
Introduction

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REGIONAL INNOVATION SYSTEMS ISSUES

Part VI explores the drivers of regional innovation systems and begins in Chapter 33 with Franz Tödting and Michaela Trippl's review of the evolution and application of the concept. It draws attention to the firms, clusters, knowledge organizations and institutions of a region, as well as to the innovation interdependencies within the region and beyond. The last point is important because misinformed critique of the concept is often constrained to the 'bucket theory' of the region. But social systems are always open and this bucket lets water out and light in through its 'structural holes'. As noted in the Introduction (Chapter 1) to this *Handbook*, some inspiration for the framework came from the emergence of an interactive user-producer theory of innovation that replaced the linear model mentioned by the authors. It will be interesting to observe future adaptations to this in light of the observations there about new 'neoliberal' approaches such as demand-, user- and design-driven innovation (see also Chapter 43 of this *Handbook* on these). Efforts to recognize important institutional aspects, notably 'conventions' in the earliest formulation of the regional innovation system model, will clearly be affected by such reconsiderations. This may help moderate an imputed 'fuzziness' the authors report as a critique of their treatment, perhaps not surprising in light of Sunley's (Chapter 25, this *Handbook*) recognition of the difficulty in researching them and Storper's comparison of them with astronomical 'dark matter'. This is a real future challenge for innovation research in general and regional innovation systems research particularly, not least because its methodology (comparative primary research rather than modelling secondary data sets) lends itself to exploring 'convention mutation' and 'convention displacement' as discussed in Schwartz and Cooke's 'Introduction' to Part V of this *Handbook*, 'Regional worlds of innovation', as cultures collide in globalizing regional innovation systems.

Apart from soft-institutional 'conventions' issues, more attention has been devoted to the regional innovation system perspective by authors seeking to elaborate harder institutional constraints. For example the authors note Asheim and Gertler's focus on knowledge dynamics and the different systemic implications if the cognitive field is 'symbolic' knowledge (creative industries) compared to 'synthetic' knowledge (engineering). Another is the authors' own differentiation of the institutional attenuation of regional innovation capabilities along a spectrum from 'fragmented' (for example Vienna's, like London's, and conceivably other metropolitan innovation deficits) to 'locked-in' (old industry regions) to 'thin' (peripheral regions) as a cause of regional innovation and broader economic underperformance. These flesh out the body of knowledge and understanding of regional evolution in ways that proliferate but do not yet reintegrate regional path trajectories or identify path-interdependence or holistic regional evolution as called for by Martin (Chapter 15 in this *Handbook*). One further elaboration proposed by the

authors is to draw on a ‘worlds of regional innovation’ perspective after Storper, as evaluated by Sunley (Chapter 25, this *Handbook*) to specify contrasts in regional knowledge acquisition styles ranging from static, traded to dynamic, untraded, the former capturing arm’s-length exchange transactions while the latter includes ‘social networking’ capital (as profiled by Rosenfeld, Chapter 21 in this *Handbook*). Hypothetically, the full range of these is found in accomplished regional innovation systems. What has then to be teased out is in what order for which knowledge ‘convention’ sets (‘symbolic’ compared to ‘synthetic’) and with what degree of ‘relatedness’ and even path-interdependence, so that the whole regional trajectory can be specified and, in comparative perspective, typologized. This is an exciting future research agenda for regional innovation systems analysis. Correspondingly, what other profiles, including governance as well as market failures, typify underinnovating, underperforming regions; and can learning, networking and relatedness conventions be enhanced by judicious policy intervention? Cross-border innovation systems are also inadequately studied by regional innovation systems analysts as yet. Accordingly, researching another soft institutional dimension like ‘convention proximity’ in relation to the ‘convention mutation’ and ‘convention displacement’ imperatives noted above, would markedly enrich understanding of key practices in regional innovation systems.

A further issue deemed worthy of more focused attention is that of regional innovation intermediaries in the changing policy arena of regional innovation systems. The novel research issues already raised point to the following evolving priorities: divergent innovation styles; distinctive innovation knowledge bases; changing and interacting convention structures; knowledge relatedness, transversality and path-interdependence; and knowledge and innovation internationalization. Each of these represents a sign that the complexity of contemporary regional innovation is best moderated by expert support in policy formation by catalytic intermediation and, to some degree, regional innovation orchestration (Chapters 23 and 42 in this *Handbook*).

Claire Nauwelaers’s Chapter 34 in this *Handbook* raises a further series of important observations and issues. The first of these is the fashionable concern for policy optimization and the culling of programmes and intermediaries that have blossomed during the increasingly residual era of supply-side economics. So, increasingly, innovation agencies are faced, in a new era of budgetary restraint, with an urgent need to optimize a system that has in most cases grown somewhat anarchically and without strategic governance. However, given the priority listing above, it is clear that these roles, many of them involving cognitive switching, policy mixing and hybrid technical and policy skills, are unlikely to be well performed by functionaries inhabiting policy silos. Nauwelaers lists many traditional ‘government failures’ towards regional innovation: innovation infrastructure failures (including science and technology infrastructure); transition failures at firm level, for example difficulties in adapting to changing competitive environments; lock-in failures at system level, typical of old industrialized regions; institutional failures (covering supporting institutions, regulations, culture, habits, and so on); and pervasive ‘learning and capability failures’ (import, processing and renewal of policy knowledge; see Chapter 40 by Simmie on ‘Learning regions’ in this *Handbook*). All such blockages call for infusions of ‘policy fluidity’ to facilitate flows of knowledge and related resources to regional innovators.

Various real-time challenges are presented in Nauwelaers’s Chapter 34, illustrating

innovation system challenges and the roles of intermediaries in mitigating them. Among the biggest of these are cognitive and interfacing problems for actors and agents faced with high uncertainty and low versatility, as also described with solvents identified in Chapters 41 and 42 of this *Handbook*.

ENTREPRENEURSHIP AND VENTURE CAPITAL

For transition planning involving new departures for firms and regional trajectories, Schumpeter I entrepreneurship and its associated risk capital investors are key change agents and mechanisms. As much organizational change management literature stresses, nothing less than a Giddensian 'structuration' process is implied by the onset and imperatives of regional innovation paradigm and regime change. Accordingly, mechanisms for facilitating this by intermediaries and policy managers must be thoroughly understood and tested. These can include the deployment of such 'soft innovation' instruments as 'living laboratories', 'dramaturgy' and 'white spaces' identification (as discussed in Chapter 42 of this *Handbook*), some of which are routinely practised in corporate 'change management' workshops. These too are arenas in which research opportunities are ripe for observation of 'convention adjustment' to attune regions, intermediaries and firms to becoming more innovative. However, the raw material on which such institutional therapy must work has to be considered first.

Niels Bosma and colleagues Veronique Schutjens and Erik Stam perform an analysis of regional entrepreneurship in relation to regional innovation and growth in Chapter 35 of this *Handbook*. First, like innovativeness, entrepreneurship is unevenly spread across regions. But do they coincide? Giddensian thinking is again to the fore in consideration of this, as a focus on entrepreneurship means a focus on structure and agency: it is about individuals who identify, evaluate and exploit entrepreneurial opportunities within certain structures, while at the same time influencing these structures. These have spatial aspects highly familiar to students of regional innovation: localization and urbanization (dis)economies, region-specific institutions, the organization of industries in regions, and the regional availability of production factors. The fact that, nowadays, a large part of innovative change is brought about by new firms suggests regional entrepreneurship and innovation do coincide geographically proximately. Innovative firms circumvent lock-ins, at the same time incentivizing incumbents by their relative competitiveness. Accordingly, this competition has a positive effect, directly and indirectly, through (Schumpeterian) imitation, on regional productivity levels.

Nevertheless, the fact that imitators vastly outweigh innovators means the Schumpeterian distinction retains its evolutionary force and that the former is more important in, for example, agglomeration and probably cluster emergence around a few innovators. Geographical proximity is extremely important for regional entrepreneurship, almost a given. Entrepreneurs value proximity to family and friends not only for the help that those connections might offer to their ventures, but also for emotional reasons. Moreover entrepreneurs are often 'organizational products', that is, they spin-off a firm from their previous employer. Furthermore clusters are shown to be good incubators for entrepreneurship, keeping in mind that a major share of that is imitative not innovative, for example footwear. Accordingly, intermediaries are frequently

entrepreneurs, or at least entrepreneurial because they practice rent-seeking competition. Equally, entrepreneurs are occasionally innovators but more commonly imitators and as such they intermediate innovation and wider, possibly global, markets.

A comparable judgement can be made for venture capitalists although their intermediary role in regional innovation is clearer. Venture capital (VC) is composed of different types of risk capital: VC funds, corporate venture companies, business angels and other private equity entities. Jesper Lindgaard Christensen's Chapter 36 in this *Handbook*, develops this theme of their importance, uneven spatial concentration and variety of profiles in his analysis of their position in the 'order' of intermediation they perform.

There are basically two convention sets here. First, they supply risk capital that facilitates entrepreneurship; second, they supply management capabilities, experience and networking which the entrepreneur or the innovator is likely to lack. Some experts consider the latter to be more important than the former function. These functions absolutely advantage metropolitan regions where venture capital habitually settles, even though metropolitan innovation is lower than ex-urban. The convention is that they usually like to locate no more than a one-hour drive from their investment, meaning that they can serve satellite clusters as well as the metropolitan ones. This might be termed the 'convention radius' of risk capital proximity, a powerful local force in the determination and reproduction of innovation-based regional inequality. Geographically asymmetric information about good prospects means venture capitalists and business angels rely on personal and professional relationships, which in turn are most often localized in close proximity to their offices. They may also specialize sectorally for example biotechnology funds. Regional innovation in non-metropolitan regions has had to evolve distinctive conventions, notably 'informal investors' *inter alia*, that is, successful regional entrepreneurs supportive of local entrepreneurship, even some business angels, but more commonly public or public-private, including specific-purpose (for example films, intellectual property rights – IPR), regional venture capital funds. Since the venture capital industry is dynamic, it is constantly evolving innovative mechanisms to exploit market opportunities.

ACADEMIC ENTREPRENEURSHIP AND INCUBATION

In the conventional order of regional innovation, notably of new technology business firms, entrepreneurs may be born in universities through a process whereby a laboratory discovery is seen to have commercial potential and its founder is advised or even trained to become an academic entrepreneur. It is not unusual for such an entrepreneur to seek accommodation in an incubator where, if in the US he or she is expected to have three assets to gain entry: a piece of intellectual property; a business plan; and seed investment of some \$1 million. In Europe, the academic entrepreneur frequently must be stress-tested, possibly more than once in a screening stage that, if successful, may lead to a selection stage for which the survivor(s) may be rewarded with an incubator space and a grant to write a business plan. Surprisingly, it is sometimes wondered why academic entrepreneurship is weaker in Europe than in the US.

As is shown in Chapter 38, exceptions to the European norm such as Israel and, to a limited extent, the UK are closer to the US progenitor. But one European country that

fits neither convention is Sweden, where as Magnus Kloftsen and Staffan Öberg show in Chapter 37, a highly systematic innovation chain produces regionally well-spread academic entrepreneurship and incubation based on enhancing human capital, then rewarding successful academic entrepreneurs by allowing them to retain full IPR on their innovation plus access to varieties of risk capital. Entrepreneur coaching and mentoring are crucial to this process.

Finally, the intermediating stage between academic entrepreneurship and market is occupied by incubation as discussed by Daniel Shefer and Amnon Frenkel in Chapter 38. They first discuss the role of the international technological incubators programme's visions and actions, which are: fostering entrepreneurship and innovation by channelling public and private risk funding from seed to venture capital to projects; business and marketing consultation; and provision of low-cost rent and infrastructure. Incubators number 3000 worldwide, of which nearly a third are in the US, housing some 20 000 firms. Technological incubators are also found in such emerging markets as China, Turkey, Brazil and South Korea. In Israel 26 are in operation of which 23 are technological; some 200 firm 'projects' employing 2000 at a cost of \$285 million were housed in Israeli incubators by 2003. The public programme was deemed successful enough that incubators could be privatized.

However, Shefer and Frenkel's evaluation showed that private incubators concentrate in innovative regions and sectors, while public incubators are more regionally sensitive and varied in the kinds of business they house. The convention set and indeed convention radius of a typical private incubator is wholly different from that of a public one. The former have a largely economic, business or administrative orientation with most originating in industry and easily able to attract venture capital. Promoters of the latter have higher education levels and previous careers in academia or research institutes, but they are weaker in business and administrative skills. University incubators seek to combine both attributes but they incur higher than average budgetary deficits. Nevertheless, in Israel, the incubator programme (alongside the initially public venture capital programme) has been credited with shifting the country's path-dependence (measured by gross domestic product and exports) from an agricultural to a high-technology trajectory in less than 20 years.

Part VI brings together stimulating new regional innovation systems and policy thinking, especially, first, concerning diverse kinds and emphases for research on the issue of 'soft institutions' (for example conventions). These were opened up by Sunley's lead in Chapter 25 of Part V of this *Handbook*, followed in places throughout that part and highlighted in Tödting and Tripp's Chapter 33 of Part VI and Nauwelaers's and Bosma et al.'s below. Among categories of regional innovation convention identified in these numerous chapters are the following: 'convention mutation', 'convention displacement', 'convention proximity' and 'convention radius' marking proximity constraints for special innovation services (for example academic entrepreneurship, venture capital, private incubation, patent citation). Regarding policy implications of the foregoing, key ideas with regard to policy intermediation include cognitive switching, policy mixing and hybrid technical and policy mix skills, all required as supply-side support shifts to demand-side catalysis involving regional change management, living laboratories and promotion of relatedness and transversality.

Universities remain important mechanisms because their convention sets are not (yet)

narrowly profit-motivated, unlike venture capital and private incubation that clearly are. 'Ordering' such potentially related path-interdependences in regional analysis and policy promises an exciting future for researchers, intermediaries and practitioners alike, embracing key issues in regional innovation, productivity and growth analysis.