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Regional innovation policies for new path development – beyond neo-liberal and traditional systemic views

Franz Tödtling and Michaela Tripl

Institute for Multi-level Governance and Development, Vienna University of Economics and Business, Vienna, Austria; Department of Geography and Regional Research, University of Vienna, Vienna, Austria

ABSTRACT

How new regional growth paths emerge and what policy concepts are most adequate for nurturing their evolution constitute recurring themes in regional innovation and development studies. New industrial paths are often portrayed as the result of market-driven processes and Schumpeterian entrepreneurial efforts. This view goes along with a neoliberal policy approach that restricts the role of public interventions to setting up a suitable regulatory frame and supporting an entrepreneurial climate. The theoretical underpinnings and policy perspectives of this approach have been challenged by the innovation system literature, which offers a systemic view on the rise of new growth paths and advocates a more proactive role of public policy. This paper investigates the role of policy models beyond these traditional ones. We contrast different variants of systemic and multi-scalar policy concepts for new regional industrial path development. Our literature-based study shows that more recent models go beyond new path development and growth per se, paying more attention to the direction of innovation and change, and to policy approaches for achieving more sustainable forms of development. We scrutinize the theoretical and empirical bases of these new policy models and discuss why they are superior to neoliberal and older systemic ones.

1. Introduction

Regional economies face the constant challenge to rebuild their economic structures and to nourish new growth paths to offset the decline of older industries and specializations. These pressures are intensified by recurrent economic crises, globalization and grand societal challenges such as global warming and demographic change. This has led to a renewed interest in the questions (i) of how and where new regional industrial paths emerge, (ii) why some new paths grow and develop into full-blown paths, why others don’t take off but remain small or even disappear after a while and (iii) which kinds of policies are most suitable for nurturing new sustainable development paths. Contemporary debates on policy approaches such as smart specialization (European Commission, 2012; Foray, 2015), new industrial policy (Rodrik, 2004), modern forms of governance...
(Sabel & Zeitlin, 2012) and calls to rethink the role of the state (Mazzucato, 2013; Morgan, 2017) reflect these concerns in apparent ways.

New path development can take different routes such as path branching or the creation of entirely new paths (Boschma, 2017; Isaksen & Trippl, 2016). Branching implies that new paths emerge from industries and capabilities already existing in the region, often based on ‘related variety’ and related diversification processes (Boschma & Frenken, 2011). Branching can result from moves of existing firms into new product areas or through the setting up of new firms based on existing competencies (e.g. spin-offs from regional firms). Whilst early contributions had placed a strong emphasis on technological relatedness, more recent work has begun to forge a broader understanding of the notion (Carvalho & Vale, 2018; Cooke, 2012a, 2012b; Tanner, 2014, 2016) and to argue for a broader multi-actor and multi-scalar approach (MacKinnon et al., 2018; Zukauskaite et al., 2017). The creation of radically new industrial paths (or what can also be called unrelated diversification, see Boschma, 2017) represents a more radical form of change since it implies the emergence of entirely new industries or business models based on scientific discoveries, radical new technologies or forms of organization, user-driven innovation or social innovation (Isaksen, Tödtling, & Trippl, 2018). Key processes in ‘seeding’ new paths may include the establishment of new companies and spin-offs from technology-based firms (Fieldman, 2007), accumulation and exploitation of knowledge in local universities (Vallance, 2016), as well as the inflow of entrepreneurs, firms, knowledge and other resources from outside (Binz, Truffer, & Coenen, 2016; Dawley, 2014; Trippl, Grillitsch, & Isaksen, 2017).

The rise of new industrial paths has often been portrayed as the result of market-driven processes and Schumpeterian entrepreneurial efforts. Evidence from entrepreneurial ‘hot-spots’ and growth regions such as the Silicon Valley in the US (Saxenian, 1994) or Cambridge in the UK (Keeble & Wilkinson, 2000) where new economic paths seemed to have emerged ‘spontaneously’ was invoked to support the claim that it is first and foremost market-driven processes that underlie new path development. As regards policies, this view often goes along with a neoliberal approach that restricts the role of public interventions to setting up a suitable regulatory frame and supporting an entrepreneurial climate within which the firms do the rest. The theoretical underpinnings and policy perspectives associated with this approach have been challenged by the innovation system literature (Cooke, Heidenreich, & Braczyk, 2004; Edquist, 1997). An innovation system perspective offers a more comprehensive systemic view on the rise of new growth paths and advocates a broader and more proactive role of public policy in shaping new path development. But also these latter approaches have been criticized for being too little theory-based, overly static and too much confined to predefined territories such as regions or countries (Binz & Truffer, 2017; Uyarra, 2010; Weber & Truffer, 2017).

New system approaches and policy models seek to move beyond these traditional neoliberal and territorial systemic views. They highlight that new growth paths emerge in an increasingly open and interdependent world. They also pay more attention to the direction of innovation and change and propose policies to promote more sustainable development paths. The aim of this paper is to contrast the policy perspectives informed by (i) Schumpeterian and neoliberal concepts, (ii) traditional systemic approaches and (iii) multi-scalar and transition management approaches. We scrutinize the theoretical and empirical bases of these policy models and discuss why modern approaches are superior to those that emanate from neoliberal and traditional systemic views.
2. Schumpeterian and neoclassical concepts and policies

In the search for new policy perspectives for enhancing radical innovation and the development of new industrial paths, it is worthwhile to start from established theories and approaches. In the field of innovation, these cover Schumpeter’s theory as well as neoclassical models that focus on ‘market failure’ in the innovation process.

Schumpeter’s early work (1911) celebrated the pioneering entrepreneurs (i.e. people who are aware of new business opportunities and have ‘entrepreneurial spirit’) as the core actors driving innovation and economic development (Schumpeter Mark I). Entrepreneurs identify a potential market for an invention, develop it further to an innovation and commercialize it on the market (Malerba & Orsinigo, 1995). The incentive to innovate was seen in the possibility to exploit a temporary monopoly and to earn ‘pioneer profits’. Schumpeter’s early approach neglects the roles played by a supporting context or innovation system and public policy actions to enhance the entrepreneurial process. In his later years, after the emergence and growth of large (mainly American) corporations, Schumpeter (1939) changed his perspective and regarded large firms and their R&D departments as the key actors for driving innovation (Schumpeter Mark II). The main role of policy actors was seen in the support of basic R&D activities since their social benefits and those of the resulting innovations were expected to be higher than private gains.

From the 1950s onwards, neoclassical economics has become dominant. Its representatives have argued that free markets would produce optimal results for society, as long as they were allowed to work ‘freely’ without restriction by public intervention (Samuelson, 1973). The process of knowledge creation in companies (e.g. through R&D activities leading to new inventions) was identified as an important source of innovation (Dosi, 1988). However, it was argued that the economic gains of such inventions could not be fully appropriated by those creating them as long as intellectual property rights were not well protected (Arrow, 1962). New knowledge, having characteristics of a public good, could be exploited by anyone free of charge, thus reducing the incentives to invest in the creation of knowledge. This might lead to an underinvestment in R&D from a social perspective (Edler & Fagerberg, 2017). This form of ‘market failure’ justifies policy interventions aimed at increasing the investment in science and R&D. Useful policy instruments from this perspective might be public investments in basic research (e.g. in universities and other public research organizations) to enhance science-based innovations, where commercialization opportunities are highly uncertain (Edler & Fagerberg, 2017). Furthermore, subsidizing R&D in private firms and strengthening the regime of intellectual property rights rank high on policy agendas (OECD, 2010).

Neoclassical models have been criticized for a variety of reasons, most notably for suggesting a too narrow theoretical perspective, overlooking non-linear processes, neglecting the geographical dimension of innovation and being inconsistent with empirical findings from innovation studies (Edler & Fagerberg, 2017; Tödtling & Tripl, 2005). Furthermore, policy or governance failures may loom large (Mazzucato & Semieniuk, 2017), since it is unclear what the socially optimal level of public R&D investment is, or in which particular industry, technology or region investments should be undertaken. The approach also neglects the complex and often tacit nature of knowledge (Edler & Fagerberg, 2017). Furthermore, knowledge is widely distributed across actors and contexts...
It can thus be a challenging task to identify the relevant areas and sources of knowledge and to access and combine them in a useful way (Tödtling & Grillitsch, 2015). Finally, the detrimental effect of appropriability problems on innovation may have been overestimated. Empirical studies have identified the implementation and commercialization phase and other problems as the most challenging ones (OECD, 2010). The market failure argument as a rationale for science, technology and innovation policies, thus, seems to be ‘... increasingly inadequate to ... guide the design and implementation of innovation policy more broadly’ (Edler & Fagerberg, 2017, p. 8; Mazzucato & Semieniuk, 2017).

Focusing on sustainable growth paths, one can observe that the development and introduction of green technologies present particular challenges within a neoliberal policy context (Kemp & Never, 2017). Market prices of conventional technologies do usually not reflect their environmental externalities. Producers and consumers, thus, often do not have a price-based incentive to shift towards green technologies. There is also inadequate information on products and amortization periods and uncertainties about the benefits of green technologies (Kemp & Never, 2017). Then, there is ongoing investment in older technologies leading to a lock-in of socio-technical systems (Kemp, 1994). This is reinforced by economies of scale and network effects (i.e. interdependencies of technologies and infrastructure over time) (Unruh, 2002). These challenges of market failures and lock-in particularly apply to radical systemic transformation towards green technologies, which require changes in the institutional environment and long periods of sustained policy support (Foxon, 2007; Kemp, 1994).

### 3. Traditional systemic approaches and policies

The innovation systems concept has challenged the neoclassical approach and its policy perspectives. It is based on the understanding that innovation in complex contexts (such as sectors, regions or countries) depends on the interplay between different kinds of actors, networks, institutions and technologies (Edquist, 1997; Weber & Truffer, 2017). These various elements jointly generate synergies and systemic effects that go beyond the contributions of individual actors or elements (Tödtling & Trippl, 2011; Weber & Truffer, 2017).

There are different variants of innovation systems. The regional innovation system (RIS) approach highlights the regional dimension of the generation, absorption and exploitation of new knowledge and innovation. RISs can be conceptualized as the set of firms, organizations, networks and institutions, which together shape the innovation capacity and performance of regions (Asheim & Gertler, 2005). The concept emerged in the 1990s and has its origins in the literature on national innovation systems (Lundvall, 1992) and territorial innovation models (Moulaert & Sekia, 2003) such as the Italian industrial district and milieu approaches. RIS models foreground that interactive innovation often takes place at the regional level, influenced by particular socio-cultural conditions and respective policies (Cooke et al., 2004). RISs are thus shaped by existing industry structures and technological trajectories, the presence or absence of knowledge and support organizations, and the prevailing institutions and network configurations. Combining the RIS approach with evolutionary economic geography models, recent work has sought to explore how ‘existing RIS structures’ affect the rate and direction of
regional industrial change and new path development and what sort of ‘RIS transformation’ is required to support new growth paths (Tödtling & Trippl, 2013). Isaksen and Trippl (2016) and Trippl et al. (2017) suggest that regions vary in their preconditions and capacities to develop new industrial paths due to pronounced differences in endogenous potentials and different abilities to attract and absorb exogenous resources: Metropolitan regions are seen to offer ideal conditions for new path development due to high levels of variety found in their diversified industry mix, thick RIS structures and strong absorption capacities for external knowledge and resources. Specialized regions and peripheral areas, in contrast, are portrayed as constraining environments for the rise of new growth paths because of lock-ins, lacking variety, overspecialized or poorly developed RIS structures and weak absorption capacities for non-local assets.

In terms of policy, the innovation system approach is based on a broader view of how to support innovation and new path development processes than the neoclassical and Schumpeterian theories. Instead of solely focusing on market failures and underinvestment in R&D to justify policy interventions, innovation systems perspectives deal with deficiencies in the core elements and configurations of innovation systems such as (i) capability failures if actors lack the appropriate skills and resources, (ii) coordination (or network) failures in the case of lacking or inadequate interactions among actors, (iii) institutional failures in cases where context conditions (e.g. industry standards and the regulatory setting) hinder the development of innovations and (iv) infrastructure failures (Weber & Truffer, 2017, p. 113; Woolthuis, Lankuizen, & Gilsing, 2005). Tödtling and Trippl (2005) have argued for a ‘regionally differentiated’ analysis of these various kinds of failures, claiming that different types of regions face particular systemic innovation challenges and pointing to the need for a customized innovation policy approach that is sensitive to the specific preconditions, potentials and challenges found in different regions.

The notion of differentiated knowledge bases (Asheim, Boschma, & Cooke, 2011b) has enriched the discussion about the reorientation of modern RIS policies. Its proponents argue for a shift from narrow R&D and high-tech policies towards a broad based and systemic policy approach that promotes not only analytical but also synthetic and symbolic knowledge bases and combinations of them. Integration of different knowledge bases and stimulation of cross-overs between different industries is acknowledged to be an important source of new path development (Asheim, Grillitsch, & Trippl, 2017; Cooke, 2012a; Strambach & Klement, 2012) and is at the heart of what has become known as platform policies (Cooke, De Laurentis, MacNeill, & Collinge, 2010; Sydow & Koll, 2017).

The concept of cross-industry platforms has been applied to studies of a variety of clusters and industrial fields (Cooke et al., 2010). Here we focus attention on green-tech clusters. Recent analyses suggest that such platforms play a key role for their development. This work highlights the significance of related and unrelated (sectoral) variety (Boschma, 2017) for the emergence of green tech clusters, since many of them are based on a broad set of different technologies and new organizational models that often cut across industries (Cooke, 2008; Kebir, Crevoisier, Costa, & Peyrache-Gadeau, 2017). Cooke (2008) draws a distinction between different types of green tech innovations and points out that a high innovation potential is closely linked to the convergence of different kinds of technologies. He argues that some regions (and RISs) are better able to develop such technologies than others, because they host a variety of clusters. Arguably, this does not mean that platform policies work in highly innovative and ‘variety rich’ places only.
Using Norrland as an example, Cooke (2012a, p. 830) demonstrates that this ‘… low-early variety, relatively low innovation … region rose among Swedish regions as it evolved its moderately diversified platform’. Horizontally organized cluster platforms provide more variety than vertically organized clusters or supply-chains. In addition, institutional features such as (collective) entrepreneurship, social capital and associations matter. They positively affect firm foundation and knowledge transfer between clusters. Relevant policies include demand-side instruments (public procurement, ‘green’ infrastructure investment), supply-side instruments (financial subsidies to infant industries, skills and qualifications, public R&D) and support of knowledge exchange via such ‘horizontal platforms’. Analyses of green-tech clusters in metropolitan areas (Marra, Antonelli, & Pozzi, 2017) and industrial regions (Tödtling, Höglinter, Sinozic, & Auer, 2014) provide support for the view that cross-industrial knowledge circulation and policies aiming to facilitate such flows are superior to traditional cluster approaches. These studies also point to the significance of other policy measures like environmental standards, public demand and procurement (Tödtling et al., 2014) and examine the gradual transformation of green-tech clusters into open cross-industry platforms that combine competences, specializations and capabilities from several industries, such as software, transportation, analytics, construction and biotechnology (Marra et al., 2017).

The innovation system approach has come under criticism for a variety of reasons. Phelps, Atienza, and Arias (2017) flag a strong focus of the RIS literature on highly successful and innovative regions and a lack of interest into failing or dysfunctional RISs. Uyarra (2010, p. 129) argues that many analyses of RIS are ‘… inventory-like descriptions of regional systems, with a tendency to focus on a static landscape of actors and institutions’. In a similar vein, Weber and Truffer (2017, p. 104) criticize in particular NIS and RIS approaches for going not much beyond ‘… descriptions of specific institutional arrangements in the science, innovation, and technology field in yet another country or region, without working out in much detail what sort of underlying factors and mechanisms could lead to better or worse performance’. They also object to the use of predefined territorial borders (such as national or regional ones) for drawing the boundaries of systems since these do not capture increasingly globalized innovation processes. Jeannerat and Crevoisier (2016), furthermore, question the strong focus on technological innovation that has prevented a deeper understanding of new challenges in modern economies related to radical, systemic and value-oriented innovations. Phenomena such as social innovation, service innovation, or the transformation of socio-technical systems are not well covered by innovation systems approaches.

Weber and Truffer (2017, p. 108) argue that new developments in research and innovation challenge the traditional innovation systems approach. These include a growing importance of service innovation, digitalization and virtualization that have speeded up the pace of innovation (Warnke et al., 2016), an increasing use of digital platforms (Kenney & Zysman, 2016) and ‘open’ approaches to innovation (Chesbrough, 2006). These have led to an increase of collaboration between a broader range of actors than in the past, including not only science and industry, but also users, civil society and support organizations. Progressing ICT also facilitated the globalization of collaborations in the innovation process (Cooke, 2013; Dicken, 2015). Then, there are demands that public investment in R&D and innovation should ultimately lead to social and economic benefits and a strengthening of abilities to deal with societal challenges such as climate
change, health or an ‘ageing’ society (European Commission, 2013; Weber & Truffer, 2017). Tackling such challenges necessitates to move the traditional (R)IS approach beyond its focus on technological innovation and economic growth and to question the uncritical view that innovation is always beneficial (Martin, 2015). Issues related to the societal desirability of innovation, the directionality of change and the goal-orientation of innovation systems deserve due attention (Schlaile et al., 2017). Some of these aspects have recently been addressed in the literature on responsible research and innovation that deals with themes such as ethics as a design principle, technology assessment and foresight, risk assessment and monitoring of new technologies at an early stage of the innovation process, and the use of codes of conduct, standards, and of certification schemes as process principles (see, for example, Von Schomberg (2011)).

4. Recent systemic approaches and policies: towards a multi-scalar and sustainability transition perspective

In this section, we identify and contrast different variants of modern systemic approaches and policy models for innovation and new path development. These more recent approaches have in common that they try to overcome the weaknesses of conventional perspectives (see Section 3). Our review includes recent work on technological and global innovation systems (TIS and GIS), the multi-level perspective (MLP), and the literatures on strategic niche and transition management. Compared to traditional innovation systems views, these approaches often take account of transitions towards more sustainable development paths (Geels, 2004), directing attention to the present and future societal challenges such as the ageing society, health, social inclusion or climate change (Kebir et al., 2017). This is reflected in vivid discussions about the direction of innovation and growing concerns with new mission-oriented and challenge-led system-innovation and transformative innovation policies (see, for instance, OECD, 2015; Schot & Steinmüller, 2016). The last years have also seen a growing concern with new policy rationales. Weber and Rohracher (2012) have advocated a broader understanding of failures beyond classical market and structural system failures. They introduced the notion of transformational failures to point to various factors that limit a system’s capacity to undergo processes of transformative change towards sustainability. They have identified four types of such transformational failures: directionality failure, demand articulation failure, policy coordination failure and reflexivity failure. Policies should address these failures if they aim at facilitating new sustainable paths.

4.1. Process-oriented and multi-scalar views of technological innovation systems

TIS scholars have extended the analytical focus of innovation systems beyond the analysis of system elements and relationships to core processes (or functions) of TIS (Bergek, Jacobsson, Carlsson, Lindmark, & Rickne, 2008; Markard, Raven, & Truffer, 2012). Key system processes that are relevant for the performance of innovation systems include knowledge production and diffusion, entrepreneurial experimentation, resource mobilization, guidance of the search, market formation, creation of legitimacy and the creation of positive externalities. Such processes matter in particular for the emergence of new industrial (technological) paths, since all these functions are needed for radical innovation and
the setting up of new industries, including environmental technologies and sustainable development paths. Policy is regarded as relevant for a good functional performance of innovation systems, since policy actors, support organizations and regulations play a key role for creating and diffusing knowledge (e.g. through universities and research organizations), mobilizing financial and other resources, regulating market access, and creating legitimacy and positive externalities. However, these functions nowadays are no longer provided at regional or national levels only, since relevant networks often reach beyond such territorial borders (Tödtling & Auer, 2017). This calls for moving beyond predefined territories for the delimitation of systems (such as RIS and NIS) and applying a multi-scalar perspective.

Based on earlier studies on the international and partly global nature of production and innovation processes (Archibugi & Lundvall, 2001; Cooke, 2013; Yeung & Coe, 2015), recent work by Binz and Truffer (2017) advocates a multi-scalar and global innovation system (GIS) approach.4 GIS … are constituted by multi-scalar actor networks and institutional contexts that jointly support (or hinder) the formation and diffusion of an innovation. In some cases, they may be reducible to specific territorial contexts, yet in others, they depend on actor strategies, networks and institutional dynamics that co-evolve between different parts of the world. (Binz & Truffer, 2017, p. 1286)

For analysing GIS it is proposed to integrate four key system functions, namely, knowledge access, market access, financial investment and technology legitimacy.

What are the policy implications and what sort of new policy approaches are needed for dynamically evolving GIS? Binz and Truffer (2017, p. 1295) argue for a differentiated approach: System resources of industries with a footloose GIS emerge in international networks that are hard to control from a national or regional perspective. For footloose GIS types, they recommend policy interventions based on a ‘free trade zone’ rationale. These may include tax credits, liberal trade policies and the creation of local centers of excellence in order to support firms to succeed in fierce international price and technology competition. For industries with spatially sticky GIS policies that follow a territorially specific niche strategy appear to be a sound option. Local clusters in which common learning and interacting occurs may be supported by knowledge and innovation related measures. For market-anchored GIS, policy interventions according to Binz and Truffer (2017) might more strongly apply a ‘lead-market’ logic (Edquist & Zabala-Iturriagagoitia, 2012): Strategic public funding of high profile pilot projects could try to anchor global knowledge dynamics to local valuation processes (Crevoisier & Jeannerat, 2009). For production-driven GISs, conventional RIS and cluster policies might be useful (Porter, 2008; Tödtling & Trippl, 2011). Respective policy interventions might focus on fostering local industry–supplier–university networks, while also supporting international knowledge exchange and access to global markets (Bathelt, Malmberg, & Maskell, 2004).

4.2. Multi-level perspective, strategic niche and transition management towards more sustainable development paths

Studies of the transformation of sectors and innovation systems towards more sustainable forms of development have also intensively drawn on the MLP and scholarly work on
strategic niche and transition management (Markard et al., 2012). These frameworks pay attention to pronounced path dependencies of socio-technical systems and to ‘system enhancing innovations’ in and incremental change of existing systems. Sustainability transitions, however, call for fundamental shifts in socio-technical systems, brought about by ‘system disrupting innovations’. Such innovations are seen to be generated in ‘niches’. Niches are ‘protected spaces’ (i.e. specific markets or application domains), in which radical innovations can unfold without being subject to the selection pressures constituted by the prevailing regime (Smith & Raven, 2012).

According to the MLP approach transitions are shaped by the interplay of niches, regimes and landscape factors (Geels et al., 2016). The latter forms the wider context (covering societal values, macro-economic patterns, demographic developments, etc.) that may exert pressure on established regimes and can fuel niche innovations. The literature on strategic niche management (SNM) has provided useful insights into the governance of system transformations. SNM protagonists argue for the proactive creation and nurturing of niches and highlight three core processes (Berkhout, Wieczorek, & Raven, 2011): Building of new actor networks with adequate resources; articulation of expectations to mobilize resources and actors for the innovation and to shape the direction of the innovation process; institutionalized learning through which the innovation can be developed and adapted to the selection environment. SNM reaches from the identification of promising new technologies to the design and implementation of the experiment, upscaling of experiments, to niches and evaluation to what extent the niche still needs to be protected (Hommels, Peters, & Bijker, 2007).

The transition management approach (Kemp & Never, 2017), furthermore, focuses on the processes needed for facilitating transitions towards more sustainable paths. According to Kemp and Never (2017, 68f)

… transition management seeks to overcome a situation of lock-in and market failure by co-producing and coordinating policies … with clear targets and programmes for system innovation. The aim of transition management is to accelerate a green transformation of sectors by utilizing innovation possibilities and designing policies that foster private investment into those opportunities.

It relies on the development of a long-term vision, the definition of interim transition goals and pathways by involving relevant actors across different levels, experimental projects and mechanisms of policy learning. And it aims at the complementary expansion of institutional capacities and technology-related capabilities. Aspiring visions help to combine user benefits with societal benefits and they give direction to investors, innovators and consumers (Kemp & Never, 2017).

Rodrik (2014, p. 485) assigns a positive role of ‘strategic collaboration and coordination between the private sector and the government with the aim of learning where the most significant bottlenecks are and how best to pursue the opportunities that this interaction reveals’. Possible forms of such an engagement of government in business networks are transition arenas, supplier development forums, regional collaborative innovation centres, investment advisory councils, sectoral round-tables and private–public venture funds (Rodrik, 2014). These arenas and forums are in line with Cooke’s (2008) suggestion of horizontally organized cross-industry platforms that might support the development of new green economy paths. Kemp and Never (2017) furthermore argue that the
implementation of transition management requires the alignment of different policy fields such as science policy, innovation policy, R&D programmes for sustainable technologies and environmental policies.

The approaches discussed above provide useful hints to the process side of policies that could support the emergence of sustainable industrial paths (Geels, Hekkert, & Jacobsson, 2008). They show in particular the obstacles (such as the resistance by dominant players), the complexity of actors involved, alignment and coordination needs, and the importance of engagement of policy actors in business networks for giving policies a direction that might be more beneficial for the whole society. Yet until recently, these concepts have been rather silent about the geographical dimension of transition processes and the role different policy scales (ranging from the local to the global one) can play in fostering the development of more sustainable paths in variegated spatial contexts. Over the past few years, however, many efforts have been made to integrate spatial perspectives into the frameworks outlined above (see also Section 4.1), leading to a rapidly growing body of literature on the geography of sustainability transitions (Hansen & Coenen, 2015; Raven, Schot, & Berkhout, 2012; Truffer & Coenen, 2012; Truffer, Murphy, & Raven, 2015). Scholarly work has begun to explore how socio-technical transitions unfold in different geographical contexts, seeking to better understand the place specificity of such processes. Enhancing knowledge about the spatial non-homogeneity of regimes by investigating nation-specific and region-specific regime variants and examining to what extent and in which ways different types of regions may be used for niche development and experimentation with novel solutions also rank high on current research agendas (see, for instance, Hodson, Geels, & McMeekin, 2017; Späth & Rohracher, 2012). Whilst much progress has been achieved in finding answers to these questions, it is also fair to state that our understanding of how green path development takes place in different region types and which policy interventions are most adequate in which spatial contexts is still limited.

5. Conclusions

Over the past years, there has been an increasing interest into how new growth paths come into being and what policy approaches are best equipped to promote their rise and dynamic evolution. This paper sought to contrast different policy models and their conceptual underpinnings: (i) Schumpeterian and neoclassical concepts and policy perspectives; (ii) traditional systemic approaches and policy perspectives and (iii) multi-scalar system approaches and ‘challenge-driven’ policy perspectives aiming at more sustainable development paths.

The aim of this paper was to review these frameworks and to outline and compare the policy implications that have been drawn from these different conceptual perspectives. Schumpeterian and neoclassical approaches direct attention to entrepreneurs, firms and markets and presume that it is these key actors and institutions that bring forward innovation and new path development. In terms of public policy interventions, emphasis is given to public investments in (basic) science and R&D, setting up a suitable regulatory frame (e.g. for intellectual property rights) and supporting an entrepreneurial climate. Both approaches lack a systemic perspective and fail to take account of untraded interdependencies and synergetic effects among firms, other organizations and policy makers.
According to the traditional RIS approach, it is the successful interplay of various actors (particularly firms, research organizations and policy makers) and the combination of different kinds of knowledge that matter for innovation and new path development. Fixing system failures and applying a horizontal platform approach to facilitate cross-industry knowledge flows are seen as sound policy options to support innovation and new growth paths. However, apart from a few notable exceptions (see, for instance, Cooke, 2012a), little has thus far been said about the applicability of platform strategies to ‘low variety’ regional contexts, i.e. to strongly specialized, formerly well-off but now locked-in and declining areas, and to peripheral regions. Pivotal questions have not sufficiently been tackled: To what extent and by what means can variety be endogenously developed in such places? Can related or unrelated variety be ‘imported’ from outside the region (Boschma & Iammarino, 2009; Trippl et al., 2017)? Traditional accounts of RIS and path development pay insufficient attention to global innovation interdependencies. Furthermore, the direction of change is hardly addressed by proponents of traditional approaches. Finally, much attention is given to the generation and combination of knowledge and little is said about which other types of activities or processes are required to promote new path development.

The new generation of systemic approaches and policies appear to be better suited to tackle contemporary economic and societal challenges. Employing a functional and multi-scalar perspective, recent work on TIS and GIS highlights a set of activities beyond knowledge re-combination and propagates a view that reaches beyond ‘fixed territories’. Due emphasis is given to configurations of networks and the interplay of policies at different spatial scales, ranging from the local to the global level. The MLP and the strategic niche and transition management approaches highlight the role of experimentation and argue that radical innovation and new paths often emerge in niches outside dominant regimes and their persistent selection environment. They draw attention to the direction of transformation, to manifold barriers to new path development, to the co-evolution of institutions and to the need for policy coordination for promoting transitions towards more sustainable paths. However, scholarly work has only recently begun to explore the spatial dimension of such transitions. Consequently, little is known about how green path development unfolds in different types of regions and which policy instruments and mixes work best in different spatial contexts.

In terms of future research activities, we see the greatest potential in further developing the conceptual ideas and policy implications of the latter approaches. They appear to be best equipped to explain how more radical forms of innovation and path development come into being and how transformations towards sustainability (may) take place and could be supported by proactive policies. However, more conceptual and empirical research is needed to better understand systemic and other barriers to and driving forces of change. Scholarly work on transformational system failures has advanced our understanding of what factors and dynamics may impede fundamental changes by identifying various systemic deficiencies. Yet, it remains unclear under what conditions they make their appearance and which types of these failures matter most in which geographical, industrial and sociotechnical contexts. More research is needed to uncover how barriers to new path development and wider transformations play out in different contexts. Given the urgency and scale of grand societal challenges and pronounced path dependencies of established systems and resistance to change, one may also critically ask if new path
development (or niche creation) policies are sufficient or if they need to be complemented by ‘old path breaking policies’ (or what Kivimaa and Kern (2016) have called regime destabilization policies). However, the question of which policy mixes for new path development and old path disruption policies should be applied in which types of regions is still poorly understood and should thus rank high on future research agendas. Exploring these issues in more detail would essentially enhance our knowledge of why some places succeed to nurture new paths and embark on more sustainable trajectories while others fail. Developing sound development strategies for the latter group, i.e. for disadvantaged and left-behind places with limited opportunities to grow new paths, constitutes a core challenge for policy actors in the years to come (Rodriguéz-Pose, 2018).

Notes

1. For more fine-grained typologies of new path development, see Martin and Sunley (2006), Tödtling and Trippl (2013) and Isaksen et al. (2018).

2. According to the International Encyclopedia of the Social Sciences ‘neoliberalism’ refers to an economic and political ideology that prioritizes the market over alternative social arrangements aiming at an efficient allocation and utilization of scarce resources for the satisfaction of human needs. It is based on freedom of choice, private property and individual decisions, underpinned by competition among firms and other actors. The role of the state should be limited to ensuring an environment conducive to individual choice and initiatives, protecting private property rights, and providing public goods that the market does not deliver in an efficient way (based on the International Encyclopedia of the Social Sciences. Encyclopedia.com, 5 March 2018, http://www.encyclopedia.com).

3. The past years have seen a vivid debate on more systemic conceptual and policy approaches to entrepreneurship. There is, for instance, scholarly work on entrepreneurial ecosystems (Stam & Spigel, 2016) and national and regional systems of entrepreneurship (Qian, Acs, & Stought, 2013; Acs, Autio, & Szerb, 2014). Although these approaches place the phenomenon of entrepreneurship in a systemic context indicating e.g. supporting local conditions, they have been criticized, like the RIS concept, of not exactly specifying elements, relationships and spatial scales of such a system (Alvedalen & Boschma, 2017). As for policies, the entrepreneurial ecosystems approach seems to be less interventionistic than the innovation systems or the transition management concepts (see Sections 3 and 4), since it relies more on the entrepreneurial and private initiatives that also shape their respective contexts than these latter approaches (Stam, 2015).

4. Binz and Truffer (2017, p.1286) argue that

… three key improvements are needed in a more integrative GIS perspective. First, it should conceptualize the key system elements and the contexts in which positive externalities (or system functions) emerge from a spatially open, multi-scalar perspective. The key question for innovation systems research is not whether the embedding of innovation processes in national or regional territorial contexts still matter, but how it matters and whether it matters differently for different types of technologies and industries. Secondly, the perspective should be dynamic and able to explain the processes that lead to the creation (and decline) of new technologies and industries. Third and finally, it should account for systematic differences between innovation dynamics in various industry types.

Disclosure statement

No potential conflict of interest was reported by the authors.
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