

# 5

## Rural-urban linkages and innovation cities

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This chapter starts by summarising the OECD framework on rural-urban linkages followed by a description of Korea's innovation cities. It then draws on four examples of linkage development pertinent to the objectives and continued growth of the innovation cities from OECD countries. These examples include: Nuremberg, Germany; Brest-Pays Centre-Ouest Bretagne, France; Southern Ontario, Canada; and finally Scotland from the United Kingdom.

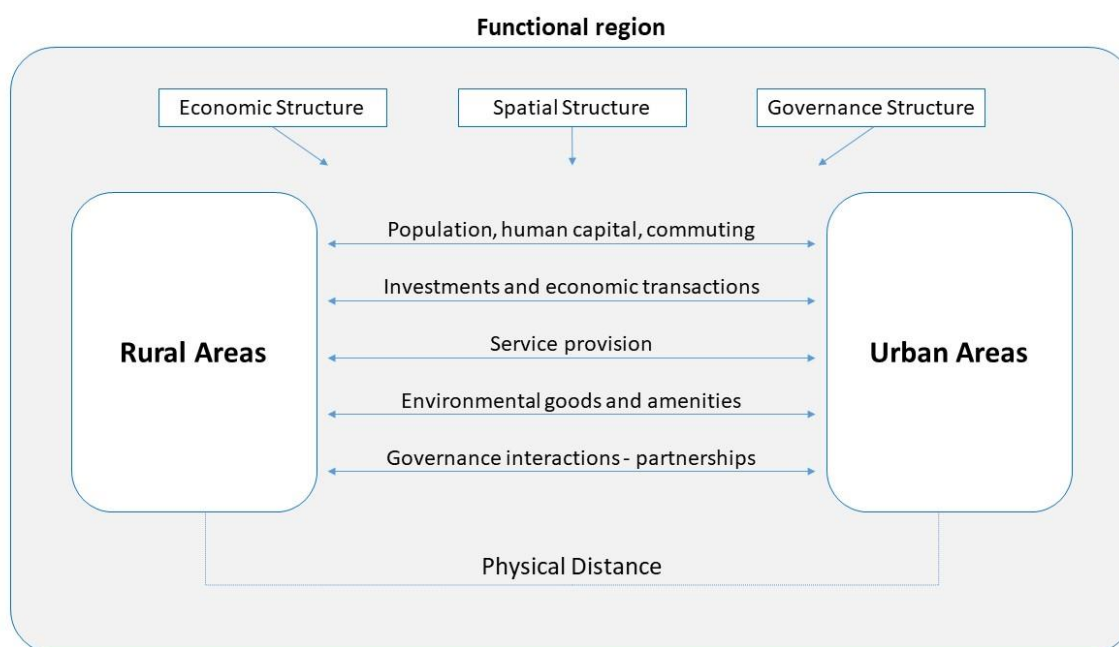
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## Rural-urban linkages: What are they and why do they matter?

While rural and urban areas are often separated by traditional administrative boundaries, they are nonetheless deeply interconnected through a variety of complex relationships. These relationships stem from the differing characteristics of the rural and urban territories, enabling each to complement the other's assets and help address the other's shortcomings, potentially unlocking socio-economic benefits for both.

Rural-urban linkages exist across several dimensions including demographic, environmental and economic aspects (OECD, 2013<sup>[1]</sup>). Demographic linkages include commuters and migration patterns. This can include young people moving from rural to urban areas for educational or career opportunities, or urban retirees moving to rural areas to enjoy a slower pace of life, a greater sense of community and proximity to nature. Environmental linkages can include shared assets, such as water, and amenities for public enjoyment, such as natural beauty spots. Economic linkages include a wide variety of relationships, including trade and supply-chain links between firms across the rural-urban continuum, investments and relationships around research and innovation that support the development and commercialisation of new products and services.

**Figure 5.1. Linkages between rural and urban areas within functional regions**



Source: OECD (2013<sup>[1]</sup>), *Rural-Urban Partnerships: An Integrated Approach to Economic Development*, <https://dx.doi.org/10.1787/9789264204812-en>.

Linkages tend to be stronger in rural areas that are close to cities. Compared to other OECD countries, Korea is quite densely populated and has many rural regions that have a functional urban area (FUA) or are also close to a small- or medium-sized city. Firms and workers in these rural areas benefit from good access to markets, services and agglomeration of talent present in urban areas, benefits often referred to as “borrowed” agglomeration effects. Rural areas close to cities often enjoy environmental amenities and lower land and housing costs than cities, making them both attractive places to live and in which businesses can invest. The commuting zones around urban areas in Korea have seen their populations

grow much more rapidly than the urban centres themselves, with among the largest difference in growth rate observed anywhere in the OECD (2001-11) (Veneri, 2018<sup>[2]</sup>).

Today the potential for linkages across the rural-urban continuum, and for rural areas to participate in the global economy beyond, is greater than ever thanks to improved digital and physical infrastructure that has made possible new ways of living and working. The COVID-19 crisis may further accelerate these changes through the growth of remote working, online public service delivery and the emerging need for resilient domestic supply chains for some goods, all of which may offer new opportunities for rural areas. Korea's recently announced investments to expand 5G coverage, support farmers and food security, upgrade rural hospitals and improve the wireless Internet infrastructure in some rural schools (OECD, 2020<sup>[3]</sup>) can all support the growth of these links.

Better integration between rural and urban areas is important for socio-economic performance. On average, places where “rural” and “urban” are closer, and where institutions are more inclusive, perform better than others in terms of growth of population and gross domestic product (GDP) per capita respectively (OECD, 2013<sup>[1]</sup>). Yet stronger linkages alone may not benefit all residents and can, in some cases, be detrimental. It has been shown that in rural areas, where a high proportion of the population participates in an urban labour market (e.g. by commuting to jobs in a nearby city), while this often leads to indicators of high income, high education and high quality of life in that area, such indicators may mask underlying problems. Those rural residents who do not commute and who continue to work locally may see a rising cost of living, particularly for housing, and a falling relative wage (Bosworth and Venhorst, 2018<sup>[4]</sup>).

Policy interventions can help create, strengthen and optimise rural-urban linkages to deliver economic development and well-being to rural and urban residents while mitigating potential pitfalls. While these interventions can take many forms, there are two broad categories:

- Interventions to facilitate partnerships between governments – including both formal and informal arrangements, voluntary or mandated, between municipalities and the administrations of rural areas and/or to create new regional authorities.
- Interventions to facilitate linkages between non-governmental entities – including between educational and research institutions, not-for-profit organisations and private businesses.

Partnerships between governments are often used to facilitate regional cohesion and identity, and co-ordinate improvements in regional transportation and other public services that involve spatial planning such as education and health provision, where they can help achieve economies of scale and strengthen agglomeration economies. They can also be used to manage and protect shared resources such as water and air quality.

Interventions that support linkage formation between non-governmental entities may be leveraged to connect businesses with supply chains, support the development of consortia between businesses and research institutions, support the commercialisation of research and provide services that support entrepreneurs across the rural-urban continuum.

## From innovation cities to regional hubs

Korea's Innovation Cities initiative began in 2004 with the execution of the Special Act on the Construction and Support of Innovative City Acceptance of Public Institutes Relocating to Local Cities. Initially led by the central government, the Innovation Cities initiative was intended to ease pressure on Seoul while catalysing the development of the country's secondary cities through the relocation of public institutions, along with their staff and their families. A total of 153 public institutions were relocated from the capital area and distributed across 10 of the country's secondary cities, a process that was complete as of May 2020. The initiative has involved the development of new districts within each of the host cities,

including new offices and other commercial amenities for the relocated institutions and new housing areas for the relocated workforce.

A near-term impact of the initiative has been to drive up the population of the host cities. With the Innovation City districts now home to a combined population of 204 716 inhabitants, this population grew 11% in 2019 over 2018 and supported similar growth, of 10.9%, in local tax revenue. Along with the relocation of public institutions, the initiative has sought to bring together academia, research institutions and enterprises with the intent to spark new engines of innovation and economic growth. At the same time, the government has invested to improve the public services, housing, cultural amenities and transportation infrastructure in these cities to encourage the relocation of staff and help them integrate into their new communities. For each of the cities involved (Figure 5.2), the policy has notably identified a theme aligned with the city's existing industrial characteristics (OECD, 2012<sup>[5]</sup>). The theme informed the selection of public institutions that were relocated to each city and the intent is to develop these themes into brands that will enhance the city's image and help attract investment.

**Table 5.1. Innovation Cities and their theme**

Region(s)	City/Urban district	Theme
Gangwon-do	Wonju-si	Vitality City, realising harmony of health, life and tourism
Jeollabuk-do	Jeonju-si	Bio-industry hub connecting traditional culture with state-of-the-art technology
Busan	Yeongdo-gu, Nam-gu Y	Hub for maritime affairs and fisheries, film and finance, connecting land and sea
Ulsan	Jung-gu	Environmentally friendly high-tech energy hub
Chungcheongbuk-do	Jincheon-gun and Eumseong-gun	Inno-valley of innovation and culture
Gwangju, Jeollanam-do	Naju-si	Capital of high-tech futuristic industrial cluster
Gyeongsangbuk-do	Gimcheon-si	Hub for state-of-the-art science technology and transportation
Gyeongsangnam-do	Jinju-si	Hub for leading mechatronics industry
Jeju	Seogwipo-si Y	Leading international exchange and educational training
Daegu	Dong-gu	Hub for educational and academic industries; centre of the southeast's industrial cluster

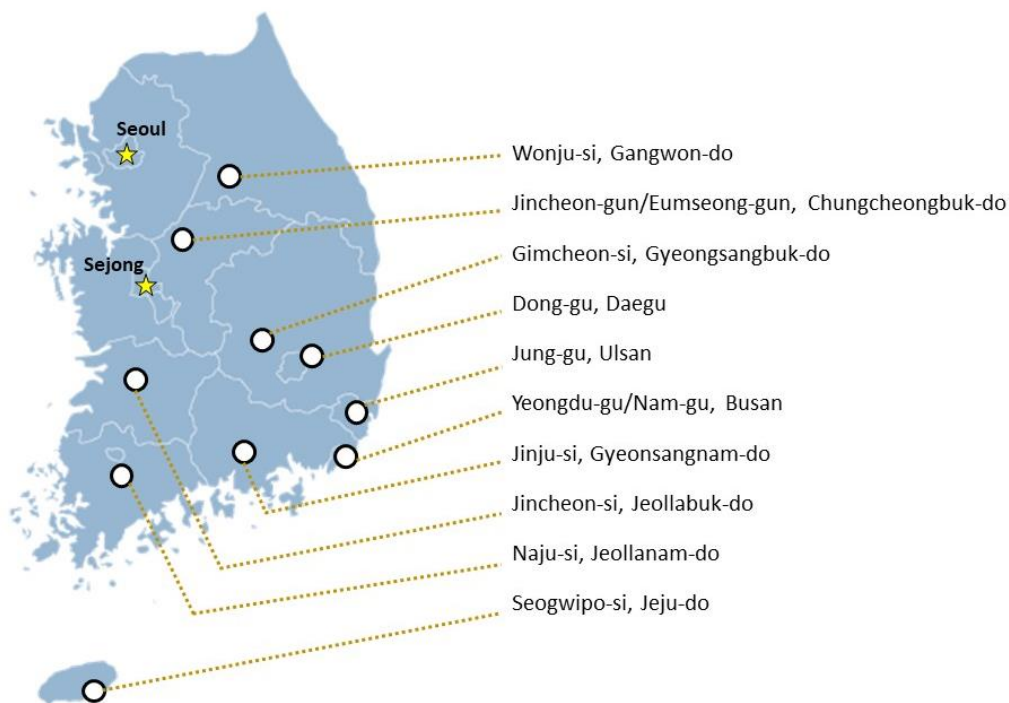
Source: OECD (2012<sup>[5]</sup>), *OECD Urban Policy Reviews, Korea 2012*, <https://doi.org/10.1787/9789264174153-en>.

With the relocation of institutions now complete, the initiative is now moving into its “second season”. In this phase, control has shifted from the central government towards local leadership, with local governments taking the lead on planning for the further development of their Innovation City over the next five years. In this second season, a new emphasis has been placed on better integrating the relocated institutions into the local community and on improving quality of life for residents by building social infrastructure. To strengthen the relationship between the relocated institutions and their host cities, new targets have been set for 2022 on local hiring (30%) and on leveraging local suppliers in procurement activities (20%). In 2019, 25.9% of individuals hired by the relocated public institutions were of local origin (21% was targeted) and 13.4% of procured goods were locally sourced. Focus is also shifting from public institutions towards the private sector. An important goal of the Innovation Cities initiative moving forward will be to foster regional hubs, innovation clusters that leverage the existing strengths of each place in combination with the relocated public institutions and with investment and incentives to spur private sector innovation and growth.

In support of these objectives – greater connection with the local community, improved well-being for local people and the emergence of private-sector driven innovation clusters that leverage regional strengths – rural-urban linkages will have an important role. As the initiative evolves from its top-down origins into a

more organic engine of regional development, policy interventions by the central and local governments can help ensure that the initiative is inclusive of rural residents and firms and that it supports the well-being of both rural and urban people.

**Figure 5.2. Map of Korea's Innovation Cities**



Source: OECD elaboration based on MOLIT (2020<sup>[6]</sup>), *Innocity*, <https://innocity.molit.go.kr/>.

## Experiences in building linkages from other OECD member countries

The examples that follow draw on the experiences of other OECD members that have sought to strengthen linkages across the rural-urban continuum. Selected examples focus on aspects in common with Korea's Innovation Cities initiative, specifically:

- Building regional governance and a regional brand identity in Germany.
- The importance of reciprocity in the rural-urban relationship in France.
- Strengthening regional clusters by including rural entrepreneurs and small- and medium-sized enterprises (SMEs) in Canada.
- Leveraging rural assets as testbeds for emerging technology in Scotland (UK).

### **Germany: The Nuremberg Metropolitan Region**

*A rural-urban partnership to better compete in a globalised world*

The Nuremberg Metropolitan Region (NMR) is home to approximately 3.5 million people covering an area of 21 349 square kilometres and 33 administrative districts (11 of them urban, 22 rural) (OECD, 2013<sup>[11]</sup>). It is one of Germany's ten largest economic regions. The boundary of the region covers a much wider

geography than a conventional functional area defined in terms of labour market self-containment. Its territory encompasses four different functional metropolitan areas and a wide rural territory surrounding them. One of the main determinants of the current boundary of the NMR is the integrated public transport system. This network of public transport is a strong unifying element that allows for reciprocal exchanges of the population (carrying workers from the periphery to the centre and tourists from the centre to the periphery).

Since 2005, these districts have been voluntarily co-operating in projects of shared interest. Their partnership was initially sparked by the German government's Demonstration Project of Spatial Planning for cross border functional regions – the MORO initiative – which launched a three-year pilot project on spatial development led by the Federal Ministry of Transport, Building and Urban Affairs, in collaboration with the Federal Institute for Research on Building, Urban Affairs and Spatial Development. The intent of this initiative was to provide incentives for urban and rural areas in Germany to engage in project-oriented co-operation. Funding for the initiative was low, providing only around EUR 80 000-100 000 to the region over the pilot period: it was sufficient to support co-ordination and knowledge sharing activities but not meaningful investment (Richardson, Bae and Choe, 2011<sup>[7]</sup>).

The “cluster concepts” strategy was introduced by regional authorities in the Nuremberg region in the 1990s, due to the rapid increase in employment in the service sector and the decrease of employment in the manufacturing sectors. Global fields of growth, areas that represented the “strengths” of the region, were identified. The Bavarian state installed several universities of applied sciences in the districts of the NMR to support the maintenance and development of industrial activities (SMEs) in these fields and to stabilise the rural areas. The aim was to combat this downturn by strengthening the regional labour market and stimulating co-operation and the formation of networks between companies, as well as between companies and institutions.

With the region facing a declining and ageing population and the need to keep young and skilled labour within the region after educating them, the leaders of Nuremberg and the other core cities (Erlangen, Fürth and Schwabach) recognised that due to their small size, they were not able to become a leading hub without the co-operation of their surrounding rural areas. Together with leaders from the other districts and other levels of government, they sought to build a region better equipped to compete in a globalised economy, in both the domestic and international markets, by becoming more integrated, cohesive and recognised as a single entity. They each shared a vision that region-building would help combat the pressures of globalisation. Nuremberg was well placed to lead this initiative, because the city saw itself as being linked with, and not in opposition to, surrounding areas. The cultivation of a new, shared identity in response to globalisation was the essence of the approach to the partnership. Both urban and rural partners acknowledged that a more integrated region was more likely to remain “on the map” or to gain visibility, which made it necessary to work across traditional administrative boundaries.

The basis for the NMR is the Bad Windsheim Declaration, a document which sets out the principles for the partnership, one of which is rural-urban collaboration. The document notes that separating rural and urban areas or treating urban and rural as separate and/or opposing “does not correspond to historical, economic, sociological or cultural realities”. The core activities for the partnership include:

- Developing an international brand, the “Nuremberg Metropolitan Region”.
- Setting up a metropolitan development model based on urban and rural partnership.
- Strengthening the knowledge society through a cluster policy.
- Promoting integration with the Trans-European Transport Network.

### *Partnership structure*

The power-sharing inner structure guarantees the functioning of the partnership. At the core is the council of elected officials (55 lord mayors, mayors and rural district administrators, including representatives of

the Bavarian state government). In the council, decisions about strategies and common projects can only be made by consensus; each member has one vote, regardless of population size or economic strength, the “same eye level” principle set out in the Metropolitan Charter. The principle of “one voice, one vote” has helped build trust and overcome partners’ suspicions of the big city, since the rural counties outnumber the cities and could have dominated the partnership. The council is supported and guided in this process by several entities, each with its own function: the NMR Presidency, the NMR Central Office, the Steering Committee and the seven fora of expertise. In the fora, around 600 participants work on addressing the core issues concerning the metropolitan region. The steering committee discusses issues and projects concerning the metropolitan region and brings them before the council. The management office manages the issues for the council and the steering committee as well as the day-to-day business of the NMR.

Leadership played an important role in the emergence of the rural-urban partnership. Building a regional identity and fostering co-operation among areas with no history of trust has involved a two-stage approach to rural-urban partnerships, with the first phase devoted primarily to region and identity building. The choice of “win-win” projects helped to avoid conflict both within the partnership (between the partners) and outside it (in relation to state and municipal responsibilities) and the adoption of a consensus approach and a principle of equal representation helped to overcome partners’ suspicions that a dominant partner with more resources and capacity would shape the debate. Factors that have enabled the partnership to thrive include an understanding of the interdependence of rural and urban areas, clearly defined objectives, representational membership, democratic participation and strong leadership. Factors that could slow the growth of the partnership are a financial situation dependent on subsidies and a focus on measuring inputs, rather than results.

#### *Takeaways for Korea*

- Overcoming the limitations of size by building a network of interconnected territories and cities was seen in Nuremberg as a way to achieve network economies that could make them competitive with large metropolitan areas. In Gwangju/Jeollanam-do, a similar approach has been applied through their “win-win consultative body” to better position their region *vis-à-vis* the capital. This approach may also help Innovation Cities to more quickly achieve such scale, and several of the themes identified for the initiative, such as those on vitality and tourism, bio industries, fisheries and environmentally friendly energy, may lend themselves particularly well to the inclusion of surrounding rural areas in their branding and clustering efforts.
- In structuring rural-urban partnerships, principles such as “one voice, one vote” can help overcome fears rural leaders may have of being dominated by larger and wealthier cities.
- Integrated public transport systems that cut across the rural-urban boundary can support regional cohesion and unlock agglomeration benefits by increasing the mobility of labour and visitors.
- Large investments may not be necessary – where shared interests are recognised, a small incentive from the central government may be sufficient to prompt the development of partnerships at the local level.

### **France: The Brest-Pays Centre-Ouest Bretagne reciprocity contract**

#### *National government as a driver of urban-rural linkages at the local level*

In 2016, the French government launched a new initiative named “city-countryside reciprocity contracts”. These contracts stem from the acknowledgement by the national government of the complementarity potential of its different urban and rural territories. The initiative was developed with the explicit goal of reducing the gap between urban and rural territories in France, strengthening linkages across traditional administrative boundaries. The reciprocity contract initiative is an experimental tool to promote inter-municipal co-operation and to empower a new subnational entity: metropolitan areas. The agreements are

adaptable to different territorial realities. Their jurisdictions are not predefined and this allows them to cover different areas depending on the local priorities and contexts (OECD, 2016, p. p.210<sup>[8]</sup>; European Network For Rural Development, n.d.<sup>[9]</sup>).

This policy initiative stemmed from a national consultation process on rural challenges that lasted two years, through which the diversity of rural areas was acknowledged and an understanding that rural-urban interactions should address not just proximity issues (e.g. commuting patterns) but also consider reciprocal exchanges in order to build meaningful partnerships. Potential areas for co-operation through the pilot initiative include:

- Environmental and energy transition (e.g. food security, waste management, preservation of agricultural land and bioenergy development).
- Economic development (joint promotion of the territory and the development of joint territorial strategies, land use policies, support for business and the development of teleworking to help maintain remote town centres).
- Quality of services (promoting touristic sites, access to sports facilities, leisure, heritage and access to health services).
- Administrative organisation (mobilisation of staff with specific skills to support key projects).

Four territorial partnerships were selected on a voluntary basis: the metropolis of Lyon and Pays d'Aurillac, the metropolis of Brest and Pays Centre Ouest Bretagne, the metropolitan territory of Toulouse and the Massif des Pyrénées, and the urban community of Le Creusot-Montceau les Mines and the Natural Regional Park of Morvan (European Network For Rural Development<sup>[9]</sup>).

Brest Métropole Océane is a harbour city of 207 000 inhabitants. It is renowned for its research and development activities and its robust service sector. Its rationale for pursuing the reciprocity contract was linked to the medium-long-term risk of losing competitiveness and attractiveness in comparison to the regional hub of Rennes. The Pays Centre-Ouest Bretagne has a population of 97 000 inhabitants and has experienced a significant decline in productive employment since 2009, mainly due to the agro-food crisis that impacted the milk sector. Its motivation for joining the reciprocity contracts stemmed from the risk of the area becoming a medical desert and the presence of a fast-growing wood sector looking for new markets.

In that sense, the city of Brest and the rural area of Centre-Ouest Bretagne worked together to fulfil their respective priorities and agreed to support innovative projects around four main strands: i) economic development; ii) social inclusion; iii) health, culture and services; and iv) environment and energy transition. In order to determine each of these strands, local government officials and residents from both areas met three to four times in 2015 to negotiate win-win partnerships and joint activities to address areas of common concern. This bottom-up process was facilitated by Brest-Bretagne urban agency planning. It led to the development of a joint roadmap, which was formally adopted by the local assemblies before being signed with French government representatives in November 2016.

The initial reciprocity contract did not include any financial commitment from either side. However, there was a provision for the addition of a new budget line in the multiannual framework contract, the *Contrat de Plan État-Région* (CPER, the state-region planning contract), agreed by the central government and the regional authority of Brittany that led to a public grant of EUR 2 million for the 2015-20 period (with potential for seeking European Structural and Investment Funds as well).

A year after the signature of the reciprocity contract, there are already incipient results in terms of supporting an audio-visual cluster (a regional hub for documentary films), healthcare (services provided by Brest Hospital are also made available to the rural areas of Pays Centre-Ouest Bretagne) and bioenergy (wood energy cluster that brings together all local timber industry businesses).



### *Takeaways for Korea*

- As in Germany, the French national government played a facilitating role, creating a new initiative and leveraging only a small amount of incremental funding, and was able to encourage linkage formation where there had been none before.
- Key to the success of the French initiative was the notion of reciprocity: both sides were expected to contribute to the relationship, and both expected to get something back in return. To forge successful partnerships that receive buy-in from all sides, it may be necessary to identify the ways rural areas can help Innovation Cities as well Innovation Cities can help rural areas.

### **Canada: The Southern Ontario Scale-up Platform**

#### *Entrepreneurial supports available wherever you live*

Southern Ontario is a cornerstone of the Canadian economy with the region accounting for more than a third of Canada's population, jobs and economic output. The province of Ontario generates nearly half of the country's business research & development spending, almost two-thirds of patent applications and over 40% of Canada's science, technology, engineering, and mathematics (STEM) related workforce – all critical inputs to drive growth and innovation in the digital economy. With over 46 000 SMEs and 1 million Ontarians employed in knowledge-intensive sectors, the Southern Ontario Region has grown into the second-largest technology cluster in North America and the Greater Toronto Area has become the fastest-growing global technology market, recently surpassing San Francisco, Seattle and Washington combined – with a total of 241 000 technology industry jobs. The city of Waterloo, around an hour west of Toronto, has the second-highest density of technology start-ups on the continent and the concentration of technology talent in the national capital, Ottawa, five hours east of Toronto, is among the highest in North America. These three cities, Ottawa, Toronto and Waterloo, have together been at the heart of Southern Ontario's technology cluster for many years now.

In each city, the sector is supported by a strong business accelerator organisation, specifically the MaRS Discovery District, Communitech and Invest Ottawa, in Toronto, Waterloo and in the capital respectively. These organisations work closely with local universities, researchers, investors, business strategists and mentors, as well as with the government, to provide entrepreneurs and SMEs with the tools, advice and access to finance their need to innovate, commercialise new ideas and technologies, and grow their companies.

Outside of these cities though, the picture is quite different. Rural areas in Southern Ontario have not shared in the recent success of the region's major cities. In the decade following the economic recession of 2008, Ontario saw the creation of 865 000 net jobs. However, 87% of this job growth was concentrated in Ottawa and Toronto, while rural communities experienced the loss of 76 000 jobs over the same period. On a national scale, although employment is up by close to 15%, rural employment remained below pre-recession levels, as of 2019.

Relative to rural areas in other parts of Canada, rural areas in Southern Ontario are relatively close to cities and well connected by roads, rail and broadband services; however, rural entrepreneurs have not had access to the array of support available to their counterparts in the major cities. Recognising this issue, the Federal Economic Development Agency for Southern Ontario, which provides funding to the three major business accelerators, included a provision in recent funding negotiations to develop rural-urban linkages between the three major business accelerators and other innovation centres serving smaller communities and rural areas across the Southern Ontario Region. The resulting Southern Ontario Scale-Up Platform, announced in 2019, brings together MaRS, Communitech and Invest Ottawa into a new partnership. A goal of the new platform is to make the programming, advisory services and other

support offered by these organisations at their urban locations available to entrepreneurs and SMEs located outside the three major cities, by partnering with local innovation centres.

To that end, Invest Ottawa has developed its Eastern Ontario Collaborator initiative and is signing partnership agreements with other organisations throughout Eastern Ontario, a rural area surrounding Ottawa. In one example, Invest Ottawa provided funding support to Queens University, in Kingston (population: 117 660, 196 km from Ottawa) to develop their Launch Lab initiative, including a boot camp for early-stage start-ups, a pre-commercialisation pilot for intellectual property holders and a growth accelerator programme for SMEs. The boot camp has been offered in rural Lanark County and the town of Cornwall (population: 45 723, 103 km from Ottawa) and all programming is being adapted for virtual delivery. Invest Ottawa has also partnered with a local vocational college, St. Lawrence College, with three campuses across Eastern Ontario to develop a business ecosystem pathfinding tool to assist start-ups and scale-ups in connecting with available resources. The inclusion of traditionally underrepresented groups has also been a priority, and so Invest Ottawa is collaborating with Algonquin College to develop and implement an early-stage entrepreneurship programme specifically for Indigenous entrepreneurs that aims to foster Indigenous learning and collaboration. Programming will include peer-to-peer networking and mentorship opportunities, events and lecture series with Indigenous business leaders.

By helping rural residents with business ambitions fulfil those ambitions in their own communities, without having to move into the cities to find the help they need or to commute, the benefits of their efforts may be captured locally, supporting the development of rural communities. Linkages forged via the Scale-Up Platform are also expanding the capacity of the smaller innovation centres outside the major cities, while fostering a stronger network between these centres and the major platform members, creating new opportunities for knowledge sharing and idea development across a wider area.

#### *Takeaways for Korea*

- Linkage formation does not necessarily require new agreements between governments, which can be time-consuming and require political leadership. By leveraging its role as a funder, the government can also foster the creation of meaningful rural-urban linkages between non-governmental organisations through a relatively simple contracting process.
- Strengthening linkages between Innovation Cities and surrounding rural areas can support economic development and inclusion for rural residents, particularly if linkage programming is adapted to the characteristics of the rural communities, while at the same time strengthening the cluster by expanding the available talent pool and idea pipeline.

### **Scotland (UK): The European Marine Energy Centre (EMEC)**

#### *Leading-edge research in a sparsely populated rural community*

Orkney, an archipelago of 70 islands lying approximately 16 km north of the Scottish mainland, is a sparsely populated rural area (population: 22 270, density: 22 inhabitants per km<sup>2</sup>) of rugged terrain and wet, windy weather (NRS, 2019<sup>[10]</sup>; HIE, 2019<sup>[11]</sup>). Since 2003, the area has been home to the European Marine Energy Centre (EMEC), a testbed facility for developers of wave and tidal energy converters, technologies that generate electricity by harnessing the power of waves and tidal streams.

EMEC is a not-for-profit private company, initially established with public funding. The centre has received a total of approximately GBP 34 million from Highlands and Islands Enterprise, Scottish Enterprise, the Scottish and United Kingdom (UK) governments, the Orkney Islands Council, the European Union and the Carbon Trust, though, in 2011, it became financially self-sufficient. Orkney was selected thanks in part to attributes of its rurality – a rugged environment with relatively light sea traffic and some of the world's strongest tidal currents. The strength of the wave patterns and tidal currents around the islands, in

combination with its sheltered harbours and, crucially, an infrastructure asset: connection to the national power grid, make the area an ideal location for proving technologies designed to survive in harsh marine environments. The centre offers purpose-built, accredited open-sea testing facilities, with 13 grid-connected test berths and 2 scale test sites where smaller-scale devices, or those at an earlier stage in their development, can gain real sea experience in less challenging conditions than those experienced at the grid-connected wave and tidal test sites (Figure 5.3). They also have a hydrogen production plant where hydrogen is generated from tidal and wind energy.

**Figure 5.3. EMEC Test Site locations around Orkney**



Source: (EMEC, 2016<sup>[12]</sup>), Pathways to commercialisation: An EMEC guide to research, development and testing of marine energy technology, EMEC, 2016.

EMEC provides an example of a rural-urban linkage, initially established through state support that enables innovation and economic development for both rural and urban areas. Urban-based partners, including universities, energy companies and engineering firms, rely on EMEC for its capabilities and EMEC, in turn,

relies on them; neither could function optimally without the other. The centre works closely with many urban partners in Scotland and beyond, including:

- The FloWave ocean energy research facility at the University of Edinburgh, where real-world data collected by EMEC's offshore buoys is being used to support the university's research, permitting the development of accurate scale models of complex sea environments in a tank.
- The Offshore Renewable Energy Catapult in Glasgow and the University of Strathclyde's Advanced Forming Research Centre, where EMEC is providing forensic analysis of component points of failure and developing a database of common failure mechanisms in wave and tidal energy devices. The Catapult in Glasgow has supported over 600 SMEs to develop and commercialise new offshore renewable energy products and the information EMEC is collecting is expected to provide a better understanding of the issues around component reliability, leading to improved performance and, ultimately, lower-cost, more competitive marine energy.
- Orbital Marine Power, an Edinburgh- and Orkney- based company that has developed a new tidal-energy device, prototypes of which were tested at EMEC. Their new device, being built in the city of Dundee where manufacturing is expected to support up to 100 jobs (McLaren, 2019<sup>[13]</sup>) will have a generation capacity of 2 MW. Along with hosting the new device, EMEC's role will involve undertaking an independent performance assessment, helping to de-risk the company's technology and improve investor confidence as it approaches full commercialisation.

In addition to informing research and supporting employment and business development in cities, EMEC has fuelled economic development in Orkney itself. Local marine firms, already experts in the local marine environment, now support approximately 300 jobs (Orkney Marine Renewables, 2016<sup>[14]</sup>) providing supply chain services to EMEC's activities and customers, which include major corporations like e.on and Alstom, with further benefits for the local economy from business travellers visiting the centre (Westbrook, 2019<sup>[15]</sup>). In the years since its founding, EMEC itself has developed world-leading expertise in the marine energy sector that has opened a new avenue of economic opportunity in consulting. The centre has advised on over 100 projects with other organisations and governments, including in Japan, Korea and the United States, on the development of the marine energy sector and the creation of EMEC-like testbed facilities elsewhere. EMEC has also developed expertise in several adjacent sectors, such as marine cables and connectors, device support structures and moorings, monitoring devices, impact assessment and undersea acoustics, providing many new avenues of opportunity for Orkney and their urban research institutions and industrial partners.

### **Box 5.1. COVE and IGNITE**

#### **Rural-urban linkages to develop an ocean technology cluster in Atlantic Canada**

The Centre for Ocean Ventures & Entrepreneurship (COVE) is a collaborative facility for applied innovation in the ocean sector located on the water's edge in Halifax Harbour, Nova Scotia. The centre is home to ocean technology businesses, post-secondary institutions, researchers and marine-based and service businesses that support the ocean sector. It supports pre-commercial start-ups, ocean technology firms of all sizes, traditional marine supply chain companies and academic collaborations with industry.

IGNITE is a technology incubator/accelerator focused on rural Nova Scotia. It brings together entrepreneurs, start-ups, and small businesses to work together, providing them with structure, mentorship, and opportunities to operate and grow. It aims to encourage more rural Nova Scotians to explore entrepreneurship as a career path and helps to link its members with the wider region's business community, start-up ventures and educational institutions.

In April 2019, COVE and IGNITE signed an agreement to work together, forming a rural-urban linkage that the two organisations expect will be mutually beneficial and will help strengthen Nova Scotia's growing ocean cluster. For IGNITE and its members, the relationship with COVE provides them access to COVE's services, expertise in ocean technology, deep ocean research and engineering and its linkages with universities and major firms with potential supply chain opportunities, including, for example, naval shipbuilders and other firms in the defence sector. Meanwhile, the partnership will also help strengthen COVE's expertise in the areas of capture fisheries and aquaculture, the "fish tech" sector that is an important industry in rural Nova Scotia.

### *Takeaways for Korea*

- By identifying rural assets (both natural and human capital), and leveraging these to support the research, development and commercialisation activities in Innovation Cities, rural areas can play a central role in their economic development, delivering benefits to both urban and rural areas.
- Unlocking the potential of rural places to best support the development of Innovation Cities may require some targeted infrastructure investment. In Orkney, a key factor was that the islands were connected to the UK's national power grid (other possible sites were rejected because they lacked this).
- Programming to support innovation activity in rural areas should be flexible enough to permit exploration across sectors. Innovation in rural areas often occurs through adaptive measures that apply existing technologies in new ways to solve problems in adjacent or unrelated sectors, thus the sectoral themes identified for the Innovation Cities may prove unnecessarily constraining if used to determine eligibility.

### ***Strengthening the impact of Innovation Cities in the surrounding rural areas***

Improving rural-urban linkages can be a good way to achieve better and more inclusive development. When rural and urban areas are more connected, they can benefit from the complementarity of their different endowments, facilitating innovation and firm growth, better access to jobs, amenities and different types of services. Yet rural-urban interactions are complex and creating new linkages is not always risk-free.

Achieving meaningful linkages may entail costs and additional administrative burdens. It may be necessary to overcome administrative constraints and co-operate across levels of government, both horizontally and vertically. Developing processes for this may require time and resources, as well as capacities that are not in place at the start of the co-operation process, the development of which may involve additional investment. Linkages may also require improvements to physical and digital infrastructure and political will from all sides. What is more, as linkages are developed, care must be taken to see that the benefits they unlock are experienced in an inclusive way, giving due consideration to local sensitivities and leaving no one behind.

Korea's Innovation Cities are unusual in that they were developed as largely self-contained urban areas transplanted from elsewhere in the country. They did not grow organically and their residents are, for the most part, not originally from the area in which they now live. Their extended families may not live in the area and it may feature distinctions in language, food and other cultural attributes that differ from those they are used to. Consequently, these cities may be less well integrated with and connected to the surrounding rural areas than would be an ordinary city, presenting a unique set of challenges moving forward. As the Innovation Cities enter their second season as regional innovation hubs, there are several specific ways they may explore through which to form tighter links with their surrounding rural areas and that may contribute to their development:

- **To increase the integration of the cities with their host communities**, residents in the surrounding area may be encouraged to live in the Innovation City, while workers for the relocated public institutions may be encouraged to reside elsewhere in the broader community and not necessarily within the city's purpose-built housing. Improvements to connectivity with the surrounding rural areas may be necessary to facilitate commuting. This would offer the incoming residents a wider variety of places to live and greater proximity to nature while helping local people feel like they too are part of the innovation city, with improved access to its services and amenities.
- **To be more inclusive of rural people**, by increasing the availability of support for entrepreneurs and SMEs in rural areas so they can participate in the growing cluster alongside those in the cities. Local spill-overs may also be supported by expanding existing procurement activities among the relocated public institutions, with incentives for other participants in the not-for-profit and private sector to also contribute.
- **To achieve scale and develop a strong regional identity**, by partnering with neighbouring jurisdictions and the provincial governments to identify a shared identity and achieve weight sufficient to compete with the capital.
- **To accelerate innovation and strengthen emerging clusters**, by leveraging the assets of rural areas to support the development of the cluster and widen the pool of talent and ideas.

Having a clear sense of the advantages that can be achieved and the specific links intended is a way of motivating the relevant actors to co-operate, as is taking care to structure the relationships such that rural participants feel their voices are heard and they are not dominated by a much larger city. Beginning small and ramping up the co-operation over time helps develop trust as participants begin to see the positive outcomes and provides time for participants to develop new capacities.

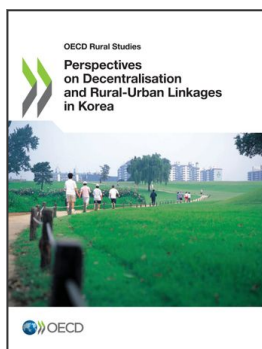
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