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Following or breaking regional development paths: on the role and capability of the innovative entrepreneur

Markus Grillitsch 

ABSTRACT

Structural change, economic diversification and new path development feature prominently in scientific and policy debates. Against the backdrop of increasing specialization in the economy, this paper reinterprets Schumpeterian innovative entrepreneurship as a fundamental process that creates new connections between distinct fields of specialization, thereby induces path-breaking innovations and structural change. It is argued that the transformation capability of innovative entrepreneurs rests essentially on their position(s) and networks within evolving innovation systems. By focusing on micro-level processes and transformation capability, the paper complements the large body of work on structural barriers. Unintended consequences, supporting institutional arrangements and policy implications are discussed.

KEYWORDS

innovation systems; entrepreneurship; path-breaking innovations; structural change; institutions; regional development

JEL B52, L16, O30, R10

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INTRODUCTION

As a response to pressing economic, environmental and demographic challenges, structural change has become a priority for public policy and features prominently in the scientific discourse. Recent work in regional studies and economic geography discusses structural change in terms of regional industrial path development and economic diversification (e.g., Bathelt, Munro, & Spigel, 2013; Binz, Truffer, & Coenen, 2016; Dawley, 2014; Grillitsch, 2016; Isaksen & Trippl, 2016; Morgan, 2016; Neffke, Henning, & Boschma, 2011; Zhu, He, & Zhou, 2017).

Innovative entrepreneurship is pivotal in this debate. While most innovations are of incremental nature (Abernathy & Utterback, 1978), some innovations break with existing industrial paths by combining knowledge and resources in novel ways (Schumpeter, 1911). Path-breaking innovations trigger new specializations, and the allocation of resources to activities that realize higher private but potentially also social value (Foray, David, & Hall, 2009; Kirzner, 1997; Shane & Venkataraman, 2000). Innovative entrepreneurship is essential not only to spark new specializations but also to transform places and mobilize required resources for new path development (Feldman, 2014; Feldman, Francis, & Bercovitz, 2005).

Incremental innovations propel specializations forward whereas radical innovations are about new combinations between specializations (Strambach & Klement, 2012). By reinterpreting Schumpeterian innovative entrepreneurship, this paper offers a theoretical perspective on the creation of new connections between distinct specializations in evolving innovation systems. It shifts attention from structural barriers to the capability of innovative entrepreneurs to establish such connections. Attention to capability is important if one follows the idea that '[a]ction depends upon the capability of the individual to "make a difference" to a pre-existing state of affairs or course of events' (Giddens, 1984/2007, p. 14). In a similar vein, Boschma (2017) argues that economic diversification depends on the capabilities of regions to use their diversification potential.

The focus on capabilities addresses an important research gap because we know a great deal more about structural barriers (cf. the literature on lock-ins: Grabher, 1993; Hassink, 2010; system and transformation failures: Tödtling & Trippl, 2005; Weber & Rohracher, 2012; and socio-technical regimes: Geels, 2002) than about the role of agency and micro-level processes in shaping structural change processes (Asheim, Grillitsch, & Trippl, 2016; Boschma, 2017; Uyarra, 2010). It can be argued that the preoccupation with structural and transformation

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failures in the innovation system literature is grounded in an over-socialized perspective that assumes a pervasive and highly deterministic influence of social structure on the behaviour of agents (Granovetter, 1985). In contrast, the entrepreneurship literature has always focused on agency, but has been criticized for paying too little attention to the influence of structure on human agency, i.e., proposing an under-socialized explanation. Even though the recent literature on regional and national systems of entrepreneurship (Acs, Autio, & Szerb, 2014; Qian, Acs, & Stough, 2013), entrepreneurial ecosystems (Mason & Brown, 2014; Stam, 2015), and entrepreneurial systems of innovation (Lindholm-Dahlstrand, Andersson, & Carlsson, 2016) sets out to overcome this deficiency, the interplay between structure and agency remains unclear, in particular in relation to radical innovations and structural change.

In this paper, innovative entrepreneurship is conceptualized as a nexus in the dynamic relationship of social structure and agency. Social structure refers to the evolving institutional architecture of innovation systems. Innovation systems are conceptually relevant because they explain learning, the creation and diffusion of knowledge, and consequently the generation of innovations. Agency refers to innovative entrepreneurship as driver of path-breaking innovations and structural change. Why and how social structure affects innovative entrepreneurship is discussed in the following section. Consequently, the paper elaborates on innovative entrepreneurship as a fundamental process for generating path-breaking innovations. It is argued that innovative entrepreneurship rests essentially on the capability to combine knowledge and resources from different social structures. The factors that underpin this capability, defined as the *transformation capability of the innovative entrepreneur*, are then discussed. The importance of networks between social structures is discussed and two important mechanisms – multiple positions and positional mobility – are identified that give raise to such networks. The paper continues with a discussion about institutional arrangements that promote the transformation capability of the innovative entrepreneur and counter possible unintended consequences. Finally, the conclusions provide reflections about the wider academic and policy implications, as well as potential empirical research avenues.

SOCIAL STRUCTURE: PREREQUISITE AND BARRIER FOR PATH-BREAKING INNOVATIONS

The literature on innovation systems views innovation as a result of complex, uncertain and collective learning processes, which are shaped by institutional conditions. In this regard, all formal and informal institutions are relevant that enable or constrain learning and knowledge exchange (Lundvall, 1992; Markard & Truffer, 2008). Institutions in innovation systems have the functions of reducing uncertainty and transaction costs, managing conflicts, enabling cooperation, and incentivizing innovation activities

(Edquist & Johnson, 1997). The main argument is that actors who are part of an innovation system share a common institutional framework, which promotes interactive learning, the generation of knowledge and innovativeness.

Research on national systems of innovation and varieties of capitalism has identified patterns of institutional configurations that influence the emergence, evolution, innovativeness and competitiveness of specific industries (e.g., Hall & Soskice, 2001; Nelson, 1993). Accordingly, institutional complementarity or coherence between different institutional domains positively affects innovation and economic outcomes. There are parallels to the more recent literature on transitions, which identifies the institutional regime as a stabilizing force for existing consumption and production patterns (Geels, 2002; Markard & Truffer, 2008). The regime creates coherence and complementarities between different institutional domains, which are difficult to break and change.

At the regional level, the innovation systems approach emphasizes informal institutions. Shared norms and values, as well as the network embeddedness of actors, facilitate the generation of trust and interactive learning (e.g., Asheim & Isaksen, 2002; Cooke, Gomez Uranga, & Etxebarria, 1997). Evolutionary accounts foreground the co-evolution of industries, technologies and institutions (Nelson, 1994), which is reflected in the literature on sectoral and technological innovation systems (Carlsson & Stankiewicz, 1991; Malerba, 2002; Markard & Truffer, 2008). The latter are not geographically defined but suggest the development of institutional complementarities and coherence at a global scale related to a specific sector or technology.

It can be questioned, however, whether institutions shape the actions of all individuals and organizations in an innovation system in the same way. After all, the behaviour of researchers is shaped by different institutions than the behaviour of business leaders. Institutions in the construction sector are different from those in the tourism or financial sectors. The division of labour is reproduced in professions, each of which develops specific institutions. Profession-specific institutions and knowledge bases imply that, for instance, academics, top managers or financial experts can relatively easily switch jobs between countries while switching professions is very difficult. This implies that institutional architectures are complex multilayered systems erected at different geographical scales (Gertler, 2010; Hassink, 2010). Whereas profession- or industry-specific institutions often cross national boundaries, territorial institutions produce regional and national variations in the conditions for innovation and entrepreneurship (Ebner, 2016; Hall & Soskice, 2001).

This is illustrated in Figure 1. The dotted lines in the form of parallelograms represent social structures associated with regional, national or international boundaries. At the regional level, this can relate, for instance, to an entrepreneurial culture, which was found to be a persistent and important factor explaining entrepreneurial and innovation behaviour (Fritsch & Wyrwich, 2014; Grillitsch & Asheim, 2016). National institutions include laws and

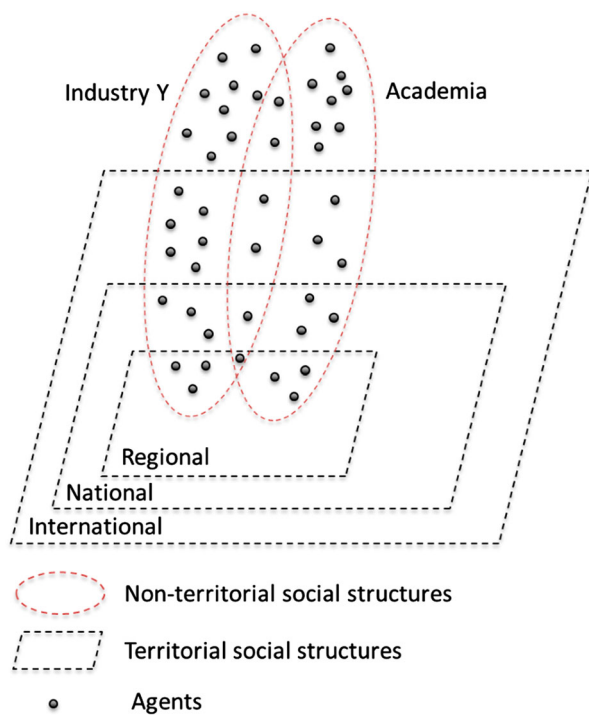


Figure 1. Multilayered and multiscale structure of innovation systems.

regulations governing, for instance labour relations, bankruptcy proceedings, banking and finance, consumer protection and safety etc. The international level reflects that laws and regulations are often harmonized in line with international treaties or as required due to a membership in international organizations such as the European Union (Fromhold-Eisebith, 2007).

The oval dotted lines in Figure 1 represent social structures not defined by geographic administrative boundaries such as industries, sectors, professions, religions or nationalities. The image illustrates only two of such non-territorial social structures, namely industry Y and academia, whereas in reality there will be many. Industries are embedded globally through value chains (Gereffi, Humphrey, & Sturgeon, 2005), production networks (Henderson, Dicken, Hess, Coe, & Yeung, 2002), and innovation networks (Chaminade & Vang, 2008). Equally, academia is embedded globally through international research collaborations, the mobility of star scientists (Agrawal, Cockburn, & McHale, 2006; Trippel, 2013) as well as established institutions about scientific work and publishing.

Social structures are characterized by interdependencies between agents (e.g., between firms of an industry), which also implies denser networks (production networks, innovation networks, social networks) within than between social structures. Ter Wal and Boschma (2011) suggest that networks in young industries are diffuse and become more structured and rigid as industries mature. Frequent interactions will trigger the evolution of specific institutions that facilitate future exchange between agents belonging to a particular social structure. In that way knowledge, institutions and networks co-evolve to form distinct social

structures, which may be expressed as sectors, industries, professions or region-specific cultures.

Thus, the main interdependencies between agents unfold within social structures, meaning that institutions are more similar and networks denser between agents of one social structure than between agents of different social structures. It is consequently systematic that networks between social structures are weak. Such gaps in network structures have been conceptualized as 'structural holes' in networks theory (Burt, 1992). However, there are also overlaps between social structures as individuals and firms can belong to different social structures at the same time. For instance actors within a global industry with shared industry-specific institutions may be embedded in different regional or national institutional contexts, thus creating institutional variety within an industry.

On the one hand, by reducing transaction costs and uncertainties, institutions are an important driver for deepening the division of labour, economies of scales, and the accumulation of specialized knowledge and resources. With a deepening division of labour, innovation systems become increasingly complex, constituted of multilayered and multiscale social structures that together constitute the regional and national preconditions for innovation and entrepreneurship (Grillitsch, 2015). This then leads to a more frequent occurrence of structural holes and an exponential increase of possible recombinations of knowledge and thereby opportunities for innovation and entrepreneurship (Schumpeter, 1911; Storper, 1989).

On the other hand, over time social structures often develop strong technological interdependencies, hierarchical, rigid and closed networks, and specific institutions. Although such a development is not predetermined (Martin & Sunley, 2011; Trippel, Grillitsch, Isaksen, & Sinozic, 2015), it is a common trajectory for industries (Ter Wal & Boschma, 2011) and clusters (Maskell & Malmberg, 2007; Menzel & Fornahl, 2010) creating situations of lock-in (Grabher, 1993; Hassink, 2010). These path-dependent, cumulative processes induce cognitive, institutional and social distance (Boschma, 2005) between the different social structures and consequently augmenting barriers for establishing connections and bringing together complementary types of knowledge and resources.

Social structure thus provides opportunities and imposes constraints for path-breaking innovations. The innovation system literature has contributed significantly to the understanding of how institutions shape microprocesses, and in particular networking, learning, and innovation behaviour of firms. It points to the importance of innovation intermediaries and organizations supporting networking and knowledge transfer (Howells, 2006; Klerks & Leeuwis, 2009). However, the innovation system literature has been criticized for a rather static perspective that fails to explain how microprocesses affect social structure and thereby drive structural change (Asheim et al., 2016). Uyarra (2010, p. 122) argues that '[m]icro-approaches are more agent-centered, and concentrate on an explanation of the entrepreneurial behavior of innovative firms'. Yet, with few exceptions, the role of the entrepreneur is to a

large extent evacuated from the literature on innovation systems (Acs et al., 2014; Carlsson, 2007). Addressing this gap, the next section discusses innovative entrepreneurship as specific form of agency that brings about path-breaking innovations.

INNOVATIVE ENTREPRENEURSHIP: AGENCY THAT CONNECTS AND CHANGES SOCIAL STRUCTURES

In general terms, agency can be defined as the capability to take action and make a difference over a course of events (Giddens, 1984/2007, p. 14). This paper is concerned with a specific form of agency, namely the capability to generate path-breaking innovations, thereby foregrounding the role of the innovative entrepreneur. Entrepreneurship is about discovering and exploiting opportunities to create value (Shane & Venkataraman, 2000). In this paper, value is interpreted broadly capturing private pecuniary but also non-pecuniary and social value. Entrepreneurship may rest on individuals establishing new organizations; however, it may also occur within incumbent firms. The individual or the team of individuals perceiving a new opportunity, acting upon it and mobilizing the necessary resources, including convincing other stakeholders, takes on the entrepreneurial role. In this vein, Van de Ven, Polley, Garud, and Venkataraman (1999) interpret entrepreneurship as a form of leadership performed by a core network of actors in the pursuit of 'the innovation journey'. Innovation is understood in the Schumpeterian sense as the introduction of improved or new products, processes, organizations or markets resulting from novel combinations of knowledge and resources (Schumpeter, 1911). Novel combinations rest on interactive learning processes that involve a variety of actors (Lundvall, 1992).

Opportunities that are perceived and pursued by entrepreneurs do not necessarily entail innovation, and some innovations may be realized without entrepreneurship. For instance, a sales person in an ice cream shop may observe the queue of clients and thus perceives the opportunity of opening a new ice cream shop nearby. Acting on this perception and opening a new ice cream shop may pay off even without introducing any innovation. Conversely, the generation of innovations does not necessarily require entrepreneurship. Through learning by doing, using and interacting (Lundvall & Johnson, 1994) firm processes and routines may be improved. This type of path-dependent, cumulative and incremental innovation does not necessarily rely on an entrepreneur who identifies and acts on an opportunity. Entrepreneurship is not required if it becomes evident that efficiency or effectiveness can be enhanced by changing routines and processes, or, in other words, if implementing such a change does not per-tain uncertainty.

Most innovations entail uncertainties related to technologies or markets and therefore result from entrepreneurial processes. Incremental innovations are associated with low levels of uncertainties while the opposite is true for path-breaking innovations. The cause for these

uncertainties is that path-breaking innovations refer to novel combinations of knowledge and resources, combinations that are uncommon in existing industries and for which no – or limited – historic experience exists (Schumpeter, 1911). Due to the uncertainties arising from novel combinations, path-breaking innovations require a high degree of entrepreneurship, where a strong belief in a still uncertain potential to create value and to make substantial changes in technologies and markets motivates the mobilization of resources.

The argument that path-breaking innovations are novel combinations of knowledge and resources from different social structures in innovation systems is supported by recent empirical studies. Strambach and Klement (2012) show on the basis of innovation biographies that path-breaking innovations necessitate the combination of various types of knowledge held in different institutional domains. Rodan and Galunic (2004) find that managers are more innovative if they can draw on a higher degree of heterogeneity in knowledge through their social networks. Grillitsch, Martin, and Srholec (2016) conduct a large-scale econometric study in Sweden showing that knowledge combinations within the firm as well as being located in a knowledge-heterogeneous region contribute to the innovativeness of firms.

The question can be asked: is it even possible to create path-breaking innovations entirely from within one industry? Established industries are characterized by dominant designs, established institutions and stable networks (Ter Wal & Boschma, 2011). Within this frame, knowledge and resources are developed in a cumulative manner, thereby reinforcing and not breaking with existing paths. In contrast, industry renewal typically results from the introduction of new technologies developed outside the respective industry (Tödtling & Trippl, 2004). Also, regional branching involves by definition more than one social structure because branching captures firm diversification into related industries based on existing competencies (Frenken & Boschma, 2007). Moreover, the emergence of new industries is hardly conceivable without combining knowledge and resources from different social structures, for instance to develop production capacities and business models, to tap distribution channels, or to access finance. Using the example of regenerative medicine, Sotarauta and Heinonen (2016) show that new path creation is not feasible without the combination of various complementary competencies, resources and services. A strong cumulative knowledge base in one sector only is thus not a defining feature of innovative entrepreneurship.

Another important consideration relates to the social and institutional embeddedness of path-breaking innovations. In order to succeed, such innovations often require institutional and normative changes (Granovetter, 2005). The concept of institutional entrepreneurship captures the process of breaking with existing institutions and taking deliberate action to institutionalize alternative ones (Battilana, Leca, & Boxenbaum, 2009; Garud, Hardy, & Maguire, 2007). The question is whether innovative entrepreneurs are also institutional entrepreneurs. Some

innovative entrepreneurs actively pursue institutional change. This is necessary when the promoted path-breaking innovation strongly conflicts with existing institutions. For instance, several providers of sharing economy services such as Uber or Airbnb face such institutional barriers. However, path-breaking innovations do not need to conflict with existing institutions. For instance, innovations that introduce nanotechnology into the textile industry to produce technical textiles are path-breaking but do not necessarily require deliberate action to change prevailing institutions. Consequently, innovative entrepreneurs are not necessarily institutional entrepreneurs.

In essence, therefore, innovative entrepreneurship is about acting on perceived opportunities that arise through new combinations of knowledge and resources from different social structures. By acting on such perceived opportunities, the innovative entrepreneur is an essential driving force for new specializations and the allocation of resources to higher value creating activities (Foray et al., 2009; Grilitsch, 2016). The entrepreneur takes actions and risks attempting to realize a perceived opportunity, which, in the case of success, defines an entrepreneurial discovery (Kirzner, 1997). An entrepreneurial discovery signals technological and market potentials to other actors who, as a consequence, may decide to invest their time, energy and resources to exploit the new potentials. An entrepreneurial discovery is thus a spark for the creation of a new specialization, which entails the co-evolution of technologies, markets and institutions (Nelson, 1995) and thereby the formation of a new social structure. Or, in the words of Shane and Venkataraman (2000, p. 219), 'entrepreneurially driven innovation in products and processes [are] the crucial engine driving the change process'.

TRANSFORMATION CAPABILITY OF THE INNOVATIVE ENTREPRENEUR

Transformation capability of the innovative entrepreneur is defined as the capability to combine knowledge and resources between social structures. Such capability is essential for innovative entrepreneurship if we follow the argumentation presented above. This section argues that transformation capability rests on the networks and position(s) of innovative entrepreneurs. Social networks can exist within and between social structures. This distinction matches the concept of bonding and bridging social capital (Putnam, 1995). Networks within social structures (bonding social capital) support cumulative knowledge generation, incremental innovations and the advance along existing development trajectories, with the risk of creating lock-ins. Networks to individuals positioned in other social structures (bridging social capital) capacitate the innovative entrepreneur to combine knowledge and resources in novel ways and thereby to generate path-breaking innovations.

Stuart and Sorenson (2007) identify five mechanisms through which social networks influence entrepreneurial ventures, namely access to information and resources, brokerage, status, embeddedness and sanctions. Of those, the acquisition of information and resources as well as

brokerage are directly linked to the idea that entrepreneurs bridge different social structures. The argument is that due to the uneven distribution of information and resources, heterogeneous networks provide advantages in opportunity recognition and resource mobilization.

Empirical studies support this line of arguments. Individuals with diverse networks are more likely to engage in entrepreneurial ventures (Renzulli, Aldrich, & Moody, 2000; Stuart & Ding, 2006). The presence of dealmakers (highly connected individuals) in a region is positively correlated to start-up rates (Feldman & Zoller, 2012). Networks between social structures positively affect revenue growth of new entrepreneurial ventures (Batjargal et al., 2013) and firms with links to dealmakers grow substantially more than similar firms without such a connection (Kemeny, Feldman, Ethridge, & Zoller, 2016). Stam and Elfring (2008) provide evidence that new ventures exhibit a higher performance if the entrepreneur has networks to actors from different sectors in the innovation system such as research institutes, financial institutes, law firms, foreign companies, open source development communities etc.

However, there are also dark sides associated with social networks. Christopherson and Clark (2007) show how powerful firms influence policy and drive the innovation agenda often at the expense of innovative small and medium-sized enterprises. The potential problems associated with social networks are:

pervasive rent seeking (or the determination of certain individuals to seek benefits at the expense of all others in the community), insider-outsider problems (or the pernicious conflicts of interest between insiders to a community and outsiders), clientelism, and nepotistic practices. All of these factors have negative effects on overall development and on the distribution of income.

(Rodríguez-Pose & Storper, 2006, p. 4)

Even though these problems mainly apply to networks within rather than between social structures, the latter can lead to self-sustaining coalitions and lock-in of regional economies (Grabher, 1993; Hassink, 2010).

Networks between social structures therefore enable innovative entrepreneurs to realize novel combinations, but may also have unintended consequences. Furthermore – as discussed previously – such networks are relatively rare and difficult to establish due to institutional and cognitive barriers. This raises some important questions: How do innovative entrepreneurs establish networks between social structures in the first place and what are the implications of this for possible unintended outcomes? In this regard, multiple positions and positional mobility surface as two powerful mechanisms.

Multiple positions

Individuals may hold positions in various social structures, e.g., a researcher who is on the board of a firm, a manager who contributes to a civil society organization or an academic who holds positions at universities in different

countries. Multiple positions imply the exposure of individuals to different social structures and thereby promote bridging social networks as well as an improved understanding about the respective institutional contexts, ways of thinking and viewing the world. Suvinen (2014) provides empirical evidence for the relevance of multiple positions as a mechanism that stimulates innovative entrepreneurship. Suvinen finds that university professors who engage in innovation activities often hold simultaneous positions in, for example, firms, politics or intermediary organizations.

Multiple positions enhance interpretative, network and formal power of individuals (Sotarauta & Mustikkamäki, 2014). Formal power captures the direct influence associated with a position to commit resources and to create or change institutions. Network power capacitates agents to mobilize distributed resources and to control and facilitate the flow of information. Interpretative power rests on an understanding about different contexts; the capability to explain rationales, perspectives of the world and behaviour; and the creation of meaning across different contexts. Multiple positions allow individuals to extend their network and interpretative power to the different social structures in which they hold a position.

Moreover, it is rather common that entrepreneurs hold multiple positions. Individuals who are at the same time self-employed and wage earners, so-called hybrid entrepreneurs, represent a large share of entrepreneurial activities (Folta, Delmar, & Wennberg, 2010; Raffiee & Feng, 2014). Not all hybrid entrepreneurs are Schumpeterian innovative entrepreneurs. In some cases, hybrid entrepreneurship provides supplementary income (e.g., consultancy assignments for academics) and in other cases, it provides additional non-monetary benefits (e.g., time flexibility). Conversely, for Schumpeterian innovative entrepreneurs, hybrid entrepreneurship is one way to reduce uncertainty and to learn about the performance of the venture before ultimately making the transition (Folta et al., 2010).

Multiple positions are, however, potentially problematic due to conflicts of interest. For instance, if a researcher gets involved in commercializing scientific knowledge, the incentives increase to publish research results that support the commercial undertaking. Furthermore, highly visible individuals in powerful positions will receive more invites for additional positions than less influential individuals, which contributes to political lock-ins due to coalitions of incumbent actors protecting vested interests (Grabher, 1993). Consequently, the mechanism of multiple positions should be invoked with care. In particular, conflicts of interest must be avoided, potential conflicts of interest unveiled and a high degree of transparency ensured.

Positional mobility

Positional mobility captures the move of individuals between positions in different social structures. Academics may leave or put to rest their position at university to start a new firm, engage in a political role or work for intergovernmental organizations. A successful entrepreneur may sell

their company and engage as a venture capitalist. Employees may move between industries. The main difference to multiple positions is that individuals quit or withdraw from previous positions. Nevertheless, individuals will bring their experience, worldview, understanding about the institutional context and way of thinking from their previous position. Furthermore, even though interdependencies and frequency of interactions diminish, weak ties and latent networks related to the previous position will remain and can be mobilized if needed.

The importance of positional mobility has been underlined in studies on university–industry collaborations (Lawton Smith & Waters, 2011). Mobility between these two sectors contribute to overcoming barriers of technology transfer, coordinating knowledge flows and developing networks between the two sectors (Lambooy, 2005). However, while the local labour market is an important mechanism in regional systems, positional mobility also contributes to accessing knowledge and resources globally (Waters & Lawton Smith, 2008). Highly skilled individuals move relatively often between regions and use their networks from previous positions and locations for knowledge transfers (Tripl, 2013). This premium of co-location in previous positions for knowledge transfers is more pronounced for knowledge flows between than within technological fields and is mediated by institutional contexts (Agrawal et al., 2006).

In a similar vein, spin-offs and acquisitions induce positional mobility and have been identified as key mechanisms for entrepreneurial experimentation in innovation systems (Lindholm-Dahlstrand et al., 2016). It is argued that spin-offs are more flexible than incumbent firms. This flexibility makes spin-offs more able than incumbent firms to cope with the high technological and market risks associated with path-breaking innovations. Spin-offs disembed the entrepreneur from existing structures but still equip the entrepreneur with technological and market knowledge, understanding of the institutional context, and social networks. Successful spin-offs are often re-embedded through acquisitions into existing structures that provide access to global markets and financial resources.

Time plays an important role in explaining the raise and decline of network and interpretative power arising from previous and new positions. Context knowledge from previous positions loses value over time as the respective social structures evolve and change. Due to labour mobility, retirements, job rotation and reduced interactions, networks to the old environment also weaken over time. In addition, it takes time to develop context-specific knowledge and to build up a network within the social structure to which the individual moved. Potential conflicts of interest loom especially close to the point in time when the move happens. For example, the move of the former president of the European Commission, José Manuel Barroso, to Goldman Sachs has invoked significant criticism, raising among others questions about conflicts of interest and contacts with the bank before the 18-month cooling-off period has passed.

Positional mobility of key decision-makers demonstrates the strength of the mechanism, but also the problems it may cause. As with multiple positions, avoidance of conflicts of interest and assurance of transparency are essential. Whereas positional mobility of high-ranking individuals may be very problematic, positional mobility of lower- and middle-ranking individuals allows realizing the advantages of this mechanism at relatively low risk. Lower- and middle-ranking individuals understand different institutional contexts and knowledge bases, and can draw on a heterogeneous network, but have less power to mend the system to their own benefit.

SUPPORTING INSTITUTIONAL ARRANGEMENTS

The above discussion has shown that the transformation capability of innovative entrepreneurs rests on networks between social structures, which are facilitated by multiple positions and positional mobility. This triggers the question how policy can support building such networks while keeping the potential unintended consequences at bay.

First, the barriers for networks between social structures are themselves socially constructed. For instance, the degree to which interactions between academia and industry are supported or hindered varies by countries, locations, possibly even departments (Etzkowitz, 2012). Policy measures such as extended leave policies can contribute to reducing such barriers. Grillitsch and Rekers (2015) find that institutional change affects social networks, the barriers for interactions between social structures, and consequently learning and innovation processes. In the concrete example, changes in the national healthcare system increased the barriers for interactions between med-tech firms and hospitals in Skåne, a county located in southern Sweden. Given that Sweden has a decentralized healthcare system, the county could take measures to help overcome the institutional boundaries between hospitals and firms, thereby creating a region-specific competitive advantage. Emphasizing the role of regional policy, Etzkowitz (2012, p. 768) argues that 'the absence of a strategy of creating permeable boundaries among the institutional spheres can be a significant retarding factor in regional development'.

Second, policy can actively create or promote social structures that are inclusive and cut across other social structures such as inclusive education systems or open membership associations (Grillitsch, 2015). Cross-cutting social structures provide networking opportunities for individuals positioned in different social structures and thereby contribute to the accumulation of transformation capability of innovative entrepreneurs. Empirical evidence provides support for the claim that cross-cutting social structures have a positive effect on innovative entrepreneurship. Davidsson and Honig (2003) find that opportunity recognition and the success of nascent entrepreneurs are positively related to the engagement of entrepreneurs in trade associations, chambers of commerce or service clubs such

as the Lions or Rotary. Grillitsch and Asheim (2016) disentangle the institutional context of the globally leading maritime cluster in Møre og Romsdal, Norway, and show how being part of the local community supports connecting different social structures presented in the cluster. The local community constitutes a cross-cutting social structure, which rests on a strong regional identity as well as high levels of trust and informal knowledge sharing. Locals in management positions of foreign firms are essential for translating between different institutional settings and promoting continuous information sharing, learning and innovation collaboration with local entrepreneurs and businesses as well as regional government and higher education institutes.

Third, quality of governance plays an important role to counter the potential negative effects of networks between social structures. Quality of governance, which is positively related to regional innovation and growth as well as the impact of regional policies (Rodríguez-Pose & Di Cataldo, 2015), comprises several dimensions (Charron, Dijkstra, & Lapuente, 2014). High accountability, the enforcement of law and control of corruption are important to unveil, avoid and sanction conflicts of interest. Moreover, corruption and a lack of accountability strengthen self-sustaining coalitions of elites, which are a major source of lock-in (Grabher, 1993; Hassink, 2010).

DISCUSSION AND CONCLUSIONS

The argument advanced in this paper builds on two fundamental ideas for understanding industrial dynamics, namely the division of labour and the role of the innovative entrepreneur. Specialization leads to the formation of distinct social structures in which industries, technologies and institutions co-evolve. This particularization of innovation systems fosters the cumulative development of knowledge and resources in specific fields and, at the same time, propels the opportunities for novel recombinations of knowledge, resources and factors of production. Industrial dynamics result from the interplay between incremental innovations pushing the production and knowledge frontier in specific fields and path-breaking innovations that rest on the recombination of knowledge and resources distributed across the multilayered and multiscalar structures of innovation systems.

Innovative entrepreneurship is identified as a particular form of agency that connects and changes social structures. The evolving structures of innovation systems constitute the playing field for the innovative entrepreneur. However, the recombination of knowledge and resources from different social structures is constrained by institutional and cognitive distance as well as structural holes in networks. Furthermore, commonly acknowledged rigidities and lock-ins hinder the institutional change that is required for the formation of path-breaking innovations. Consequently, a pivotal question is what factors determine the innovative entrepreneur's capability to combine knowledge and resources from different social structures: in short, the innovative entrepreneur's transformation capability.

It is argued that such capability depends on the position(s) and networks of innovative entrepreneurs, and in particular networks between social structures. Multiple positions and positional mobility are two essential mechanisms promoting such networks. Despite their merits, respective networks and mechanisms may trigger unintended consequences in the form of conflicts of interest and the protection of vested interests through a coalition of elites from different social structures. Consequently, balanced policy approaches need, on the one hand, nurture the transformation capability of innovative entrepreneurs while, on the other, counter the negative effects associated with social networks.

The proposed framework can be applied empirically. Even though the scope of this paper does not allow for a detailed discussion about the operationalization of the key concepts, it is worth noting that networks, multiple positions and positional mobility are observable both quantitatively and qualitatively. As regards quantitative studies, individual register data are promising, in particular as such data are becoming increasingly available for longer time series. Through such data, the positions of individuals in different social structures (e.g., different industries, sectors, locations) can be identified with high accuracy. Longitudinal data allow the tracking of the moves of individuals between positions. Furthermore, there is a tradition of conducting surveys to capture network data, which can be applied for the networks of innovative entrepreneurs. This provides opportunities for investigating the causal relationships advanced in this paper from the bottom up, e.g., between social networks and the transformation capability of innovative entrepreneurs, between this capability and the creation of path-breaking innovation, between path-breaking innovations and structural change. Institutions and policies shape and mediate these relationships, which calls for further empirical investigations.

This paper proposes a direction of scientific enquiry that walks the narrow path between over- and under-socialized approaches. This allows the developing of a theory of change, where the causal interrelationships between social structure and agency are unveiled. The transformation capability of innovative entrepreneurs is a necessary piece to explain why structural change occurs in some regions while other regions remain locked in past trajectories. By pointing out policy interventions and institutional preconditions that contribute to building transformation capability, this paper is relevant for recent policy initiatives aiming at structural change such as the smart specialization (Organisation for Economic Co-operation and Development (OECD), 2013) and system innovation approaches (OECD, 2015).

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