

1 Lessons learned

The need for innovative regions and cities

Innovation is key for growth in all types of regions but many regions are struggling to transition towards new growth opportunities and reap the benefits that a constantly expanding global pool of knowledge offers. Traditionally, “innovation” carries the notion of scientific and technological breakthroughs and this aspect remains a crucial component of most innovation policy. Patenting activity and research and development (R&D) spending are, however, highly concentrated. Ten large (Territorial Level 2, TL2) regions account for about 45% of global patents and private sector spending on R&D among 34 OECD countries with available data. The same 10 regions produce a sizeable share (approximately 18%) of OECD-wide gross domestic product (GDP) but far less than their contribution to frontier innovation. This does not mean there is no frontier research activity elsewhere: many regions have frontier activities in certain sectors or academic disciplines. It does, however, mean that a purely frontier-focused approach to innovation policy will exclude a large number of places, firms and people and will miss out on their potential.

Innovation for many firms and regions is less about expanding the frontier and more about “catching up”, i.e. adopting ideas, inventions and innovations from other parts of the country or even other parts of the world. Capturing these dynamics requires a broad notion of “innovation” that includes all types of novel processes, products or activities that come through knowledge creation in a firm, the public sector or any other innovating unit. It also requires acknowledging that the tools to unlock innovation potential differ and depend on the capacity of the different actors in the region. The opportunity to upgrade exists everywhere but R&D incentives, support for patent commercialisation and rewards for academic excellence might not be the right tools to unlock them in every region. What is required are programmes adapted to the local context, in particular the capacity of the “regional innovation system”, i.e. the network of relevant innovation actors and the formal or informal links between them.

The need to improve the innovation performance of regions is mounting. Economically, weak productivity growth across most OECD regions is weighing on aggregate growth. In one-third of OECD countries, productivity growth has been concentrated in a single and already highly productive region. In some countries, the productivity gap between the top region and others is closing but in 14 out of 31 OECD countries, regions at the productivity frontier contributed more than 50% to the overall productivity growth in the country between 2000 and 2016. Beyond the slowdown in productivity growth, OECD countries will have to leverage regional innovation to support mitigation and adaptation measures to combat climate change. They will need innovation to ensure functioning and sustainable economies in the face of rapid ageing and look outward to ensure that globalisation and the growing role of emerging economies create benefits for all and not just a select few firms or individuals.

The choices regions make will determine how successfully they navigate the ongoing fourth industrial revolution. The fourth industrial revolution is characterised by the integration of the physical and digital worlds, enabled by improved monitoring through sensors, connected devices and advances in machine learning and artificial intelligence that open new routes for automation of tasks. Without intervention, interpersonal and interregional inequality is likely to continue to rise. Technological improvements often substitute routine cognitive and manual skills, which means that the wages of workers that rely on these

skills will fall or even that their jobs become obsolete. This will affect workers in manufacturing but also in services. Trying to avoid change is not the solution but innovation policy can help steer the direction to ensure that progress creates jobs and makes workers more productive, rather than replace them, and that the local workforce is prepared to use new tools.

Building on regional innovation systems...

There is no single “best practice” to follow to ensure that all types of regions fully leverage their innovation potential. Instead, policy needs a tailored approach that considers and adapts to local assets, including the region’s economic foundations, good transport accessibility, availability of talent, investors, incubators or urban-cultural and other amenities for example. This approach should not be purely driven by the public sector but engage the local actors that create, share and distribute knowledge. These actors come from different parts of the regional fabric: they are firms in the private sector, academics at local universities, policymakers in the public sector or civil society organisations (including business networks and industry associations). Together with the formal and informal links between these actors, they form the regional innovation system.

The importance of regional innovation systems for policy purposes is growing. Regions and their specific assets are increasingly finding their way into national innovation policy, supported by a paradigm shift in regional development policy from a subsidy-oriented model to policies that invest in local assets and unlock growth potential – including innovation assets. There is also a move towards less direct interventions at the national level. National innovation policy shifting towards framework setting and regulation has also provided more space for regions and cities to develop their own policies.

The ambition to achieve a particular type of economic growth (e.g. smart, inclusive or sustainable) embraces the idea that economic growth has not only a rate but a direction. Innovation and the current growth model may be having negative impacts in terms of job destruction and environmental degradation – elements with important local dimensions. There are often clear synergies between economic growth and other objectives, e.g. developing workforce skills contribute to productivity gains for firms, wage gains for workers and can raise the capacity for the adoption of innovation in firms and the region as a whole. Green public procurement can stimulate innovation in providing firms with incentives for developing environmentally friendly products and services, ideally supported by market consultation and involvement of suppliers in the development of feasibility studies and procurement strategies. Regions, cities and rural areas are well-placed to enable these synergies and to make the most of their potential through local networks and actions that complement national frameworks. They are also the places where trade-offs between different objectives are felt the strongest. This can be an opportunity in the pursuit of policy objectives as residents can experience local benefits directly, making them potentially more amenable to accepting their costs.

Mission-oriented innovation policy – i.e. policy that targets a specific outcome rather than steps in the innovation process – aligns well with grand but concrete challenges. “Missions” can be driven by national or global agendas, e.g. the United States’ “man on the moon” mission in the 1960s. They can also be set by subnational actors, e.g. Stockholm’s strategy for a fossil-fuel-free city by 2040 or Daegu’s transition of their traditional vehicle manufacturing sector to a leading sector for future vehicles. The mission statement itself can be key to ensuring that innovation in line with the mission is activated across sectors, actors, disciplines and regions. Successful mission-oriented innovation policy must acknowledge that there is not necessarily a single – best – path to achieving the mission. It, therefore, pays to enable bottom-up solutions and experimentation in the process.

Innovation policy challenges are often dispersed among networks formed by governments, innovators, private platforms and users. This may mean leaving space for people to experiment and test new solutions by themselves and to find ways of exchange and collaboration that help governments make use of them.

Experimental governance is an example of an explicit mechanism that enables a multi-level architecture to address challenges but also leverage the opportunities from a distributed approach to innovation. Responsibility for policy design and implementation is distributed between different levels of government and special-purpose local institutions. In this architecture, it is up to the higher levels of government to set general goals and performance standards and to establish and enforce the “rules of the game”. It is up to the lower levels to have “the freedom to advance the ends as they see fit”. It involves a multi-level process in which four elements are linked in an iterative cycle: i) broad framework goals and metrics are provisionally established by central and local authorities; ii) local authorities are given broad discretion to pursue these goals in their own way; iii) as a condition for this autonomy, local agents must report regularly on their performance and participate in a peer review in which their results are compared to others who are using different means to the same ends; and iv) the goals, metrics and decision-making procedures are revised by a widening circle of actors in response to the problems and possibilities revealed by the peer review process; and the cycle repeats.

... to support catching up

Diffusion of knowledge and uptake of new ideas across regions is by no means automatic. Many regions are struggling as firms’ fail to adopt new technologies and fall behind in the global economy. Simply adopting a regional innovation systems approach will not solve these challenges on its own. To be successful, regions need to address the systemic challenges that hold back the development of their local innovation system. A clear understanding of the capacity and the bottlenecks in the regional innovation system is the first step in this direction. The second is to tailor the system to the regional or local characteristics. The third is to ensure that the system is adaptive and can grow as the local and regional capacities improve or shift to a different growth path as technologies and the global context evolve. Without such a place-based approach, innovation policy might inadvertently accentuate inequality and regional disparities as local pockets of excellence (e.g. in research) fail to create benefits for the wider region and the lack of prerequisites in non-frontier regions limits the capacity of firms to benefit from innovation diffusion. A key challenge is that upgrading the regional innovation system often requires a very broad view of the local ecosystem and more than simply adjusting one element. It is less about what matters most than about setting a path to develop all elements of the innovation system. As there is no capacity to adjust all elements at once, it is important that regions not only set a path but also remain on it.

Innovation policy needs to reflect heterogeneity in terms of innovation capacity in regional innovation systems. In practice, highly heterogeneous regions or even countries are using very similar policy mixes, i.e. follow a “cookie cutter” approach without adapting to the different local capacities and opportunities. Instead, true policy learning and experimentation adopts the policy mix through monitoring and evaluation, which need to be embodied in programmes and policies from the outset. Policy learning includes provisional goal setting and revisions based on lessons drawn from experiences and from “learning by doing”.

Learning is crucial for catching up. A region that is not at the innovation frontier can copy, imitate or import many of the ideas, innovations and discoveries produced in other places and thereby boost local productivity and increase growth. The same applies to policies that support innovation and innovation diffusion. Regional and national policymakers can learn from the experience in other places, find the tools and programmes that work and avoid the pitfalls that others have experienced. This approach requires careful identification of suitable examples that fit the local context. Learning through processes is another important path. Developing an innovation strategy that fits the local or regional needs is important. In some places, its greatest value lies, however, in the process of developing the strategy as governments develop internal capacity, external links with local firms, academics or civil society and find a platform that helps align interests and narratives within the region.

Learning requires investment. The learning process itself requires resources but investment needs go beyond the direct time and money put towards learning. Institutional and administrative capacity for collaboration and exchange are critical for policy learning. They underpin the ability to adapt external solutions to local and regional bottlenecks. Building up such capacity requires investments in knowledge, skills, and the education and training system. Regions differ widely in their adoption capacity and the cumulative benefits that accrue from investment. National governments can support regions through dedicated capacity building as well as setting up platforms of exchange between regions.

A fundamental challenge in policy learning and experimentation is determining the underlying social and institutional criteria necessary to make policy learning successful. A second related challenge is whether and how policy learning and experimentalist approaches are applicable across different types of regions. Not all learning mechanisms are applicable to all regional contexts. In particular, regions with weak institutional capacity – paradoxically those most in need of learning – face a range of barriers to learning because of their institutional weaknesses in terms of governance and capacity. A third is the true engagement of all actors in the innovation system. Simply adopting a tool, such as experimental governance, as a policy approach will not induce greater involvement by firms, citizens and civil society on its own. Rather, it depends on the ability of those regions and localities to foster the creation of more networked and collaborative forms of governance in order to succeed.

One way to support regions with less developed innovation systems is through specific learning mechanisms, such as learning networks. Learning networks are formally established mechanisms meant to support the practical learning of its members. Learning networks provide the flexibility to find concrete solutions to the challenges that are specific to each region's innovation system. Typical challenges in less developed innovation systems include low levels of co-operation, weak administrative and governance capacity, lack of critical mass or a lack of systemic support for entrepreneurs. A second mechanism is to carefully balance top-down policies with locally led policy efforts and to experiment with existing governance arrangements to allow actors at the margin to be part of the policy process. Success might depend on the ability of local leaders to form collaborative arrangements allowing public sector institutions to work with the private sector in devising experimental approaches. The ability to do so often depends on the willingness of policymakers to enhance their capacity to lead and work with change.

Innovation in non-frontier regions relies more on imitation and adoption than the development of own innovations. It includes, for example, incremental changes to production processes, local adaptations of established technologies by importing capital and knowledge, and local institutional capacity building to manage innovation policies. This is also reflected in the type of skills and supportive infrastructure firms in non-frontier regions need. Vocational and engineering skills rather than scientific capacity are more important for upgrading in regions that are lagging behind the innovation frontier. Knowledge is often implicitly imported (e.g. in the tools and machinery that firms purchase from elsewhere) or flows through supply chain linkages including global value chains (GVCs).

Understanding the local strengths and weaknesses...

Nurturing local innovation and innovation policy is central to ensuring that regions transition from their current economic structure towards new opportunities. Relying on past and current industrial strengths is tempting but the lessons from past industrial revolutions show that transitions are crucial for regions to remain economically strong. Past industrial revolutions also show that industrial transition is no mean feat. Even today, many European and OECD regions appear to be stuck in a “middle-income trap”, i.e. a loss of growth momentum as they reach middle-income levels. Managing transitions requires identifying and exploring areas of economic potential to generate new sources of regional growth. The identification of domains of competitive advantage should not be limited to the public sector. It requires engaging with the private sector, academia, as well as relevant actors from civil society.

The core questions centre on whether it is better to specialise in those areas where the region is already strong or whether it is better to diversify. More specialised regions were richer (in term of per capita GDP) but more diversified regions grew faster over the 2008-14 period. What further complicates the challenge is that there is no unique path to upgrading the local economy. Three common pathways for regions' innovation development include: i) regional specialisation in a particular technology domain; ii) regional diversification in related technological domains; or iii) regional diversification in unrelated technological domains. Specialisation might be the most beneficial path if a region has a strong comparative advantage and assets that are hard to replicate. Excessive concentration on specific sectors does come with risks, as exposure to shocks is very concentrated or the sector might reach maturity or even decline. Instead of further specialising within existing sectors, regions can aim to diversify their economies and thereby “branch” onto new development paths.

Different tools are available to help regions identify their strengths and weaknesses. Regional benchmarking can be of great value for identifying best policy matches in the design and implementation processes of regional innovation policies. Policies in the context of European Union (EU) Cohesion Policy and related Smart Specialisation Strategies present much space for improvement in enabling differentiated policy strategies based on regional assets. Regional mapping should consider a wider range of assets. For example, mapping local opportunities and key actors for engagement with GVCs is an important tool to inform regional innovation policies. For some regions, mapping is a critical tool to identify current barriers to progress; in others it is important as a foresight tool to avoid getting “stuck” on their current development path. Diagnosing the characteristics of regions that support integration in GVCs, such as geographical influence and stakeholder activities, is extremely useful to ensure regions can leverage their engagement with multinational enterprises on a path to regional innovative upgrading.

For future development under uncertainty, the combination of machine learning techniques and “big data” opens up new avenues for such forecasting exercises, in particular in new technology domains. Patent and trademark data have been used in some recent applications and can complement more traditional foresight methods. Technological foresight exercises can be an important help to assess how different technologies will affect a region, thus equipping local agents with the tools that help them identify needs for regulation or policy to intervene. Previous waves of technological breakthroughs have shown that new technologies do not spread evenly across space and results in a variety of outcomes across regions. Preparations to benefit from new trends need to start early as a common lesson from past industrial revolutions is that regions with a more educated and skilled workforce are those best placed to reap the benefits of new opportunities.

Despite significant progress, improving the measurement of innovation capability remains a key challenge. Especially, evidence on hard-to-quantify factors in innovation, such as links between actors or the role of (local) leadership, often remains in the realm of case studies. More can be done by improving access to available administrative data for research purposes but a large, untapped wealth of information lies in the hands of the private sector. Significant progress can be achieved by combining different data sources and finding ways to harness the potential of data in the private sector without threatening business models or the confidentiality of sensitive business data or personal data (e.g. of entrepreneurs).

... to make regional innovation systems fit for the future

A static regional innovation system will become obsolete; a learning innovation system can persist. A regional innovation system that is fit for the future is able to reconfigure and adapt. Such a forward-looking view is for example reflected in the guiding principles for smart specialisation strategies that European regions develop as part of the EU Cohesion Policy. A closed innovation system that aims to internalise benefits is most successful in settings with stable actors and has supported the development of many regions in the OECD. In a rapidly changing world, with disruptive technologies challenging incumbents'

products and even their whole business model, the question is whether such systems are suitably adaptive. Disruptive technologies are not necessarily radical but can come out of the recombination of existing technologies or competencies. This poses the question of whether the closed approach that relies on internal knowledge across those fields is light-footed enough to keep pace with change. Moving to a more open mode of innovation is difficult as there is no ideal model that can guide the process. For policymakers, it is often easier to rely on “tried and tested” approaches rather than take a risk with new approaches.

Whether through the effect of a combination of different innovations, or individual disruptive innovations, new opportunities come along with the displacement of existing industries, workers and respective institutions. Innovation can have very different regional impacts. Innovation can disrupt incumbent industries in all types of regions but the most developed regions in the innovation frontier are more likely to create (and benefit the most from) disruptive technologies, creating new sources of jobs and finding new growth paths. If regions cannot transition their economies to reap the benefit from new opportunities related to industrial transitions and disruptive technologies, they face the risk of periods of prolonged decline and rising unemployment. Rather than trying to avoid disruption, policy responses need to prepare and steer progress towards growth that is sustainable and inclusive.

More fundamentally, disrupting the way economies function might be more important now than it has ever been before. Disruptive innovations might be the only way to tackle “grand” societal challenges OECD countries are facing. Without significant changes to transport, energy production and a move towards less wasteful consumption, climate mitigation efforts and the transition towards carbon-neutral economies will fail. In many areas, innovations are becoming increasingly disruptive, completely moving markets away from existing practices, introducing new paradigms and opening up avenues for further developments.

For policymakers, the challenges that need to be overcome to increase experimentation are multi-faceted, ranging from questions of commitment to learning by monitoring on the part of ruling politicians and their public sector managers and an organisation’s technical capacity for learning by monitoring. To adopt and adapt to the learning mechanisms described in this report – collaboration and exchange, as well as greater experimentation –, policymakers need different types and combinations of skills, which might not always be easy to acquire.



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