

The Future of Rural Manufacturing

Policy Highlights



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The full book will be accessible at:

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Contact:

Jenny Vyas || Economist and Policy Analyst || jenny.vyas@oecd.org

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The Future of Rural Manufacturing provides insights on the transformations that have occurred in manufacturing across rural regions in recent decades. It describes opportunities and challenges in this context, highlighting those relating to climate and demographic change, digitalization and, patterns in globalisation. The project combines quantitative and qualitative analysis. The former examines broad trends in manufacturing performance across OECD rural (TL3) regions between 2000 and 2019, with deeper dives that draw on more granular microdata in 14 OECD countries. Case studies were conducted across 12 regions in Slovenia, Germany, Italy, and France. They comprised interviews with over 300 local, regional, and national actors across government, private sector, universities, research institutes, NGOs, and non-profit community organisations. The project also benefited from foresight and futures workshops conducted in January and July 2022 with experts and policymakers across OECD countries.



Why care about rural manufacturing?

Over the past two decades, manufacturing employment across OECD economies has declined, amounting to a loss of 8.6 million jobs between 2000 and 2018. Several factors explain this trend including outsourcing, globalisation, and productivity-enhancing automation. These have led to increasing tertiarisation, particularly in higher income economies. Indeed, across OECD countries, services now account for around 80% of gross value-added.

Metropolitan regions - through their higher densities and agglomeration effects - have been able to benefit in the form of productivity gains from this increased servitisation. In contrast, rural¹ regions - with thinner and more fragmented internal markets - have a more limited scope to boost productivity in services. This, in part, explains the widening gaps in GDP per capita between many rural and metropolitan regions. On average, metropolitan regions across the OECD had around 32% higher GDP per capita than other regions in 2020². Whilst there is scope for gaps to narrow with greater uptake of digital tools in rural areas (concomitant with investment in digital infrastructure, where large urban-rural gaps exist across the OECD. With shifting patterns emerging in international production networks and global value chains following the COVID-19 pandemic and Russia's war of aggression against Ukraine, many countries are now embarking on historically high investment programmes and new industrial policies, with increasing emphasis to leverage on the potential of rural manufacturing.

Manufacturing trends across OECD rural regions

Manufacturing remains an important driver of jobs in OECD rural economies.

This report finds in 2019, almost 1 in 5 jobs in rural areas were in manufacturing. At the same time, despite rural regions making up only 28% of the OECD population (OECD, 2020^[1]), rural regions accounted for nearly half (48%) of manufacturing jobs in the OECD. In some rural places, the role of manufacturing can be even greater; in the region of Tuttlingen for example, a leading producer of medical equipment in Germany, manufacturing employment accounted for almost half (47.5%) of the regions' workforce in 2019 (Table 1).

Table 1. Top 5 of OECD regions by share of manufacturing in local employment, 2019

Country	Region (TL3)	Region type	Manufacturing employment (% total regional employment)
Germany	Tuttlingen	NMR-M	47.5
Romania	Arad	NMR-S	45.3
Germany	Dingolfing-Landau	NMR-S	45.1
Portugal	Ave	NMR-M	43.0
Canada	Bellechasse, Quebec	NMR-M	42.0

Source: Authors' elaboration based on the OECD Regional Database, (last access: April 2023).

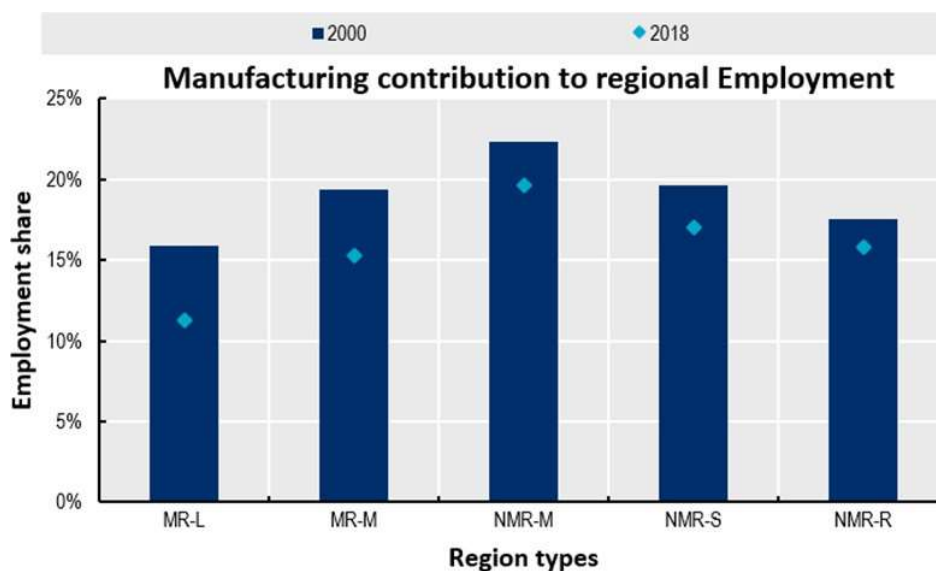
¹ For the purposes of this report, rural is used interchangeably with non-metropolitan based on the OECD extended typology. See <https://www.oecd.org/regional/regional-statistics/functional-urban-areas.htm> for more details.

² OECD Regional Outlook 2023, forthcoming

Moreover, even in places that have seen large falls in manufacturing employment over the last two decades, the sector remains a significant regional employer (Figure 1). For example in the traditional textile manufacturing region of Biella (in the northern region of Piemonte, Italy) despite manufacturing employment share falling by 15 percentage points between 2000 and 2019, manufacturing still accounted for 1 in 4 people jobs in the region in 2019.

Figure 1. Manufacturing contribution to employment

Contribution of manufacturing to total regional employment, % of total



Note: These cover 26 OECD countries as follows: Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, United Kingdom.

Source: Authors' elaboration based on the OECD Regional Database, (last access: April 2023).

The manufacturing sector also supports a significant proportion of upstream services sector jobs, including in metropolitan regions. The sector also sustains jobs in services through other indirect channels, including induced effects (i.e., spending of manufacturing workers on services) and through the use of produced capital in the production cycle. Estimates for the United States (National Association of Manufacturers), for example, reveal that for every job in manufacturing, 4.4 additional jobs were sustained in other sectors³.

³ Including in the non-durable manufacturing sector.

Manufacturing is also an important driver of gross value added (GVA) in OECD rural economies.

Table 2. Top 5 OECD regions by share of manufacturing in local total gross value added, 2019

Country	Region (TL3)	Region type	Manufacturing GVA (% total GVA in the region)
Germany	Dingolfing-Landau	NMR-S	63.19
Germany	Tuttlingen	NMR-M	57.96
Greece	Boeotia	NMR-R	55.58
Poland	Plocki	NMR-S	54.97
Germany	Altötting	NMR-R	53.05

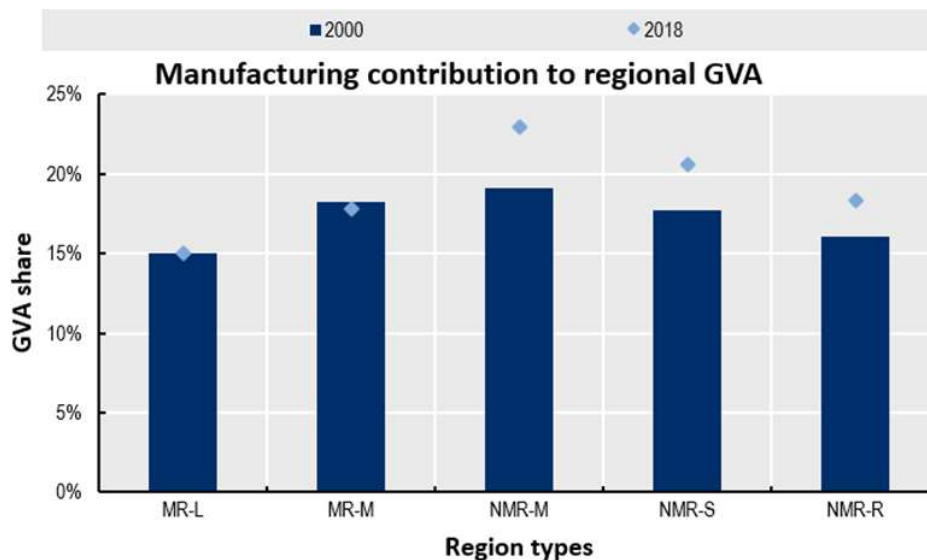
Source: Authors' elaboration based on the OECD Regional Database, (last access: April 2023).

The manufacturing sector's direct contribution to rural GVA increased from 18.5% to 21.1% from 2000 to 2019 in OECD rural regions (Figure 2), despite falls in manufacturing employment in rural areas of around 2 percentage points. This share rose to around 25% in rural areas close to metropolitan cities, highlighting increased use of capital to drive productivity growth.

Between 2000 and 2019, 449 of the 769 OECD rural regions (58%) where data is available, saw manufacturing productivity and manufacturing output increase, with 289 of this group simultaneously experiencing employment falls (Figure 3). Not only did a higher share of rural regions see productivity growth compared to metropolitan regions, but they also saw a higher share of regions increase their output.

Figure 2. Manufacturing GVA by type of TL3 region across OECD countries

Contribution of manufacturing to total regional GVA, %

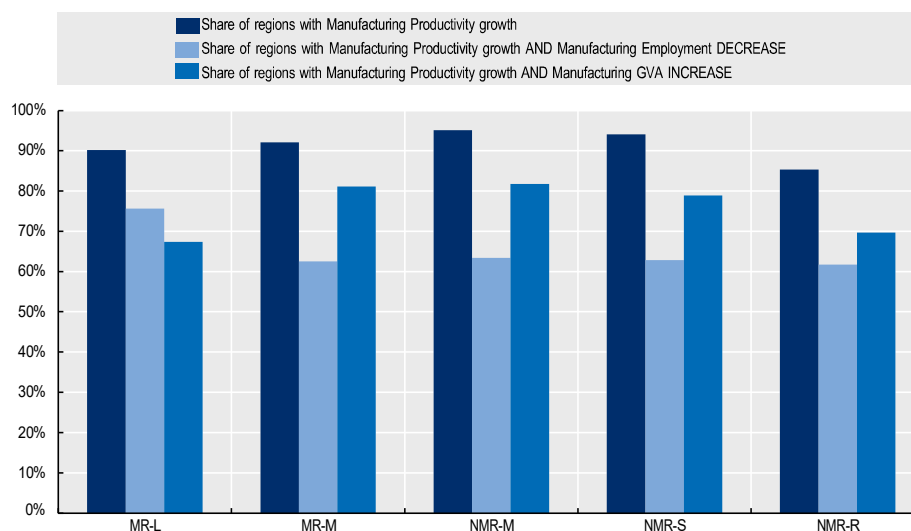


Note: These cover 26 OECD countries as follows: Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, United Kingdom.

Source: Authors' elaboration based on the OECD Regional Database, (last access: April 2023).

Figure 3. Manufacturing productivity and output growth and employment declines by region type

Share of regions increasing productivity and output, share of regions seeing declines in employment, 2000 to 2019



Note: The data includes 27 OECD countries, productivity values are based on Millions USD, constant prices, constant PPP, base year 2015

Source: Authors' elaboration based on the OECD Regional Database, (last access: April 2023)

Rural manufacturing trends differ significantly across countries

The trends in rural manufacturing reflect differences in local comparative advantages. These include factors such as labour costs, the regulatory environment, skills, transport and communications infrastructure, and geographic location (e.g., proximity to global value chain hubs), many of which have been instrumental in shaping manufacturing pathways in Central Europe. On average the manufacturing sector in Central Europe was significantly higher than across many OECD and EU economies.

Where is rural manufacturing located in OECD countries?

- In the **Czechia** the average regional share of manufacturing employment was 30% across regions in 2019. In **Slovenia** and **Hungary**, this was around 24%. In **Slovak Republic**, this was 23.1% and for **Poland, Estonia, Bulgaria, and Romania**, this ranged between 20% and 23%.
- Average shares of manufacturing regional employment by contrast were 6.7% in **Australia**, 7.5% in **Greece**, 7.7% in the **United States**, and 8.9% in the **United Kingdom**.

Rural remote regions in many of these Central European economies also outperformed other more densely populated regions in their country. For example, a taxonomy created to measure relative change⁴ of regions within countries, reveals that over one third (37.2%) of regions that moved up quintile groups were rural remote. For example, Wroclawski (Poland) and Smoylan (Bulgaria) leapfrogged from the second bottom and bottom quintiles respectively to the top quintile – with their shares of manufacturing employment increasing by 15.5 and 14.2 percentage points respectively between 2000 and 2018. Many other rural regions were also able to leverage on their comparative assets (e.g. land, lower unit labour costs, and proximity to production networks).

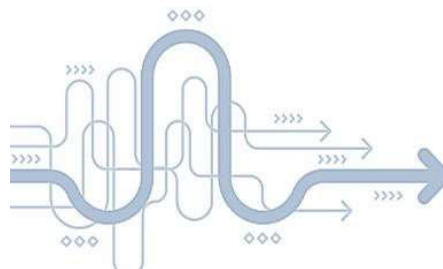
At the same time rural remote regions exhibited the highest probability of falling more than one quintile group. Beiras e Serra da Estrela in Portugal, experienced the most dramatic drop in manufacturing employment across OECD regions analysed, a fall of 55.5 percentage points from 2000 to 2018. This also led to a decline in total regional employment of 20% over the period. Other regions have successfully managed to reallocate manufacturing workers to other activities, offsetting employment losses. In the Isle of Anglesey in Wales, UK, for example, despite falls of 42% in manufacturing jobs, total regional employment increased by 4000 jobs between 2000 and 2019, as the region capitalised on comparative advantages such as tourism and other services activities.

⁴ Manufacturing path dependency across OECD rural regions is better understood through the taxonomy this analysis forms. This entailed ranking regions by their relative position of share of manufacturing employment, grouping them then into 5 quintiles and following the changing relative position of these regions, measuring the number of regions that change quintile group. It is important to note different dynamics can alter the importance that the manufacturing sector in a region has relative to the rest of the country. The changes are grouped into moving up, moving down, traditional (was in the top quintile in 2000 and remains so in 2018) and stable regions.

Recognising regional and manufacturing diversity

What drives manufacturing to one region and not another? Locational choice of manufacturing has traditionally been driven by cheaper labour and land in OECD rural regions. But the research identifies other factors that also play a critical role including:

- Accessibility and infrastructure (measured here through the number of main roads, access to ports, share of households with high broadband connectivity)
- Input suppliers, markets, and competitors (manufacturing concentration, distance from existing manufacturing hubs)
- Skills, knowledge, and innovation (measured here through the number of universities)
- Quality of government (E.g. rule of law, corruption, bureaucratic effectiveness and strength of electoral institutions)
- Policy interventions



Our analysis reveals that no dominant single determining factor dominated manufacturing performance and as such tailored, place-specific, approaches are needed for regional manufacturing development.

Hardhats to handmade

Understanding the mechanisms through which rural manufacturers differentiate their products is part of the challenge in supporting their adaptation to megatrends. Part of the explanation for the diversity of factors that can enable rural manufacturing reflects the diversity in the sector itself, and the diversity in value propositions, especially against a backdrop of growing consumer awareness of responsible business conduct and sustainability. Notwithstanding, the current cost of living crises studies in many countries consistently point to revealed preferences for goods made in local markets, and, in particular, higher quality products (Ruf, Emberger-Klein and Menrad, 2022^[2]).

In this sense it is important to note that not all manufacturing in rural areas is large-scale and inherently tied to global value chains (GVCs). Traditional and artisanal manufacturing skillsets endure in many rural areas and can be important economic drivers at a local level if combined with modern methods. In a world of largely homogenous mass-production, handmade goods produced by skilled artisans continue to be highly prized by consumers – who are often willing to pay more and increasingly take an interest in where things are made.

The differentiation that heritage manufacturers develop helps insulate them from global price competition while at the same time anchoring production locally. The Italian region of Arezzo for example, specialises in gold jewellery and textile craft using local hand manipulation techniques that have been developed and established in the region for centuries and combining these with computer driven designs and printings. The region then leverages these skills on its geographic proximity to Milan.

At the same time, rural regions can also differentiate through their innovation and technological advances that may be anchored to local natural resources. For example, the latest national industrial and regional development strategies for Slovenia highlight the potential for developing high value-added and technically advanced wood products sourced from their many forests (such as sustainable wood housing). Rural regions that are innovative through high technology production are not immune from significant competition. In these cases, regional clusters can be beneficial as a mechanism to share ideas, resources, combine supply chains, and tackle similar challenges such as

regulatory barriers. An example in the report is the medical mountain cluster⁵ in Baden-Württemberg Germany.

Considering the degree of differentiation and ties with the territory, we develop a simple typology of manufacturing firms that is relevant for the rural context (Table 3). It aims to capture distinctions in how a firm competes and classifies firms based on whether their products are differentiated or commoditised and then considers the underlying drivers. Broadly speaking, firms may create products that are either differentiated, meaning they are able to command a price (brand) premium for their product, or else are commoditised and more open to global price competition.

Rural manufacturers may differentiate themselves in three, not mutually exclusive, ways, i.) through their artisanal skills and specialised local reputation, ii.) through their heritage, and/or iii.) through innovation.

Among firms selling commodities that are somewhat homogeneous and competing mainly on price, the ties of such production may be driven by their business being built around local natural resources, and, in cases where these resources are not scarce nor costly to leverage, distance to markets can create a barrier. Manufacturers with no 'local anchor' of comparative advantage therefore are generally at higher risk of international, and indeed, national competition, heightening the importance of policies that enable upgrading or product differentiation.

Table 3. A typology of manufacturing diversity

Manufacturer Type	Differentiated			Commoditised	
	Artisanal	Heritage	Innovative	Anchored by natural resources	Anchorless
Characterised by	Highly skilled, small-scale production leveraging a historic process with longstanding ties to the region	Products with a longstanding traditional link to a region	High-technology products at the cutting edge of both production technology and product features	Products created from locally sourced natural resources	Lacking differentiating features, competing on price
Examples	Cottage industries, handmade, premium bespoke products	Swiss watches, Scottish Whisky, Italian fabrics	ICT, pharmaceuticals and medical devices	Agri-food, forestry and mining processors	Motor vehicle parts, household appliances
Scalability	Low	Medium	High	Low	High

Source: Author's elaboration

In the province of Amiata Grossetto, Italy, regional stakeholders were searching for a means to expand from traditional agricultural production. With the help of researchers, they identified their comparative advantage in the production of a new and differentiated dairy product, Amiata donkey milk, which is well-suited for infants and children with intolerance/allergies to bovine milk products as well as for adults with dyslipidemia. The region is now a key contributor in further research in the field.



⁵More information including the groups within this can be found at <https://medicalmountains.de/>

Microenterprises to Mega Factories

The manufacturing sector comprises a vast array of different types of businesses, requiring, in turn, policies that recognise this heterogeneity. These range from small-scale farmers beginning to expand into manufacturing, micro entrepreneurs bringing innovations to remote areas, medium sized family businesses looking to upgrade their traditional processes, to large scale multinationals employing substantial portions of a small town.

Recent work on enhancing Rural Innovation (OECD, 2022^[3]) reveals that SMEs and entrepreneurship are an essential pillar to enhance rural innovation, and that national innovation programmes need to be adapted to the specific rural characteristics. The business models under-pinning rural businesses that specialise in niches linked to traditional know-how and local consolidated cultural heritage for example, engage in 'innovations' that would not typically be captured in more common notions of innovation. Spatial inequalities relating to access to finance, networks, broadband infrastructure, and skills are also critical factors that need to be addressed when considering innovation, and innovation- enhancing policies in a rural context.

At the same time, large multinationals are moving to just-in-case rather than just-in-time modes of production, which favour geographically shorter chains. These patterns of trade are shifting in response to rising geopolitical tensions and higher emphasis is placed on mitigating risks of ruptures in GVCs. This presents challenges for firms integrated into more geographically fragmented GVCs but also potential opportunities for rural regions to attract investment in manufacturing, particularly in sectors considered as nationally strategic. However, attracting this investment will require boosting the attractiveness of the territory (OECD, 2023^[4]). For many areas this will require improved investments in the same factors that can drive innovation, including infrastructure - transport and digital – especially in remote rural areas. It will also require efforts to improve skills in the local workforce, particularly with respect to the green transition (OECD, 2023^[5]).

Examining the main drivers transforming manufacturing

The analysis point to three main drivers that have been transforming manufacturing and its related skills demand;

- Production processes have become increasingly fragmented and shifting patterns of trade are emerging.
- Manufacturing processes are increasing their use of digital and advanced, including automation, technologies.
- The green transition is accelerating, creating new manufacturing requirements and prospects.

1. Production processes have become increasingly fragmented

Driven by declining costs of trade through process fragmentation and eroded comparative advantages of higher-wage OECD rural manufacturers, firms have outsourced and relocated more labour-intensive activities to countries with lower labour costs — and in some cases lower regulatory and fiscal costs too.

This put an end to the large-factory era and many manufacturing towns that traditionally specialised in low-cost production lost their market positions. At the same time, these changes accelerated transitions towards more complex and innovative services parts of value chains that favoured metropolitan regions able to benefit from agglomeration advantages (OECD, 2015^[6]).

Many OECD rural regions however were able to benefit from these shifts too, in particular, former transition economies in Eastern Europe. Manufacturers in these rural areas were able to leverage on their relatively lower unit labour costs, proximity to European GVC hubs, and their benefit from entry to the EU single market. Many others were also able to identify niches and specialisations in GVCs by upgrading existing manufacturing processes to higher value parts of those chains or increasing efficiency in their current positions, boosting productivity in the process. As seen through the case studies these transitions can build on a region's existing path dependency that either a.) boost economic activities where the region has, or indeed had, a relative comparative advantage in the past or, b.) move to new activities where the skills- set, and often, capital, can be transferred.

2. Manufacturing processes are increasing their use of digital and advanced technologies

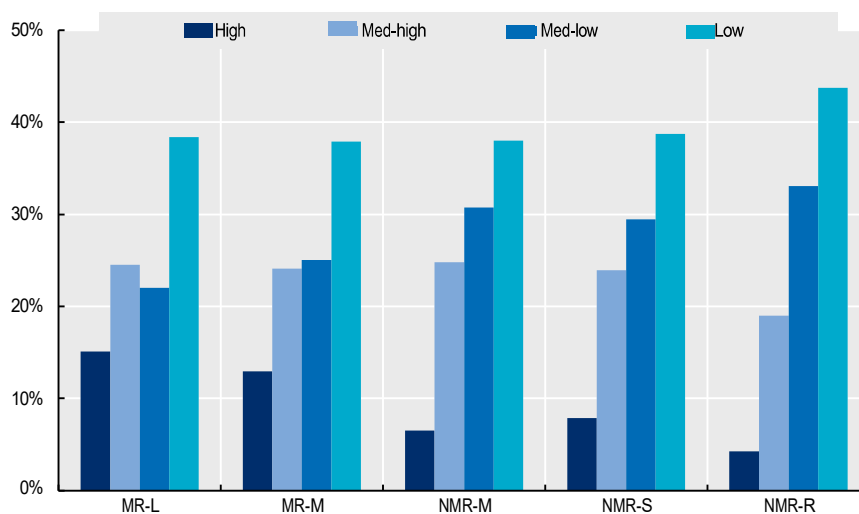
From cutting-edge advancements such as nanotechnologies and artificial intelligence to the fundamental automation and digitalisation of processes, technology is an increasingly indispensable tool for enhancing efficiency, productivity, and competitiveness. However, there are significant gaps in digital infrastructure between urban and rural areas. In terms of broadband connections, in 2019, 59% of rural households in the European Union were located in regions where access to fixed broadband with a minimum speed of 30 Mbps was available, in comparison to 86% of households in all areas overall (OECD, 2021^[7]).

Analysing the employment share across types of TL3 regions in 14 OECD countries shows that rural regions tend to have a higher share of employment in sectors that are considered less technically complex⁶ (Figure 4) At the same time, the share of more technologically complex manufacturers in rural areas is growing. From 2008 to 2019, the average share of rural region manufacturing employment in high and medium high industries increased from 5.7 to 6.4%.

⁶ The body of the report categorises what is considered a technologically intense industry via manufacturing sub-industries based on 2-digit level of NACE Rev. 2 are related to four technological intensity categories: high-technology, medium-high-technology, medium-low-technology, and low-technology following the [Eurostat/ United Nations methodology](#)

Figure 4. Average share of manufacturing employment by technological complexity and region type

Average share of manufacturing employment by technological complexity and region type, 2022 or latest available year



Note: the employment shares for each sub-industry in every country were calculated for each region as $[Emp\ Share]_{rcit} = [Emp]_{rcit} / [Emp]_{rct}$, with c referring to countries, r to TL3 region, t to year, and i to technology intensity group. In the next step, these were then averaged by region type for every country: $(Emp\ Share)_r = \sum_g \{ [Emp\ Share]_{grcit} * 1/n_g \}$, with g denoting region type. Consequently, the shares for each region type for each technology don't necessarily add up to 100%.

Source: National Statistics Offices from the following countries: Finland, Portugal, Sweden, Japan, Denmark, Norway, Slovenia, Switzerland, Australia, Canada, Germany and Ireland

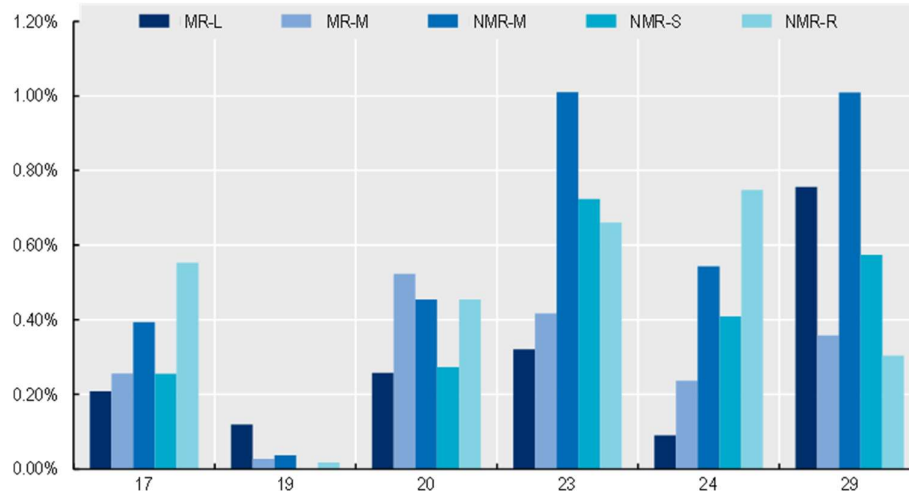
Even after adjusting for differences in occupation and activities that typically lend themselves to technological innovations, innovation in firms in rural areas continue to lag those in urban areas. For example, in the US, there are on average 13.2 patents per 1000 innovative occupations in metropolitan counties against only 5.6 on average in rural counties. This is despite the evidence that points to particularly strong productivity-enhancing effects of innovation absorption in non-metropolitan areas. For example, in the US, nearly two thirds of overall productivity growth from 2010 to 2020 can be attributed to productivity gains in non-metropolitan areas, in large part reflecting better use of resources within non-metropolitan regions, considered a proxy for innovation absorption (OECD, Forthcoming^[81]).

3. The green transition is accelerating new manufacturing requirements and prospects

The manufacturing sector is amongst the most polluting industries. In 2021, the industrial sector accounted for 38% of total global final energy consumption (IEA, 2022^[21]). Building on analysis of regional industrial transitions to climate change (OECD, 2023^[9]), this report finds that rural regions tend to have higher shares of higher greenhouse gas emitting manufacturing industries. For example, employment in the manufacture of other non-metallic mineral products is, on average twice as high in non-metropolitan than metropolitan regions. And so, in turn, these regions are more exposed to potential challenges with respect to the transition towards net zero (Figure 5).

Figure 5. Non- metropolitan regions are home to GHG emitting manufacturing sectors

Employment share in high GHG emitting manufacturing industries as a share of total regional employment by region types, 2020



Note: Industries are as follows: 17 Manufacture of paper and paper product, 19 Manufacture of coke and refined petroleum products, 20 Manufacture of chemicals and chemical products, 23 Manufacture of other non-metallic mineral products, 24 Manufacture of basic metals, 29 Manufacture of motor vehicles, trailers and semi-trailers

Source: National Statistics Offices of related countries: Finland, Norway, Portugal, Switzerland and Slovenia.

In addition, rural manufacturers have greater challenges to overcome in engaging with or driving the green transition, including access to financing, skills, knowledge, and networks. Furthermore, rural places are highly dependent on transport to move and export their output, which adds to GHG emissions.

At the same time, the transition to a net-zero emission economy can provide an opportunity for rural manufacturing businesses. Most outputs of manufacturing firms will continue to be demanded in a climate-neutral economy (including in growing activities e.g., production of electric batteries). Rather than just phasing out activities, manufacturing subsectors need to transform the way they produce products. There is great potential to drive progress through renewable energy sources. Rural regions cover approximately 80% of the OECD land mass, containing most of the water and other natural resources that can also provide sources of renewable and cleaner energy for manufacturing activities. Currently rural regions already produce 63% of the renewable energy in OECD countries, with the 36% coming from the most remote places (OECD, 2022^[10]).

4. All of which is leading to changing demands for skills

Across OECD countries nearly half of all jobs face substantial implications due to automation, a large proportion of which are in the manufacturing sector. A considerable 14% of these jobs are at high risk (indicating a likelihood of over 70% to be automated). Moreover, an additional 32% of jobs face some risk (a probability of being automated ranging between 50% and 70%), highlighting the potential for significant transformations in the execution of these roles due to automation's impact (Nedelkoska and Quintini, 2018^[11]).

The risk of job automation exhibits considerable variation across regions. For instance, in the rural region of West Slovakia the share of jobs at high risk reached nearly 40% in 2016, whereas in the region around Oslo, this was around 4%. These disparities highlight the importance of region-specific policy approaches to address the challenges posed by automation. In addition, the share of jobs at high risk

of automation varies within countries. In Canada, for example, the difference between the best and worst performing regions is only 1 percentage point, while in Spain, this gap expands to 12 percentage points (OECD, 2018^[12]).

However, automation also presents significant opportunities for rural regions that are facing declining working-age populations and ageing workforces. Over half of all OECD regions witnessed a decrease in their working-age population between 2010 and 2016. Furthermore, between 2001 and 2019, in most OECD countries, rural remote regions had a population growth rate that was half (0.33%) as that of metropolitan regions (0.70%).

Attracting high skilled workers, particularly for skills required for the green transition (OECD, 2023^[5]) will be imperative. Currently, the share of green jobs in remote rural regions can be as low as 5% compared to capital cities where these can be as high as 30% (OECD, 2023^[5]). At the same time, as most green job growth, especially those in mid-skill level occupations, is expected to occur in currently male-dominated sectors e.g. manufacturing ((ILO, 2019^[13])), there is also an opportunity to reduce gender gaps in the sector. Currently women make up only 28% of green-task jobs (OECD, 2023^[14]) and around 30% of manufacturing jobs (World Manufacturing Foundation, 2022^[15]).

Policy takeaways emerging in the case studies

The regional case studies included the Italian provinces of Arezzo and Grosseto in Tuscany, the Slovenian regions of Slovenia Goriška, Podravje and Koroška, the German regions of Ostprignitz-Ruppin, Hochsauerland, Ostprignitz-Ruppin and Tuttlingen and the French regions (départements) of Gers and Tarn-et-Garonne and Jura.

The case studies identified several common challenges to unlock the potential of rural manufacturing summarised in Table 4 below, across four broad frequently reported areas of policy relevance including: i.) overcoming skill shortages, ii.) improving land use and spatial planning, iii.) fostering a business environment conducive to growth, and iv.) governance and policy for manufacturing.

Table 4. Case study regions' most prominent challenges for rural manufacturing development

Firm challenges	Italy	Slovenia	Germany	France
Labour shortage	x	x		x
Education/skills mismatch			x	x
Limited access to capital		x		
Infrastructure deficits e.g., broadband		x	x	x
Limited access to land for expansion		x	x	
Low attention to climate change mitigation practices	x	x		
Limited innovation	x		x	
Lack attractive work environments			x	
Inflexible regulatory environment		x	x	
Need access to Futures/foresight training		x		x

Source: Author's elaboration

1. Overcoming skills shortages

Manufacturing regions should continue upgrading the skills and production capabilities of existing industries while simultaneously promoting the diversification of the local economy towards more future-oriented economic propositions.

Skills shortages appeared in almost all case studies identified. Thus, specific recommendations on skills development include:

- **Better anticipating future skills demands**, (for example through industry and skills mapping or through regional skills foresight exercises), that can help industrial transitions (OECD, 2019^[16]). More generally, the development of future-oriented activities, such as smart manufacturing, life sciences, e-mobility, or higher value-added services, have higher chances of success in those fields where the region already has some related assets to build on.
 - In the German case studies, the analysis points to the importance of platforms of exchange between education institutions and companies that were structured rather than ad hoc.
 - In the French case studies, Territoires d'Industrie can draw on the positive examples from similar regions of the Lot département (Occitanie region) that successfully worked with the *Campus des métiers et des qualifications* to build a its network of high schools offering initial training tailored to the needs of industry.
 - The analysis points to the importance of business engagement. In the Slovenian case studies business engagement, whilst positive with university researchers, was negligible with early year educators. As such, means to establish these relations e.g., through high school internships, could encourage students to stay in professional or vocational education for the manufacturing sector.
- **Developing digital skills.** Improving digital skills, through the simplification of access to pre-existing programmes, such as one-stop-shops, can help develop digital skills and access to digital resources. Positive examples can be found in Scotland/UK (e.g. Find Business Support), Canada (Business Pathfinder Tool) and Switzerland (Business Promotion Guide) (OECD, 2023^[17]).
 - In Germany specifically, this translated into ensuring that measures to strengthen digital skills also reached rural manufacturing firms, that were not covered by existing federal programmes e.g. voucher schemes.
- **Communicating the changed nature of the industry.** The image and branding of the sector were found to still be as a male-orientated manual labour industry. Highlighting innovation and better environmental, social and governance (ESG) goals can be helpful for attracting diversity and talent, including with high-skilled young and female workers.



Facilitating the changing nature of the workplace. Talent attraction to the manufacturing sector can be improved through, where possible, flexible models of work (e.g., home office) (Marshallian, Chan and Bournisien de Valmont, 2023^[18]) or adjusting child-care services to manufacturing schedules. In addition, there is potential to leverage skilled migration workers including through reforms to accreditation systems.

Women in Manufacturing

A new strategy was developed by The Department of Regional Development, Manufacturing and Water in Queensland Australia in 2023, recognising that increased diversity boosts productivity, fosters a more creative environment, and can improve morale and employee retention. This recognises that encouraging more women to pursue a career in manufacturing is critical to the industry's continued growth. As such the strategy focuses on four main priorities:

- Supporting diversity, equity, and inclusion in the manufacturing industry.
- Building on existing capabilities and skills to further women's leadership and development.
- Boosting women's participation in VET, building the STEM pipeline, and promoting advanced manufacturing capabilities throughout secondary and tertiary studies.
- Celebrating and showcasing the women in Queensland's manufacturing industry.

Learn more at <https://www.rdmw.qld.gov.au/manufacturing/manufacturing-assistance-programs/women-in-manufacturing>

2. Improving land use and spatial planning

Land-use permits, and related regulatory barriers represented a bottleneck for entrepreneurial activity for many case study regions. Putting in place flexible mechanisms across levels of government to aid firm growth alongside local cultural preservation can reduce substantial planning permission delays. Specific recommendations on land-use include:

- The German case studies pointed to the importance of more **flexible approaches to land-use planning** at state and regional levels. This can be done through the establishment of specific zones in a community (which are more open to experimentation and temporary uses) as well as through fostering inter-communal co-operation for land-development.
- The Slovenian case studies revealed the need to utilise more regularly and informally the channels between local and national policymakers especially for **long-term strategy of spatial planning**. In addition, through better management of spatial districts and with **collaboration with neighbouring regions**, this can provide solutions on housing - crucial for attraction.



A bridge in the Goriska region of Slovenia joining two municipalities.

3. Fostering a business environment conducive to growth

Building a stable and transparent business environment is critical for the health of manufacturing regions. However, often the basic framework conditions and key mechanisms for a vibrant business eco-system are missing. Specific recommendations on fostering a business environment conducive to growth include:

- Increasing the focus on **digital and green energy infrastructure**:
 - **Reduce administrative approval times** for communication network deployment, including obtaining rights of way, and improve co-ordination between different public authorities.

- **Closing the digital gap** with policies that invest in skills and ICT infrastructure to facilitate the uptake of new ideas and technologies (OECD, 2021^[7]). Some of the tailored initiatives to bridge connectivity divides in rural and/or remote areas, include demand aggregation models, public private partnership (PPP) initiatives, public funding to expand connectivity in rural/remote areas and open access municipal and community-led networks.
- **Assisting more localised production and uptake of greener energy sources** such as biogas or wind power whilst simultaneously speeding up national plans to provide grid access to alternative sources of energy. Enhance local capacity to recycle manufacturing waste to develop a circular economy ecosystem.
- **Building vibrant business ecosystems and an innovative and entrepreneurial culture** by:
 - **Strengthening links between established firms, start-ups and research institutes** for funding opportunities, knowledge exchange and skills development at state and regional levels (OECD, 2023^[19]). Formulating a supply chain directory can also foster investment and better monitor the benefits from FDI-SME linkages (OECD, 2023^[20]).
 - **Utilising digital platforms for exchanges of ideas and resources among all stakeholders** including ideas relating to technical concerns, process-related (e.g., artificial intelligence, 3D printing), finance, etc. In France, this could be combined with one-stop shops.
 - **Improving SME access to capital and uptake of support programmes.** For SMEs, challenges in access to external finance and an overreliance on internal funds are often major constraints for growth (OECD, 2020^[21]) In addition rural firms face greater difficulties accessing traditional forms of finance than their metropolitan counterparts (Kärnä and Stephan, 2022^[22]) Policy recommendations therefore include improving access to alternative sources of finance and reducing bureaucratic barriers to access grants and subsidies. OECD work on financing SMEs (OECD, 2022^[23]), particularly sustainable financing (OECD, 2022^[24]) provides more insights.



4. Governance and policy for rural manufacturing regions

Effective co-ordination across levels of government to design visions and strategies and implement them in unison is crucial. As such, specific recommendations on governance and policy include:

- **Pursuing a higher degree of integration between rural development and industrial policy** can lead to more effective actions for rural manufacturing at all levels. The case studies reveal that rural manufacturing is not a policy domain per-se but is on the crossroads between industrial, cohesion and rural development policies. As such, given that every “rural” area is different, specific place based adaptations, and the capacity to implement these adaptations, are needed for effective for industrial policy action.
- **Encouraging new sectors, sub-sectors, and value chain propositions.** For example, the consolidated fashion clusters, are the backbone of the vibrant local manufacturing and an asset of Arezzo. Yet, there are companies in other sectors in the region such as ICT firms, agrifood, and the recovery of waste materials, which are currently singular cases but have significant potential to further develop. Providing these other industries with financial support and helping them to build networks with other such companies in the wider region or with universities and research institutes can allow these firms to explore opportunities for growth. This would allow for diversification of the local industrial texture.
- **Strengthening the evaluation, monitoring and supervision of programmes.** Specifically, Sharing learnings and coordinating management of state or regionally-run structural programmes that follow bottom-up processes. These approaches have proven to be successful throughout the case studies because they develop goal-oriented collaborations across districts which benefit businesses. Such collaborations can be enhanced elsewhere by sharing learnings through peer-to-peer exchanges. Lessons-learnt from these programmes should be systematically gathered and exchanged between territories, including to regional governments looking to develop similar programmes.
 - In the example of Slovenia many industrial parks were created to boost entrepreneurial activity. However limited supervision has meant an estimated 20% are being fully utilised.
 - France provides an example of how this can be tackled by pointing to methods in their Territoire D’industrie that allow room for the development of formalised plans that encourage public-private project ownership and dialogue.
 - Successful examples can be seen in Brandenburg, Germany and Grosseto Italy
- **Establishing one-stop shops for each region to understand the plethora of information on existing aid and support schemes.** Run within an appropriate regional agency, this could provide in-person support to beneficiaries such as local businesses, municipalities or educational institutes. This can also remove unnecessary bureaucratic barriers.
- Integrating **foresight and futures** into policy making to understand how megatrends are shaping new opportunities and how rural regions, firms and entrepreneurs can leverage these. Overall, in the rapidly changing environment, governments cannot be reactive and must, instead, be forward looking in their policy design, including through engagement with all stakeholders, including firms and communities.



Municipality of Grosseto bringing together policymakers and manufacturing business representatives from across the region to exchange ideas

Table 5. Summary of Policy Recommendations

Skills	Land use and spatial planning	Innovative business ecosystems	Governance and strategy	Integrating foresight and futures into policy making
Better anticipating future skills demands	Flexible approaches to land-use planning	Strengthening links between established firms, start-ups, and research institutes	Pursuing a higher degree of integration between rural development and industrial policy	
Developing digital skills	Clearer long-term strategies of spatial planning	Utilising digital platforms for exchange	Encouraging the growth of new sectors, subsectors, and value chain propositions	
Communicating and facilitating the changed nature of the industry	Expanding digital and green energy infrastructure facilities	Improving SME access to capital support programmes	Strengthening the evaluation, monitoring and supervision of programmes	

Source: Author's elaborations

References

- Bivens, J. (2003), “Economic Policy Institute”. [25]
- Huiban, J. (2011), “The Spatial Demography of New Plants: Urban Creation and Rural Survival”, *Small Business Economics*, Vol. 37/1, pp. 73-86. [26]
- ILO (2019), “SKILLS FOR A GREENER FUTURE: A GLOBAL VIEW Based on 32 country studies”, <http://www.ilo.org/publns>. (accessed on 28 September 2023). [13]
- Kärnä, A. and A. Stephan (2022), “Do firms in rural regions lack access to credit? Local variation in small business loans and firm growth”, *Regional Studies*, Vol. 56/11, pp. 1919-1933, <https://doi.org/10.1080/00343404.2021.2016681>. [22]
- Marshalian, M., P. Chan and M. Bournisien de Valmont (2023), “Networks and rural-urban linkages for rural innovation”, *OECD Regional Development Papers*, No. 53, OECD Publishing, Paris, <https://doi.org/10.1787/4928f26b-en>. [18]
- Nedelkoska, L. and G. Quintini (2018), “Automation, skills use and training”, *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing, Paris, <https://doi.org/10.1787/2e2f4eea-en>. [11]
- OECD (2023), *Assessing and Anticipating Skills for the Green Transition: Unlocking Talent for a Sustainable Future*, Getting Skills Right, OECD Publishing, Paris, <https://doi.org/10.1787/28fa0bb5-en>. [5]
- OECD (2023), *Enhancing Rural Innovation in Scotland, United Kingdom*, OECD Rural Studies, OECD Publishing, Paris, <https://doi.org/10.1787/33b8c803-en>. [17]
- OECD (2023), *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*, OECD Publishing, Paris, <https://doi.org/10.1787/21db61c1-en>. [14]
- OECD (2023), *OECD SME and Entrepreneurship Outlook 2023*, OECD Publishing, Paris, <https://doi.org/10.1787/342b8564-en>. [19]
- OECD (2023), *Policy Toolkit for Strengthening FDI and SME Linkages*, OECD Publishing, Paris, <https://doi.org/10.1787/688bde9a-en>. [20]
- OECD (2023), *Regional Industrial Transitions to Climate Neutrality*, OECD Regional Development Studies, OECD Publishing, Paris, <https://doi.org/10.1787/35247cc7-en>. [9]
- OECD (2023), *Rethinking Regional Attractiveness in the New Global Environment*, OECD Regional Development Studies, OECD Publishing, Paris, <https://doi.org/10.1787/a9448db4-en>. [4]
- OECD (2022), *Financing SMEs and Entrepreneurs 2022: An OECD Scoreboard*, OECD Publishing, Paris, <https://doi.org/10.1787/e9073a0f-en>. [23]

- OECD (2022), “Financing SMEs for sustainability: Drivers, Constraints and Policies”, *OECD SME and Entrepreneurship Papers*, No. 35, OECD Publishing, Paris, <https://doi.org/10.1787/a5e94d92-en>. [24]
- OECD (2022), “OECD’s Rural Agenda for Climate Action Climate Action”. [10]
- OECD (2022), *Unlocking Rural Innovation*. [28]
- OECD (2022), *Unlocking Rural Innovation*, OECD Rural Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9044a961-en>. [3]
- OECD (2021), *Bridging digital divides in G20 countries*, OECD Publishing, Paris, <https://doi.org/10.1787/35c1d850-en>. [7]
- OECD (2020), *Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard*, OECD Publishing, Paris, <https://doi.org/10.1787/061fe03d-en>. [21]
- OECD (2020), *Rural Well-being: Geography of Opportunities*, OECD Rural Studies, OECD Publishing, Paris, <https://doi.org/10.1787/d25cef80-en>. [1]
- OECD (2019), *Regions in Industrial Transition: Policies for People and Places*, OECD Regional Development Studies, OECD Publishing, Paris, <https://doi.org/10.1787/c76ec2a1-en>. [16]
- OECD (2019), *Rural well-being : geography of opportunities*. [27]
- OECD (2018), *Job Creation and Local Economic Development 2018: Preparing for the Future of Work*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264305342-en>. [12]
- OECD (2015), *The Metropolitan Century: Understanding Urbanisation and its Consequences*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264228733-en>. [6]
- OECD (Forthcoming), *Enhancing Rural Innovation in the United States*, OECD Publishing. [8]
- Ruf, J., A. Emberger-Klein and K. Menrad (2022), “Consumer response to bio-based products – A systematic review”, *Sustainable Production and Consumption*, Vol. 34, pp. 353-370, <https://doi.org/10.1016/j.spc.2022.09.022>. [2]
- World Manufacturing Foundation (2022), *Women in Manufacturing*, <https://worldmanufacturing.org/women-in-manufacturing/> (accessed on 28 September 2023). [15]

