

COUNTRY BRIEFING ESTONIA

Vienna Institute for International Economic Studies

Toward Innovation-driven Growth

Innovation Systems and Policies in EU Member States
of Central Eastern Europe

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Please find all the publications of the programme under its webpage:

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EXECUTIVE SUMMARY

The EU member states of Central Eastern Europe (EU-CEE) – Poland, Czechia, Slovakia, Hungary, Slovenia, Croatia, Romania, Bulgaria, Estonia, Lithuania and Latvia – have undergone an impressive economic catch-up process since the early 2000s. However, the previously successful model of adopting labour-intensive production steps as an 'extended workbench' for Western corporations is increasingly reaching its limits, as we demonstrated in a previous study (Grieveson et al., 2021). The fundamental problem is that the key technological competencies and the segments of production with the highest added value are situated in the 'headquarter economies' of Western Europe. In contrast, the EU-CEE countries continue to specialise in labour-intensive production. Coupled with major structural changes such as decarbonisation and digitalisation, this growth model must therefore be replaced by a new one, more strongly driven by innovation. Only then will these countries be able to catch up with Western Europe in terms of productivity and living standards.

In a follow-up study (Zavarská et al., 2023), we investigated how a customised industrial policy could help EU-CEE countries to escape their 'middle-income trap'. The main finding: industrial policy needs to be stepped up in the region, all the more so at a time when countries around the world are rediscovering its significance. In this necessary effort to climb the technological ladder, there is much for EU-CEE to learn from the East Asian tiger states. They share a similar starting-point, namely the dominance of multinational corporations and a highly export-oriented nature, which the East Asian tigers have successfully leveraged to their advantage. With a highly successful industrial policy, these countries have managed to take the technological lead in some areas and create world-class companies, for instance in electronics or semiconductors.

Having established the need for a new growth model and made the case for industrial policy, we turn to innovation, the other 'missing piece' that will be required to achieve the next stage of convergence in EU-CEE. We explore how these countries could establish innovation systems at the national level, enabling them to catch up technologically and economically with the front-runners in Western Europe.

In this endeavour, EU-CEE countries face several challenges. For one, they do not spend enough on research and development (R&D), which undermines their innovation

activities. R&D expenditure is, however, slowly rising, particularly in Poland, Czechia and Croatia. Nevertheless, all countries in the region fall far short of the official EU target of 3% of GDP for R&D. Only Slovenia and Czechia record R&D expenditure of 2% of GDP, while Slovakia, Bulgaria, Latvia and Romania are below 1%. Although some countries excel in exporting medium and high-tech products, in many cases this is driven by foreign direct investment (FDI) and historical industrial strengths, rather than contemporary domestic innovation. As a result, high-level technological expertise mainly resides within large multinational companies that maintain extensive production sites in these countries, while R&D is carried out primarily in their Western European headquarters. This means that cutting-edge expertise and technology are only available on the 'islands' of the production plants of these companies in the EU-CEE countries. Because of this isolated existence, local companies, especially small and medium-sized ones, struggle to benefit from cutting-edge technology. Exports of innovative services are currently very limited.

Although the region has quite a high share of graduates in science, technology, engineering and maths (STEM subjects), the education system struggles to achieve quality and universities are underfunded. The region has a long way to go in green innovation, hampering its competitiveness in this crucial area of the EU's envisaged 'twin' (digital and green) transformation. By contrast, the region appears better positioned for the digital transformation. In particular, there are a number of emerging innovative enterprises in EU-CEE countries in digital technologies. However, many of them lack strong connections to the broader innovation system and tend to operate as isolated success stories.

Reflecting these challenges, the innovation performance of the region is not particularly promising, although there are some positive developments. With the exception of Estonia, all EU member states in Central Eastern Europe are below the EU average and outside the global top 30. However, the innovation performance is generally in line with the economic development of each country, albeit with some exceptions. Estonia clearly outperforms, while Poland, Slovakia and Romania underperform.

From the policy side, despite recent progress, an overarching problem is the lack of co-ordination and financial

support for innovation and R&D activities by national governments. The disconnect between FDI policies and innovation policies further complicates the implementation of strategies to enhance industrial innovation and upgrade EU-CEE's position in value chains. Although EU membership provides opportunities for collaboration and learning, the current innovation policy approach of the EU, which is focused more heavily on the needs of advanced countries, hinders active participation by EU-CEE countries. Only a few EU-CEE countries utilise their national policy space to engage more actively in EU initiatives.

IRELAND AND SINGAPORE AS ROLE MODELS

In this context, Ireland and Singapore can serve as an inspiration for EU-CEE, as they each successfully transitioned from an FDI-dominated to a more balanced innovation system, in which domestic firms actively contribute to the generation of innovations. Like the EU-CEE countries, their early economic growth was mainly driven by large multinational enterprises (MNEs) – similar to the 'extended workbench' model in EU-CEE. Later in their development stage, however, Ireland and Singapore changed their growth strategies. One notable element was the focus on a highly selective investment promotion approach (called 'innovation by invitation' in Ireland), which involved specifically attracting investments that corresponded to the country's own industrial strengths and potential. Additionally, a systematic and highly focused approach was taken to connect foreign companies with local firms and suppliers to establish industrial clusters in promising niches. Incentives were also created to encourage foreign companies already operating in the country to carry out more R&D locally, thus bringing in more added value.

A critical factor here was well-trained skilled labour. Both Ireland and Singapore have made great efforts to orient vocational training and, above all, university education in STEM subjects as closely as possible to the needs of their own economies. Other success factors included significant government funding of R&D through grants and tax breaks, the strengthening of scientific research at universities, the creation of government research funding agencies, the networking of university and commercial research, good framework conditions for start-ups, and easier immigration of highly qualified people from abroad.

POLICY RECOMMENDATIONS

Considering the specific innovation landscape of EU-CEE countries and building on the success stories from other parts of the world, this study articulates a series of recommendations aimed at guiding the EU-CEE region's next growth phase, advocating for a transition from imitation to innovation.

1. FACILITATE EFFECTIVE CO-ORDINATION OF THE INNOVATION SYSTEM

- Encourage the establishment of a long-term innovation strategy that provides stability and planning security and is not subject to the electoral cycle. This is linked to the creation of a central innovation agency to co-ordinate the various elements of a coherent innovation policy at the national level.
- Improve the utilisation of EU funds and provide more money at the national level for the promotion of innovation. From a converging country's perspective, the reality that EU-CEE can lean on EU finances is a substantial advantage, which needs to be leveraged more strongly.
- Improve the public administration and its institutions. In addition to expanding the pool of innovation policy experts within the public sector, this includes a shift towards a culture of evidence-based policy making, establishing and strengthening in-house capacities to analyse different policies and their interactions.

2. ENABLE COMPANIES TO CLIMB UP THE TECHNOLOGICAL LADDER

- Strengthen the innovative potential of domestic companies, helping them to upgrade and grow. Key strategies in this direction involve fostering local supplier development, offering targeted R&D incentives, as well as promoting clusters. Avoiding an arbitrary over-emphasis on high-tech sectors is also crucial, ensuring that innovation policies are locally relevant for realistic and effective outcomes in the region.
- Select FDI in a targeted way and focus on areas that align with the country's traditional industrial strengths in order to build upon them. Create incentives for foreign MNEs operating in the country to conduct more R&D locally, thereby bringing additional value.
- Connect MNEs operating in the country with local companies so that the latter can benefit from their technological expertise and know-how. Eventually, industrial clusters should emerge that reflect the country's strengths and specialisations.
- Identify and develop promising industrial niches. Facilitate a targeted specialisation of the economy in the most promising areas that offer the greatest comparative advantage. The EU-wide approach, known as 'smart specialisation', can be especially useful, as it seeks to achieve intelligent, inclusive and sustainable growth within the given economic conditions.
- Move away from tax incentives as the main instrument to stimulate R&D spending by companies towards more direct grants, especially in EU-CEE countries with fewer fiscal constraints.

3. STRENGTHEN UNIVERSITIES AND RESEARCH INSTITUTIONS

- Increase the exchange and improve networking between science and business. This includes making collaboration between universities and industry a prerequisite for certain types of funding, reviewing the regulatory frameworks governing publicly funded institutions, and establishing and actively using technology transfer offices, as well as participating in EU-wide initiatives that encourage the commercial application of research.
- Promote international partnerships and create opportunities for the cross-border mobility of researchers. There are various means of stimulating such partnerships, such as making research collaboration grants more widely available, negotiating various fellowship programmes (also within the EU-CEE region), and simplifying work permits and visa procedures for international researchers.
- Stimulate internationally outstanding scientific excellence. This should, however, be relevant to the local economy and its industrial base and take their needs into account.

4. DEVELOP HUMAN CAPITAL

- In order to have enough well-trained specialists available for an innovation-based growth model, vocational training and university education need to be expanded, especially in the STEM subjects of science, technology, engineering and mathematics.
- Talented workers from abroad should be recruited in a targeted manner, and skilled citizens who have emigrated should be enticed with special incentives to return home. It is well known that the EU-CEE countries are grappling with a pronounced 'brain drain' and, consequently, a significant shortage of skilled labour. This situation is often linked to challenging living conditions, ranging from expensive housing to a lack of childcare and inadequate healthcare. This also necessitates a new social policy to improve living conditions.
- Vocational training and apprenticeships should be made more attractive so that young, talented people follow these pathways, especially in technical and scientific fields. EU-CEE countries can build on the presence of MNEs to advance apprenticeship and internship programmes, career exploration programmes, and mentorship initiatives to ensure that students get hands-on experience from a relatively early age. The aim is to also ensure a more balanced talent distribution, so that high-achieving students are more drawn to, and can excel in, vocational pathways.

5. IMPROVE ACCESS TO FUNDING FOR INNOVATIVE COMPANIES

- In order to offer innovative companies better access to suitable financing from the outset, a legal framework and market conditions that reward innovation and risk-taking need to be cultivated. In particular, simplifying regulations, encouraging new fund creation, and promoting regional funds for smaller markets can be useful. Governments should cautiously explore co-investment mechanisms, avoiding disruption to private funding.

COUNTRY BRIEFING ESTONIA

INNOVATION LANDSCAPE

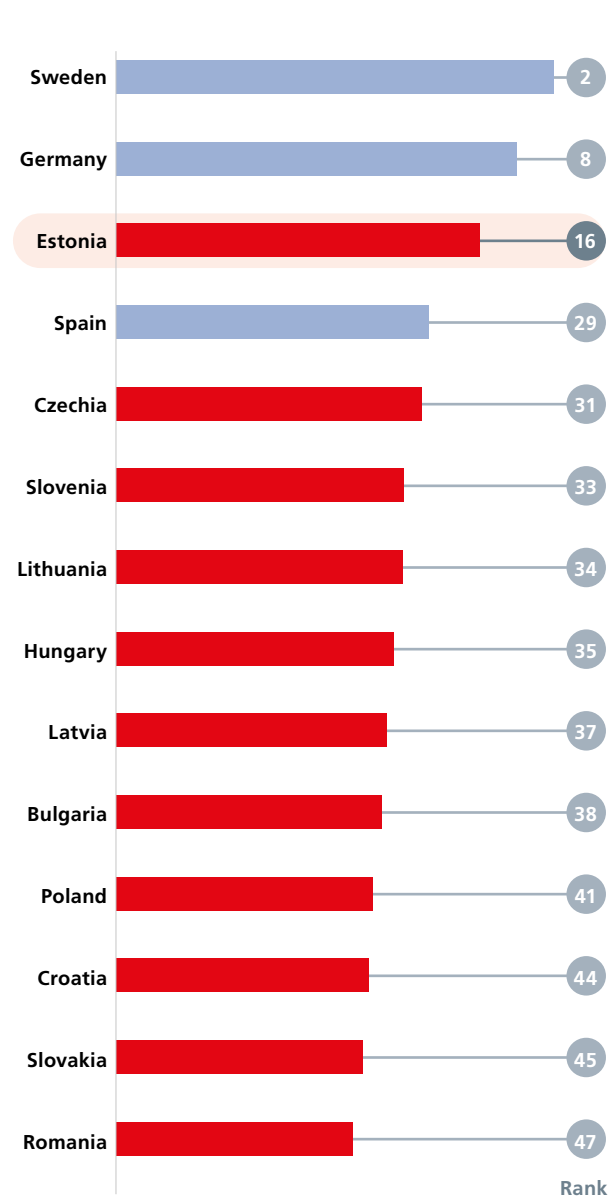
Estonia is a small economy with remarkably high innovation capacity – it ranks 16th in the Global Innovation Index and is among the innovation leaders in the European Innovation Scoreboard. Europe's leader in start-ups and unicorns per capita, Estonia's innovation potential is based on its STEM-oriented and highly competitive education system, its transparent and well-operating institutions and efficient infrastructure, a high degree of digitisation in the government and the economy, a favourable investment and tax environment, and sound use of venture capital, as well as proactive policies to support start-ups and innovation within firms.

With 10 unicorns founded in Estonia (including Skype, Bolt and Wise) and 1,444 start-ups currently in operation (mainly in the sectors of business software and HR, fintech, and consumer products and services), the country has a high degree of innovation creation and adoption. Beyond start-ups, innovation adoption in established firms has also accelerated over the last decade, with AI adoption doubling over the last two years.

Estonia's share of knowledge-intensive services' exports is far above the EU-CEE level, and surpasses the EU average. Yet, despite high-quality innovation inputs, exports of medium and high-tech manufacturing products are lagging far behind exports of knowledge-intensive services, marking one of the innovation weaknesses of Estonia. The economy's persistently high energy dependency, relatively underdeveloped innovation clusters, low expenditures on research and development (R&D), and low number of patents per capita are among other areas where the Estonian innovation system could improve. Furthermore, Estonia ranks above the EU-CEE level in product and business processes innovations in SMEs, yet below the EU average.

Whereas Estonia pioneered digital innovation, both in state services and business operations, green innovation started to catch up relatively recently and now forms the core of innovation strategies. Three Estonian high-tech companies (Skeleton Technologies, Elcogen and Stargate Hydrogen Solutions) are participating in the Important Projects of Common European Interest (IPCEI) EU policy initiative 'H2 technology' in the frontier research on the

Global Innovation Index – Rank 16 out of 132 countries



Source: GII 2023.

hydrogen value chain. Further integration of research and technologies (DeepTech) and development of clusters bringing together high-tech services and manufacturing with state-of-the-art research is another objective set for the next decade.

National Innovation System Indicators

Priority areas	Indicator	Estonia	EU	EU-CEE
Education system	Tertiary education graduates in STEM, share in % (UNESCO)	28.1	24	24.2
	Spending on tertiary education per student, in EUR at PPP (Eurostat)	8,640	7,990	6,600
	PISA scales in reading, maths and science (GII)	526	484	480
Technological capacities of enterprises	R&D (GERD) financed by business, share in % (Eurostat)	50.9	57.7	43.5
	R&D expenditures (GERD) in % of GDP (Eurostat)	1.8	2.3	1.3
	SMEs with product innovations, share in % (EIS)	25.2	27.0	22.8
	SMEs with business process innovations, share in % (EIS)	41.1	41.6	32.4
	Finance for start-ups and scale-ups, average perception scores from 0 to 10 (GII)	6.0	4.3	4.5
Collaborations and linkages	Innovative SMEs collaborating with others, share in % (EIS)	17.3	11.7	10.1
	University-industry R&D collaborations, average perception scores from 0 to 7 (GII)	4.1	4.2	3.8
Innovation outcomes	Granted patents per million inhabitants (WIPO)	92	586	86
	Exports of medium and high-technology products, in % of total product exports (EIS)	36.5	61.2	49.5
	Knowledge-intensive services exports, in % of total services exports (EIS)	65.5	63.6	48.6

Sources: EIS 2023; Eurostat; GII 2023; UNESCO; WIPO; World Bank, WDI.

Note: data for EU and EU-CEE are simple averages, except for EIS and Eurostat, with original data for EU.

Data for 2021 or the most recent available year; more details on the methodology and data availability to be found in the Annex.

Mapping innovation policy initiatives

	Yes/No	Name of the initiative/programme	Comments
Innovation agency	Yes	Enterprise Estonia (EAS) + KredEx	The merging of KredEx and Enterprise Estonia (EAS) in 2022 was the first step towards the creation of a single Estonian Business and Innovation Agency. KredEx and Enterprise Estonia have been active in all areas – promoting innovation, supporting the development of sustainable business models and research-intensive solutions, attracting FDI with high added value, aiding in recruitment of top-level international workers, advising businesses on potential trade partners and expansion into foreign markets, helping to develop the start-up ecosystem. KredEx and Enterprise Estonia offer grants, loans, venture capital, credit insurance and guarantees to promote innovation activities within firms.
Programmes for human capital development	Yes	Under the Estonian Education Strategy 2021–2035 and the Estonian Lifelong Learning Strategy 2020	Both strategies envisage specific actions for the development of skills and knowledge that are in line with labour market needs, prioritising the provision of work-based learning to boost productivity.
Programmes for human capital attraction and retention (e.g. reverse brain drain)	Yes	Startup Visa programme e-Residency programme Returning researcher grant	The well-established Startup Visa programme allows non-EU founders to set up their start-up in Estonia, as well as easing the process for Estonian start-ups to hire non-EU talent. The e-Residency programme was launched in 2014 to allow entrepreneurs worldwide to establish, run and grow their companies online, using Estonian digital business services (currently there are around 100,000 e-residents). The returning researcher grant is administered by the Estonian Research Council and aims to support the return to Estonia of researchers – Estonian citizens or current/ former Estonian residents – who have been working outside Estonia.

Start-up programmes (incubators, dedicated financing, etc.)	Yes	Startup Estonia	A well-established organisation, which implements several initiatives to develop the knowledge and skills of start-up founders, improve the access to finance for start-ups and address regulatory bottlenecks.
Venture capital programmes	Yes	SmartCap	Well-established programme established in 2011, which aims to create a vital venture capital market and enable innovative Estonian companies to emerge and grow globally.
Cluster programmes	No		
Technology-specific policies	No		
Tax incentive schemes	No		Although there is no specific tax programme to boost innovations, 0% tax on retained and reinvested profits and a flat 20% income tax for distributed profits (it will increase to 22% in 2024) are deemed to have a positive effect on firms' innovation activities.
Innovation collaboration platform	Yes	Accelerate Estonia Estonian ICT Cluster	Launched in 2019, Accelerate Estonia is Estonia's governmental innovation lab, operating as a platform for all Estonian ministries, the public and private sectors, experts and entrepreneurs to join forces in identifying, developing and implementing innovations. The platform aims to remove regulatory barriers and expand market possibilities to boost innovative entrepreneurship. The Estonian ICT Cluster initiative was recently established as a collaboration platform for ICT companies, aiming to boost the development of new ICT products and solutions, promote the exchange of knowledge and experience, and foster their export to the international market.

COUNTRY-SPECIFIC POLICY PRIORITIES AND RECOMMENDATIONS

- **Increase expenditures dedicated to R&D, with EU funds complementing stronger national innovation efforts.** Whereas research and innovation promotion are well-established government priorities, actual gross spending on R&D falls below the EU27 average and amounts to less than 2% of GDP. The recently established Accelerate Estonia platform, which promotes close collaboration between public authorities and entrepreneurs, is an important milestone as it reinforces the government's role in identifying and implementing innovations. However, the public investment in R&D and innovation needs to be more stable, predictable, and transparent, with funding mechanisms aligned with the strategic priorities identified in the smart specialisation strategies.
- **Better identify the responsibilities, tasks and role of the newly created single investment agency.** At present, the Estonian innovation system suffers from fragmentation, overlapping responsibilities, and lack of strategic vision and leadership. The lack of co-ordination and communication between the key agencies responsible for identifying, supporting and implementing innovations results in duplication, overlap and gaps in state funding. The recent merger of two key agencies (Enterprise Estonia and KredEx) into a single agency is expected to establish a clear division of roles and tasks among the different ministries and agencies involved in research and innovation policy, as well as a better alignment of policies and programmes across different sectors.
- **Reinforce linkages between public research and industry to boost innovation throughout the entire economy.** Despite an attractive start-up scene and a growing science base, collaboration between public research and industry is limited, except in the fields of AI, computer science, medicine and genetics. The recently recognised priority to accelerate DeepTech is a step towards stronger co-operation between research and industry, yet co-operation should emerge also in the sectors with less intensive start-up activity, including manufacturing, transportation and energy. Likewise, research capacities within companies need to be leveraged. Knowledge exchange and technology transfer may require additional incentives for firms to strengthen in-house research capacities to be able to fully comprehend and absorb the knowledge generated through these linkages.
- **Address skills gaps and mismatches, and enhance efforts to attract and retain talents from abroad.** Estonia's innovation potential is severely limited by its

ageing population, 'brain drain' and skills gaps. Hence, measures to support the education and training of researchers and entrepreneurs, and to promote their life-long learning and career development, should remain among the government's top priorities. Furthermore, researchers' remuneration should be more attractive and competitive to enhance public and private research output.

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Toward Innovation-driven Growth: Innovation Systems and Policies in EU Member States of Central Eastern Europe

This country briefing contains a short summary of a much broader study that deals with the perspectives of innovation policies in Central Eastern and Southern Eastern Europe.

Twenty years after EU enlargement, the economies of Central and South Eastern Europe have become important components of Europe's industrial production system. Now, these countries are faced with the task of taking a new step towards a more sustainable and productive growth model.

This step can only be taken if the countries succeed in becoming innovating economies with national companies that are strong in research, development and innovation. To succeed, the countries have to develop not only strong industrial policies, but also policies that aim at creating solid national innovation systems. The study analyses the region's potential and uses the examples of Ireland and Singapore to describe successful innovation strategies. It is authored by a team from the Vienna Institute for International Economic Studies.

It is part of a series of FES studies on the growth model in EU-CEE and its prospects which have been published in recent years.

The full study can be found here:

<http://library.fes.de/pdf-files/bueros/budapest/21198.pdf>



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