



European Innovation  
Scoreboard **2024**  
Country Profile  
**Estonia**

## European Innovation Scoreboard 2024 – Country profile Estonia

European Commission

Directorate-General for Research and Innovation

Directorate G – Common Policy Centre

Unit G.1 – Common R&I Strategy & Foresight Service

Contact Alexandr Hobza, Chief Economist and Head of Unit G.1

Athina Karvounaraki

Alexis Stevenson

Email RTD-STATISTICS@ec.europa.eu

RTD-PUBLICATIONS@ec.europa.eu

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Directorate A – Strategy and Economic Analysis

Unit A.1 – Chief Economist

Contact Román Arjona, Chief Economist and Head of Unit A.1

Xosé-Luís Varela-Irimia

Email GROW-A1@ec.europa.eu

European Commission

B-1049 Brussels

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# **European Innovation Scoreboard 2024 Country profile Estonia**

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**Strong Innovator**Summary innovation index (relative to EU in 2017): **115.3**Rank: **14**

Change vs 2023: ▼ -2.9    Change vs 2017: ▲ 26.8

Estonia is a Strong Innovator with performance at 104.8% of the EU average in 2024. Performance is below the average of the Strong Innovators (111.3%). Performance is increasing more than the EU (+10%).

| Indicator                                                   | Performance relative to the EU in 2024 | Performance change 2017-2024 | Performance change 2023-2024 |
|-------------------------------------------------------------|----------------------------------------|------------------------------|------------------------------|
| <b>SUMMARY INNOVATION INDEX</b>                             | <b>104.8</b>                           | <b>26.8</b>                  | <b>-2.9</b>                  |
| <b>Human resources</b>                                      | <b>127.4</b>                           | <b>23.0</b>                  | <b>9.6</b>                   |
| New doctorate graduates                                     | 100.0                                  | 23.2                         | 11.6                         |
| Population with tertiary education                          | 102.2                                  | 1.8                          | -2.4                         |
| Population involved in lifelong learning                    | 188.0                                  | 48.9                         | 21.4                         |
| <b>Attractive research systems</b>                          | <b>134.6</b>                           | <b>66.9</b>                  | <b>10.1</b>                  |
| International scientific co-publications                    | 168.8                                  | 82.2                         | -5.7                         |
| Scientific publications among the top 10% most cited        | 108.1                                  | 29.0                         | 12.2                         |
| Foreign doctorate students as a % of all doctorate students | 145.0                                  | 135.4                        | 19.9                         |
| <b>Digitalisation</b>                                       | <b>95.5</b>                            | <b>32.4</b>                  | <b>21.9</b>                  |
| Broadband penetration                                       | 69.0                                   | 32.9                         | 11.7                         |
| Individuals with above basic overall digital skills         | 132.3                                  | 31.9                         | 31.9                         |
| <b>Finance and support</b>                                  | <b>101.8</b>                           | <b>23.0</b>                  | <b>3.3</b>                   |
| R&D expenditure in the public sector                        | 106.6                                  | 0.0                          | 3.3                          |
| Venture capital expenditures                                | 150.6                                  | 70.5                         | 0.0                          |
| Direct and indirect government support of business R&D      | 35.8                                   | 1.2                          | 7.3                          |
| <b>Firm investments</b>                                     | <b>94.1</b>                            | <b>35.6</b>                  | <b>-14.8</b>                 |
| R&D expenditure in the business sector                      | 66.7                                   | 24.1                         | 0.8                          |
| Non-R&D innovation expenditures                             | 147.1                                  | 41.0                         | -35.5                        |
| Innovation expenditures per person employed                 | 74.6                                   | 42.5                         | -10.0                        |
| <b>Use of information technologies</b>                      | <b>118.1</b>                           | <b>24.3</b>                  | <b>7.1</b>                   |
| Enterprises providing ICT training                          | 79.3                                   | 33.1                         | 11.5                         |
| Employed ICT specialists                                    | 155.9                                  | 16.2                         | 3.3                          |
| <b>Innovators</b>                                           | <b>109.1</b>                           | <b>35.7</b>                  | <b>-18.1</b>                 |
| SMEs introducing product innovations                        | 117.5                                  | 49.9                         | 11.6                         |
| SMEs introducing business process innovations               | 102.0                                  | 21.9                         | -46.5                        |
| <b>Linkages</b>                                             | <b>166.1</b>                           | <b>23.6</b>                  | <b>-39.9</b>                 |
| Innovative SMEs collaborating with others                   | 165.1                                  | -59.7                        | -66.1                        |
| Public-private co-publications                              | 192.0                                  | 64.2                         | -7.5                         |
| Job-to-job mobility of HRST                                 | 156.2                                  | 76.5                         | -32.3                        |
| <b>Intellectual assets</b>                                  | <b>119.0</b>                           | <b>24.0</b>                  | <b>-3.1</b>                  |
| PCT patent applications                                     | 60.0                                   | -1.8                         | -2.1                         |
| Trademark applications                                      | 199.7                                  | 64.5                         | 4.2                          |
| Design applications                                         | 123.9                                  | 26.2                         | -10.1                        |
| <b>Employment impacts</b>                                   | <b>123.9</b>                           | <b>71.7</b>                  | <b>-11.5</b>                 |
| Employment in knowledge-intensive activities                | 110.2                                  | 7.3                          | 10.9                         |
| Employment in innovative enterprises                        | 136.1                                  | 131.0                        | -31.7                        |
| <b>Sales impacts</b>                                        | <b>69.7</b>                            | <b>9.8</b>                   | <b>-0.5</b>                  |
| Exports of medium and high technology products              | 58.2                                   | -2.2                         | 13.6                         |
| Knowledge-intensive services exports                        | 76.0                                   | 31.2                         | -0.7                         |
| Sales of new-to-market and new-to-firm innovations          | 78.6                                   | -0.7                         | -22.3                        |
| <b>Environmental sustainability</b>                         | <b>56.7</b>                            | <b>-9.9</b>                  | <b>-8.0</b>                  |
| Resource productivity                                       | 26.4                                   | 19.1                         | 5.4                          |
| Air emissions by fine particulates                          | 87.2                                   | 65.3                         | 19.0                         |
| Environment-related technologies                            | 42.3                                   | -142.2                       | -57.8                        |

**Relative strengths**

- Trademark applications
- Public-private co-publications
- Population involved in lifelong learning

**Relative weaknesses**

- Resource productivity
- Direct and indirect government support of business R&D
- Environment-related technologies

**Strong increases since 2017**

- Foreign doctorate students as a % of all doctorate students
- Employment in innovative enterprises
- International scientific co-publications

**Strong decreases since 2017**

- Environment-related technologies
- Innovative SMEs collaborating with others
- Exports of medium and high technology products

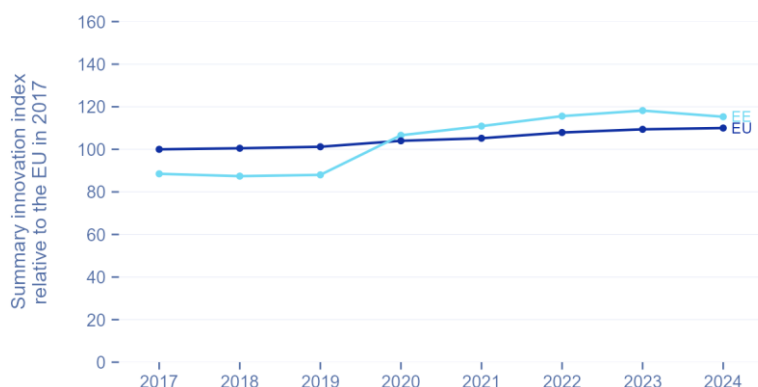
**Strong increases since 2023**

- Individuals with above basic overall digital skills
- Population involved in lifelong learning
- Foreign doctorate students as a % of all doctorate students

**Strong decreases since 2023**

- Innovative SMEs collaborating with others
- Environment-related technologies
- SMEs introducing business process innovations

**Footnote:** The first data column shows scores relative to the EU in 2024, with colour codes indicating performance levels. The subsequent columns show performance changes over time, with scores relative to the EU in 2017, coloured in purple for positive change and red for negative change. As reference years differ between the first column (2024) and the last two columns (2017), scores cannot be directly compared or subtracted across these columns.



## Summary innovation index

The line chart shows the evolution of the innovation performance of Estonia over time, relative to the performance of the EU in 2017.

**Footnote:** All performance scores (SII and dimensions below) are relative to that of the EU in 2017.

## Framework conditions

Estonia performs close to or above the EU average for all three framework condition dimensions with positive trends for all indicators since 2017 and notably the attractiveness of the research system (at 134.6% of the EU average in 2024 for that dimension). Estonia has significantly improved the availability of skilled human resources with an increase of STEM doctorate graduates (+23.2%-points) in the population and population in lifelong learning (+48.9%-points) since 2017. However, skills shortages and mismatches in many sectors persist and reduce Estonia's competitiveness.

The Government has taken several measures to promote doctoral studies: in 2022, doctoral studies were reformed, from 2024 a single doctoral school has been approved to replace 13 former schools and the Cross-Sectoral Mobility Measure (SekMo) programme can support a doctoral student working in a company. International scientific co-publications have increased significantly between 2017 and 2024 (+82.2%-points). In addition, the number of foreign doctorate students has increased significantly since 2017 (+135.4%-points), also partly driven by policy interventions. Already a highly digitalised county, Estonia's performance has continued to improve over the last eight years.

### Human resources



### Attractive research systems



### Digitalisation



## Investments

Estonia's performance on investments is varied but overall show a sustained improvement since 2017 across the board, while still lagging below the EU performance on government support of business R&D (35.8% of the 2024 EU average), R&D expenditure in the business sector (66.7%), and surprisingly for a country known for high its level of digitalisation, the share of enterprises providing ICT training (79.3%). As a response, support for business research and innovation has been strengthened in recent years, notably under the Estonian recovery and resilience plan (RRP). There has also been a drop in performance since 2023 on two indicators and one dimension (firm investments, -14.8%-points), this is based on updated (fast track) data for CIS2022 and may reflect a shock from the COVID pandemic.

### Finance and support



### Firm investments



### Use of information technologies



## Innovation activities

The set of indicators based on the Community Innovation Survey data all show a positive trend since 2017, except for innovative SMEs collaborating with others (-59.7%-points). However, the most recent data, from the CIS2022, points to a decline in Estonia's performance (compared to 2023), even if all indicators continue to perform above the EU average for the innovators and linkages dimensions. In 2023, a new research and technology organisation has been launched to support applied research in Estonian firms. The Estonian Business and Innovation Agency also provides a range of support measures to innovative businesses including tech-based start-ups, such support is focused on firms active in the priority areas of the national research and innovation strategy. Finally, Estonia's patenting performance remains a weakness, standing at 60.0% of the EU average in 2024, partly due to the relatively low business R&D spend.

### Innovators



### Linkages



### Intellectual assets



## Impacts

Employment impact of innovation in Estonia are relatively positive, above the EU average at 123.9% of the 2024 EU level, and improving since 2017; although employment in innovative enterprises dropped since 2023 (-31.7%-points). Again the latter is a CIS indicator which may be impacted by the COVID crisis. Estonia struggles to turn innovation activity into tangible results in terms of sales and exports of medium/high tech and knowledge intensive services and new to market/firm innovations. Only the trends for knowledge intensive services exports are positive since 2017, driven probably by a number of successful scale up firms in SaaS sector notably. Estonia's performance is weakest on resource productivity and the two other environment related sustainability indicators, with the latter indicator on environmental technology related patents declining markedly since 2017 (-142.2%-points), despite a relatively active cleantech start-up community. In this context, a Green Fund has been set up with the support of the RRF to finance the development and scaling-up of innovative green start-ups.

### Employment impacts



### Sales impacts



### Environmental sustainability



## Structural differences

### Performance and structure of the economy

Estonia's economy has been hit in the last few years by several shocks including notably the Russian war of aggression against Ukraine, which has increased the geopolitical risk of investing in the country. The economic structure of the country is still relatively more oriented to manufacturing with a higher share of lower-medium tech sectors than the EU average. The share of turnover from large enterprises is also much lower than the EU average underlining the relatively fragmented nature of the economy. The information and communication technologies (ICT) sector is a main driver of the service sector representing a higher share of employment and value added in the Estonian economy compared to the EU average (ETAG, 2023). Estonia is among the leading countries in Central and Eastern Europe in terms of FDI per capita, with notably 30% of FDI in financial and insurance.

### Business and entrepreneurship

Estonia has a highly developed start-up ecosystem and boasts the most unicorns per capita in Europe. It has been the birthplace of 10 unicorns, two of which emerged in 2022. According to Invest Estonia, this is 7.7 unicorns per million capita. Entrepreneurial activity is supported by a range of government policy measures including the Startup Estonia organisation, SmartCap (fund of funds) and various measures of the Estonian Business and Innovation Agency, including e-residency and a Startup Visa. FDI net inflows remain strong and well above the EU average. In 2023, Invest Estonia (Estonian Investment Agency) secured €336M worth of foreign investment to Estonia, creating more than 1,000 high-paying jobs, and keeping on par with the record-breaking results of 2022. This includes investments in new technology development centres and green energy. Buyer sophistication is close the EU average which provides a good basis for innovators to trial new or innovative products.

### Innovation profiles

The relatively lower shares of in-house product innovators with market novelties is likely a reflection, in part, of the position of many Estonian firms as subcontractors in global value chains. In contrast, the share of in-house business processors is much higher than the EU average, suggesting a strong focus on improving performance through developing and implementing solutions.

### Governance and policy framework

Estonia's governance system is generally favourably assessed both in term of relatively low levels of corruption and a strong rule of law for business activities. The promotion of entrepreneurship from a young age is also well embedded in the system. The government also plays a pro-active role in the procurement of advanced technologies and innovation procurement through a series of initiatives including Accelerate Estonia Government Lab, etc. There is a strong focus on cybersecurity, deeptech and cleantech (green energy) in current policies.

### Climate change

Low resource productivity persists as a feature of Estonia's economy, adding to competitiveness concerns. Nevertheless, circular material use is performing above the EU average and, despite greenhouse. Nevertheless, with EUR 1 generated per kg of material consumed in 2021, resource productivity in Estonia is dragged down by resource-intensive industries (European Semester Report 2024). Resource productivity is one of Estonia's relative weaknesses in terms of innovation capacity, with Estonia ranked 13th on the 2022 Eco-Innovation Scoreboard. Between 2015 and 2022, the greenhouse gas emission intensity of Estonia's workforce declined from 29.6 to 20.4 tonnes per worker. Although this is still above the EU average, (14.3 tonnes per worker in 2022), it indicates a positive trend in the green transition.

### Demography

Although the Estonian population has grown for the last seven years (in part due to immigration from Ukraine), the latest projection (by Statistics Estonia) predicts a decrease in Estonia's population by 2085 to about 1.2 million people living in Estonia, from 1.3 million in 2024. The population will decrease mainly due to low fertility and population ageing. While this is a long-term projection, the availability of skilled labour is already a challenge given a high employment rate. Measures such as the Startup Visa aim to facilitate the attraction of highly skilled employees. Population density is much lower than the EU average and this average figure hides a concentration of the population in the capital city Tallinn and the surrounding Harju County. This has a direct impact on the potential to raise innovation and productivity rates of more rural counties.

## Structural indicators

The table below presents some structural differences between Estonia and the EU.

|                                                               | EE    | EU    |
|---------------------------------------------------------------|-------|-------|
| <b>Performance and structure of the economy</b>               |       |       |
| GDP per capita                                                | 84    | 100   |
| Average annual GDP growth (2021-2023 average)                 | -1.7  | 1.9   |
| Employment share Manufacturing                                | 17.9  | 15.8  |
| Employment share High and Medium high-tech                    | 23.6  | 37.9  |
| Employment share Services                                     | 39.2  | 39.8  |
| Employment share Knowledge-intensive services                 | 24.5  | 28.6  |
| Turnover share SMEs                                           | 24.3  | 12.6  |
| Turnover share large enterprises                              | 19.1  | 49.6  |
| Foreign-controlled enterprises – share of value added         | 17.6  | 13.3  |
| <b>Business and entrepreneurship</b>                          |       |       |
| Enterprise births                                             | 1.2   | 0.8   |
| Total Entrepreneurial Activity                                | 13.1  | 6.8   |
| FDI net inflows                                               | 12.2  | 1.9   |
| Buyer sophistication                                          | 3.5   | 3.6   |
| <b>Innovation profiles</b>                                    |       |       |
| In-house product innovators with market novelties             | 9.2   | 11.7  |
| In-house product innovators without market novelties          | 16.8  | 13.7  |
| In-house business process innovators                          | 33.4  | 17.6  |
| Innovators that do not develop innovations themselves         | 0.4   | 6.1   |
| Innovation active non-innovators                              | 1.8   | 4.2   |
| Non-innovators with potential to innovate                     | 11.7  | 17.8  |
| Non-innovators without disposition to innovate                | 26.7  | 30.6  |
| <b>Governance and policy frameworks</b>                       |       |       |
| Corruption Perceptions Index                                  | 74.7  | 64    |
| Basic-school entrepreneurial education and training           | 5.4   | 2.6   |
| Government procurement of advanced technology products        | 3.7   | 3.4   |
| Rule of law                                                   | 1.4   | 1     |
| Innovation procurement as a share of total public procurement | 13.9  | 9.2   |
| <b>Climate change</b>                                         |       |       |
| Circular material use rate                                    | 16.1  | 11.5  |
| Greenhouse gas emissions intensity of energy consumption      | 79.4  | 82.8  |
| Eco-Innovation Index                                          | 115.5 | 121.5 |
| <b>Demography</b>                                             |       |       |
| Population size (in millions)                                 | 1.3   | 447   |



|                                                      | EE   | EU  |
|------------------------------------------------------|------|-----|
| Average annual population growth (2021-2023 average) | 1.3  | 0.3 |
| Population density                                   | 30.7 | 109 |

## References

The country's relative strengths and weaknesses for each indicator, compared to other EU Member States and neighbouring countries, can be found in [Annex B](#).

ETAG (2023), Overview of the Estonian ICT sector. Available at: [https://etag.ee/wp-content/uploads/2022/07/Overview-of-the-Estonian-ICT-sector\\_2023.pdf](https://etag.ee/wp-content/uploads/2022/07/Overview-of-the-Estonian-ICT-sector_2023.pdf)

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This report provides the Country profile from the 2024 European Innovation Scoreboard for Estonia

*Studies and reports*

A series of approximately 10-12 light blue, curved lines that originate from the left edge of the page and sweep downwards and to the right, creating a sense of movement and depth. The lines are of varying lengths and curves, some starting near the top and others further down, all contributing to a modern, abstract design element.