Argilés, R (2015) Smart specialization, regional growth and applications to European Union cohesion policy *Regional Studies* 49 8, 1291-1302

Malecki, E and Spigel B (2013) Innovation and Entrepreneurship**.** / Paper presented at 60th North American Meetings of the Regional Science Association International. 2013.

Motoyama, Jared Konczal, Jordan Bell-Masterson, and Arnobio MorelixThink Locally, Act Locally: Building a Robust Entrepreneurial Ecosystem http://www.kauffman.org/what-we-do/research/2014/04/think-locally-act-locally-building-a-robust-entrepreneurial-ecosystem (accessed Jan 12 2016)

Nauwelaers C, Wintjes R, 2003, "Towards a new paradigm for innovation policy?", in Regional Innovation Policy for Small – Medium Enterprises Eds Asheim B, Isaksen A, Nauwelaers C, Tödtling F (Edward Elgar, Cheltenham, Glos) pp 193–219

NESTA (2009) The Vital 6% http://www.nesta.org.uk/publications/vital-6 (accessed January 30 2016)

Qian, H., Acs, Z.J. and Stough, R.R. (2013) 'Regional systems of entrepreneurship: the nexus of human capital, knowledge and new firm formation', *Journal of Economic Geography*, 13: 559-587.

Penrose E,T (1959) *The Theory of the Growth of the Firm*. Oxford: Oxford University Press

Schumpeter, J A (1911/1934) *Theory of Economic Development* Cambridge, Mass.: Harvard University Press

Schumpeter, J A (1942) *Capitalism, Socialism and Democracy* New York: Harper & Row

Spigel, B (2015) 'The Relational Organisation of Entrepreneurial Ecosystems' *Entrepreneurship Theory and Practice* Inc., 41: 49–72. doi:10.1111/etap.12167

Sternberg, R and Müller, C (2005) 'Entrepreneurship in regional innovation systems – a case study of the biotechnology industry in Shanghai' http://www2.druid.dk/conferences/viewpaper.php?id=2707&cf=18 (accessed April 24 2016)

Stevenson, L. and A, Lundström (2001), *Entrepreneurship Policy for the Future*, Stockholm: Swedish Foundation for Small Business Research

Storey, DJ and Greene, FJ (2010) *Small Business and Entrepreneurship* Harlow Financial Times/Pearson Education

Tödtling, F and Trippl, M (2013) Transformation of regional innovation systems: From old legacies to development paths In P.Cooke (ed) *Reframing Regional Development* London: Routledge 297-317

Uyarra, E. and Flanagan, K. 2013. 'Reframing regional innovation systems: Evolution, complexity and public policy' in Cooke, P. (ed). *Reframing Regional Development: Evolution, Innovation & Transition* London:Routledge.

Ylinenpas, H (2009) ‘Entrepreneurship and Innovation Systems: Towards a Development of the ERIS/IRIS Concept’ *European Planning Studies*. 17 8, 1153-1170.

Zahra, S.A., Sapienza, H.J. and Davidsson, P. (2006) ‘Entrepreneurship and dynamic capabilities: a review, model and research agenda’, *Journal of Management Studies*, 43: 917-955.