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# Introduction

*Ron Boschma and Ron Martin*

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## RELATEDNESS AND PATH-DEPENDENCE

Two recurring themes in this *Handbook* are relatedness of industry, by means of which regional growth is assisted, and path-dependence, by means of which it can be constrained. Exploration of the first is a relatively recent phenomenon, pioneered by Ron Boschma and Koen Frenken, but already it is a core body of theory and empirical research in evolutionary economic geography. The main mechanism by which relatedness influences regional growth is through knowledge transfer between firms, one result of which can be innovation. The key agents of such transfer are employees developing their careers by changing jobs in neighbouring areas and new companies being formed by the spin-off process that may also be a vehicle for innovations. Path-dependence is a more established concept arising in economic history, particularly the branch interested in the history of innovation. It has been analysed fruitfully by Ron Martin and colleagues in the context of evolutionary economic geography and particularly regional development, adaptation and change.

The authors of Chapter 14 indicate the pivotal position occupied by the idea of ‘related variety’ in evolutionary economic geography. Comparable to ‘proximity’ as presented in Chapter 20 of this *Handbook*, it has numerous dimensions, notably the cognitive, social, organizational, institutional and geographical. Much research effort is exercised in relation to both concepts, seeking to assess the relative importance of each in understanding, for example, the evolution of agglomerations or clusters, the core problematic of economic geography. In doing this, light is cast on the role of numerous other of the key process elements of interest to evolutionary economic geography, such as innovation, technology, knowledge spillovers, learning and the creation of new regional developmental pathways. In order to illustrate this, the authors take the two most frequently identified types of relatedness – geographical and cognitive – as their main focus. They then apply these perspectives to issues of externalities and regional growth, on the one hand, and technological change in new path creation, on the other.

With respect to externalities and regional growth, Boschma and Frenken note in Chapter 14 that a key research question has been the extent to which firms in agglomerations benefit most, if at all, from ‘Romer externalities’ of localization (after Vatne, Chapter 4, this *Handbook*) or ‘Jacobs externalities’ of urbanization. Specialization and diversification are again key dynamics of growth and agglomeration, but again, while it might seem that specialization would logically require less interindustry knowledge transfer effort to the extent that similar specialist technologies were being utilized, the gains from efforts, conceivably by intermediary agencies, to assist knowledge transfers among different industries might yield the greater reward. However, the authors also place strong emphasis on technological relatedness, even among diverse industries, as being a necessary but insufficient condition for cognitive proximity – meaning clarity

of understanding the other's business model, processes and potential – to result in innovation-led profitability. Empirical research is reported as suggesting the advantage from the absorption of knowledge spillovers from regional (and extraregional) industry that is cognitively relatively proximate in some way (technological, inputs, skills), is positive and significant, whereas those from Romer externalities are less so.

These analyses are static so the authors turn their attention to the dynamics of technological relatedness and regional branching (new path creation). This is prefaced by discussion of relatedness in the short and long term, one hypothesis being that constructing advantage from related variety only brings short-term advantage. Long term, some wholly new branches are needed to sustain regional growth. This is clearly an open question, warranting deep thought, because at the heart of spatial evolution is a notion of an industrial ecosystem, which means that complementarities foster growth while unrelatedness destroys it. As noted in Chapter 23 in this *Handbook* on 'transversality' in regional innovation and growth, keeping industry conscious of regional relatedness is one of the key tasks of the advanced regional development agency. This applies to the periods of 'normal science' or unpunctuated regional equilibrium, which is the short term, especially in respect of 'episodic' radical innovation. But such multilevel interaction between regime elements and paradigm elements is extremely important during more 'epochal' creative destruction inflections. Because the 'relatedness' perspective can appear 'disembedded' from neo-Schumpeterian concerns about innovation and policy, it can also appear to be vulnerable to randomness in its predictive qualities. However, this aspect improves with the introduction of a dynamic element into the analysis represented in such branching processes as entrepreneurship, merger and acquisition, and exploitation of industrial density. These are also mechanisms that contribute to regional path-dependence, which imposes a heavy effect on regional evolution such that new path creation is generally influenced by its industrial legacy. This makes the Silicon Valley phenomenon really an extreme exception to the rule of regional development, which is one reason why it has never been replicated.

The idea of the regional economy as a path-dependent system is the subject of Chapter 15 by Ron Martin. Among the conceptual issues that the concept raises are questions such as the extent to which the regional economy and its 'regime' are uniform, or composed of elements on different paths; to what extent are paths articulated even if they are on different paths; indeed, can regional evolution be characterized as systemic at all? Clearly these are salient questions because articulation would suggest relatedness, and disarticulation its opposite. Hypothetically, therefore, the disarticulated region would be expected to be weaker in economic terms than the systemically articulated one. Once again, as with the question, 'how radical is radical?' raised in Chapter 1 of this *Handbook*, much depends on refinements of conceptual degree and intensity. Thus it may be unnecessarily misleading to inquire whether regions display path-dependence on certain industries or not. Many are multilocational, such that electrical engineering or automotive components were until the 1990s produced in almost every county of Great Britain and location quotients (measures of concentration) could be quite high in peripheral regions. But their industrial volume and density were far from equally distributed. Moreover, the presence of automotive engineering in Cornwall, or until the 1980s in Renfrewshire and East Lothian, Scotland was a product of late path-dependence, if it could even be termed path-dependence at all. Yet both Scottish plants were systemically

integrated to the nearby British Steel strip mill for 20 years, although suppliers refused to leave the West Midlands. Accordingly, the lack of spin-offs or significant network externalities make it seem inappropriate to discuss Linwood and Bathgate in terms of path-dependence. This helps to illuminate what qualifies a region to be so discussed. One element is clearly ‘agglomeration’, another may be ‘origins’ or ‘embeddedness’, meaning inquiry about why key events first occurred, evolved and diversified or ‘branched’ in a particular region. Martin’s chapter suggests this is the predominant way in which regional path-dependence is conceived and researched, in terms of either industry ‘selection’ of one from a number of candidate regions, or why a region ‘specializes’ in a specific industry.

However, a second approach involves the quest for regional path-interdependence between industries; in other words its entire ‘paradigm’ and ‘regime’ evolution such as would allow profiling systemic regional articulation. This question is also asked from different angles in research cited in Chapter 1, ‘Introduction’, to this *Handbook* investigating ‘regional varieties of capitalism’ and ‘regional corporate cultures’. Regional path-interdependence introduces the historical dimension quite profoundly. Chapter 23 on ‘transversality’ introduces some evidence for this in small, Nordic regions. Here early path-dependence (for example ships’ propellers; plough design) remains embedded in later path-dependent industry (wind turbine blades) in North Jutland, while forestry (pulp and paper) reveals early path-dependence and examples of flexography (packaging, printing, film scripts) are later emanations of an initial resource endowment in Värmland, Sweden. Connecting to the earlier discussion of ‘epochal’ and ‘episodic’ radical innovation, both transitions described above have ‘origins’ in ‘epochal’ exploitation of natural resources (‘mechanization’ in Figure 1.1, Chapter 1 in this *Handbook*) but have been ‘episodically’ innovated according to opportunities arising from intersections of epochs (for example ‘mechanization’ and ‘electrification’ for windmills; ‘mechanization’ and ‘informatization’ for graphics). Of course, path-dependence with renewal also applies to epochal long waves and their aftershocks. This seems more satisfying than the ‘randomness’ that some path-dependence analyses share with some ‘relatedness’ perspectives as indicated in the taxonomy of path-dependence in Martin’s (Chapter 15) Table 15.3.

## ABSORPTIVE CAPACITY AND KNOWLEDGE DYNAMICS

Relatedness and path-interdependence are intimately bound up with absorptive capacity, which is the subject of Chapter 16 by Maria Abreu in this *Handbook*. The capability to adopt innovations from elsewhere without misunderstandings is a valuable asset for firms in supply chains (vertical absorptive capacity) as well as related industries in a region (lateral absorptive capacity). The second is probably the harder competence, but arguably the more rewarding. The ‘learning’ advantage claimed for absorptive capacity – namely, the more pre-learning of a subject, the more that can subsequently be learnt – is one of the core assumptions of the neo-Schumpeterian innovation framework and evolutionary economic geography more generally. Ideas like ‘learning by doing’ and ‘learning by interacting’ have been common currency between them and the neoclassical school for decades, as Abreu shows. Moreover, she also shows that its progenitors later demonstrated absorptive capacity to be a fundamental explanatory element in

the understanding of path-dependence. This is because it allows for better prediction of future innovation and purposeful expectations. Such is the prospective influence of cumulateness of the process, Abreu shows, that it can lead to the potential 'lock-out' of firms that do not invest in absorptive capacity. To repeat, this is difficult, but even more so for lateral absorptive capacity, except insofar as it is moderated by the constraints of geographical proximity. Even then, it must be further assumed there is worthwhile cross-sector knowledge to be learned in or nearby to the region and a competent regional 'regime' to help communicate it, for the transaction costs of true lateral absorptive capacity can be formidable indeed, and 'knowledge filtering' is a practical necessity. Abreu demonstrates conceptual mechanisms for facilitating such lateral controls, notably in respect of asymmetrical and symmetrical filtering. This has obvious theoretical value for assessment of methods by which regional knowledge spillovers involve magnitudes of both regional knowledge leakages and infusions.

Returning to the issue of lateral knowledge transfer, the 'regional regime' has a key role to play in, for example, facilitating organizational structures and management practices that assist knowledge transfer. This can include job rotation, communities of practice and cross-functional communication mechanisms from websites to professional or scholarly publications aimed at promoting knowledge transfer. Regions that have such cultures are advantaged, especially under the learning and innovating conditions operating in a globalized knowledge economy. Abreu expresses the conviction that regional innovation systems have these cross-fertilization and cross-pollination capabilities and that, fundamentally, that is their *raison d'être*. She also cites literature that equates high human capital with high regional absorptive capacity, echoing Felsenstein's analysis in Chapter 9 of this *Handbook*. This also adds further support to the importance of knowledge-based regional networks for regional innovation and growth anatomized by Giuliani in Chapter 12 of this *Handbook*. Finally, the manner in which knowledge filters empirically through networks of knowledge-based 'gatekeeper' firms to their associated firms lends support to the idea expressed in De Propriis and Crevoisier's Chapter 13 on the importance of 'anchor' firms for regional innovation and growth.

This analysis of regional absorptive capacity, regional innovation systems and knowledge-based networks links seamlessly to Michael Steiner's Chapter 17 on 'Regional knowledge networks'. What is the added value of these beyond the virtues expressed in cited chapters, and the vast literature upon which they draw regarding varieties of network interaction for regional innovation and growth? The key lies in the emphasis in Steiner's analysis upon knowledge networks. Introduced in Abreu's chapter, here they are more deeply explored from the perspective that innovation is intimately influenced by the capabilities of economic agents to combine different pieces of knowledge efficiently. This is entirely consistent with the neo-Schumpeterian perspective on innovation and the innovator's role in facilitating entrepreneurship. As well as being important as sources and means of knowledge filtering to entrepreneurs, networks are also types of governance, set between states and markets due to their associative qualities and fully consistent also with the notion of functional regional innovation systems. As such they actually bridge various practice and policy chasms left by market failure on the one hand, and state failure on the other. This involves important knowledge-interpretative functions such as internalization and recontextualization of knowledge, as implied in regional absorptive capacity. A number of questions arise concerning 'who' and 'why' regarding

network membership, and ‘what’ regarding traffic that is carried by them. They are more or less exclusionary and self-selecting because they enhance access to valuable intangible goods – technical, market and contractual knowledge foremost – for incumbents. How knowledge circulates is highly exclusive and contractualized according to some empirical accounts; more informal and open according to others – even in the same industry, notably biotechnology. This suggests that confidential, high-value-adding, intellectual property knowledge is likely to be more circumscribed than knowledge that ranks as gossip. But it may be influenced by sector, some having less excludability than others, or less expensive origins; or it may vary by region, some being more open, sociable and trusting than others, as the social capital literature implies (see Rosenfeld’s Chapter 21 in this *Handbook*). Tacitness gives geographic proximity its *raison d’être* even if the tacit dimension of knowledge is not clearly demarcated from the codified dimension in all contexts.

## REGIONAL COMPETITIVENESS AND CULTURE

Key points raised in Part III of the *Handbook* – notably relatedness, path-interdependence, absorptive capacity, knowledge and networks – contribute to regional innovation and growth, expressed in shorthand as ‘regional competitiveness’, something that as Ron Martin in Chapter 18 of this *Handbook* notes is not clearly defined but nevertheless much aspired to. This is not a new thing, even if the rhetoric is; regions have always been required to have export firms that, on quality or price or, increasingly, interweaving aspects of both, can prosper in extraregional, preferably overseas, markets. Of course, the competitiveness drive is ultimately self-defeating, since by definition it erodes all but the strongest competitor. Nevertheless it has the virtue of stimulating paradigm and regime ingenuity to innovate ever-new and better ways of making or doing things. This, as Schumpeter knew, is the wellspring or engine of capitalism, and just as the ultimate opposite to competition is not cooperation but monopoly, so the monopolist gives way by inertia or regulation to new waves of competitiveness, according to capitalist rules. Competitiveness is thus the way in which capitalism renews itself. A region’s firms must constantly improve their productivity (unit labour costs) in their industry or move to higher-productivity industries where, conceivably, competition may be less (for example Christensen’s sustaining strategy of moving upwards into luxury from mass markets). Martin goes on to show how Porter’s and Krugman’s notions of regional competitive advantage work by emphasizing regional externalities like ‘regional regime’ and ‘regional production characteristics’ as key to increasing regional productivity that produces regional competitiveness. To this Martin adds path-dependent regional stock assets (such as past innovations, technical know-how, and so on) regional absorptive capacity and relatedness to yield a post-Porter approach that stresses – as do the chapters in Part II of this *Handbook* – adaptability, agility, flexibility and versatility of regional firms in a dynamic theory of regional comparative advantage. Finally, in Chapter 19, Al James presents an important analysis of the ‘regional culture of production’ dimension of dynamic comparative advantage. These influence relatedness, regional absorptive capacity and knowledge networks in telling and detailed ways. Thus, in line with the earlier judgement of Silicon Valley’s exceptionalism James characterizes it thus:

In Silicon Valley, a distinctive regional Californian counterculture – characterized by an openness to experimentation, the glorification of risk-taking, an acceptance of failure as a learning process, rapid change as the norm, a rejection of traditional social hierarchy, and greater loyalties to transcendent technologies than individual employers – is argued to have underpinned a regional, decentralized, network-based industrial system of learning.

This is different even from other high-tech locations in the US and encourages us to pause in reflection about the simple-mindedness of many ministerial injunctions to emulate it in, for example, the more deindustrialized parts of Great Britain. Yet, certain kinds of modern economic activity take root even there, mainly where there is path-dependent relatedness, notably renewable energy innovation in former coalfields, high-quality organic food production in hitherto ‘food deserts’, and diversified tourism where once the masses relaxed before the innovation of the package holiday. It would be repetitive to list again the key themes for regional innovation and growth covered in the chapters in this section; all, from relatedness to regional culture, are essential to an understanding of the keys to accomplishment in this complex and evolving field.