

# EUROPEAN INNOVATION SCOREBOARD 2022





# Key results of the European Innovation Scoreboard 2022

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European Commission*

**Red IDI - Informes SRIP y EIS 2022, 23 November 2022**



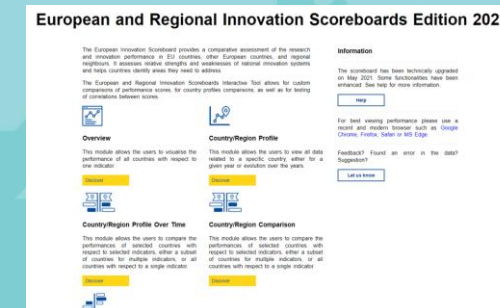
The annual European Innovation Scoreboard (EIS) provides a **comparative assessment** of the **research and innovation performance** of EU Member States and selected third countries.



It helps Member States assess areas in which they need to concentrate their efforts to **boost their innovation performance**.

It also provides an interactive tools for **customised comparison** of performance scores

<https://ec.europa.eu/research-and-innovation/en/statistics/performance-indicators/european-innovation-scoreboard/eis>





# Measurement Framework – EU Countries

4 Main Groups



12 Innovation dimensions



32 Indicators

Updated in 2021 (see Methodology Report)

## FRAMEWORK CONDITIONS

- **Human resources**
  - 1.1.1 New doctorate graduates (in STEM)
  - 1.1.2 Population aged 25-34 with tertiary education
  - 1.1.3 Lifelong learning
- **Attractive research systems**
  - 1.2.1 International scientific co-publications
  - 1.2.2 Top 10% most cited publications
  - 1.2.3 Foreign doctorate students
- **Digitalisation**
  - 1.3.1 Broadband penetration
  - 1.3.2 Individuals who have above basic overall digital skills

## INVESTMENTS

- **Finance and support**
  - 2.1.1 R&D expenditure in the public sector
  - 2.1.2 Venture capital expenditures
  - 2.1.3 Direct government funding and government tax support for business R&D
- **Firm investments**
  - 2.2.1 R&D expenditure in the business sector
  - 2.2.2 Non-R&D innovation expenditures
  - 2.2.3 Innovation expenditures per person employed in innovation-active enterprises
- **Use of information technologies**
  - 2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel
  - 2.3.2 Employed ICT specialists

## INNOVATION ACTIVITIES

- **Innovators**
  - 3.1.1 SMEs with product innovations
  - 3.1.2 SMEs with business process innovations
- **Linkages**
  - 3.2.1 Innovative SMEs collaborating with others
  - 3.2.2 Public-private co-publications
  - 3.2.3 Job-to-job mobility of Human Resources in Science & Technology
- **Intellectual assets**
  - 3.3.1 PCT patent applications
  - 3.3.2 Trademark applications
  - 3.3.3 Design applications

## IMPACTS

- **Employment impacts**
  - 4.1.1 Employment in knowledge-intensive activities
  - 4.1.2 Employment in innovative enterprises
- **Sales impacts**
  - 4.2.1 Medium and high-tech product exports
  - 4.2.2 Knowledge-intensive services exports
  - 4.2.3 Sales of product innovations
- **Environmental sustainability**
  - 4.3.1 Resource productivity
  - 4.3.2 Air emissions by fine particulates PM2.5 in Industry
  - 4.3.3 Development of environment-related technologies



## Methodology

For all 32 **indicators** data are **normalised to the same range** from 0 (worst score) to 1 (best score)

$$x_{norm} = \frac{x - \min(x)}{\max(x) - \min(x)}$$

**Average of 32 normalised indicator** scores is used to measure average innovation performance ( $INDEX_i$ )

$$INDEX_i = \sum x_{norm}$$

Relative to EU performance is calculated as **the ratio of a country's average normalised score** and that of the **EU multiplied by 100** (*Summary Innovation Index - SII<sub>i</sub>*)

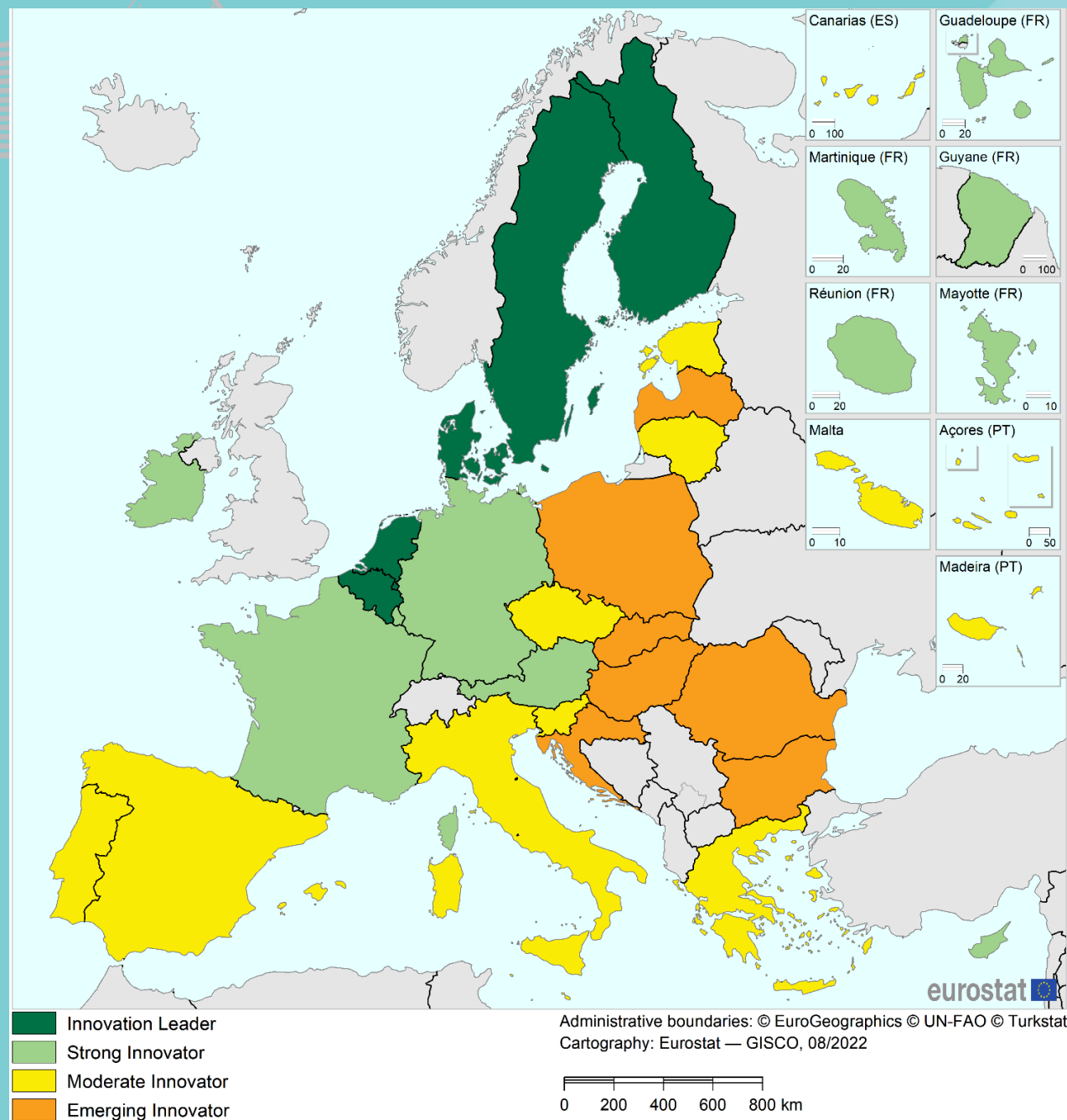
$$SII_i = 100 * \frac{INDEX_i}{INDEX_{EU}}$$

# EIS 2022 map

Four Performance Groups:

- **Innovation Leaders** with performance **above 125%** of EU avg.
- **Strong Innovators** with performance between **100%-125%** of EU avg.
- **Moderate Innovators** with performance between **70%-100%** of EU avg.
- **Emerging Innovators** with performance level **below 70%** of EU avg.

(See EIS 22 Section 3)



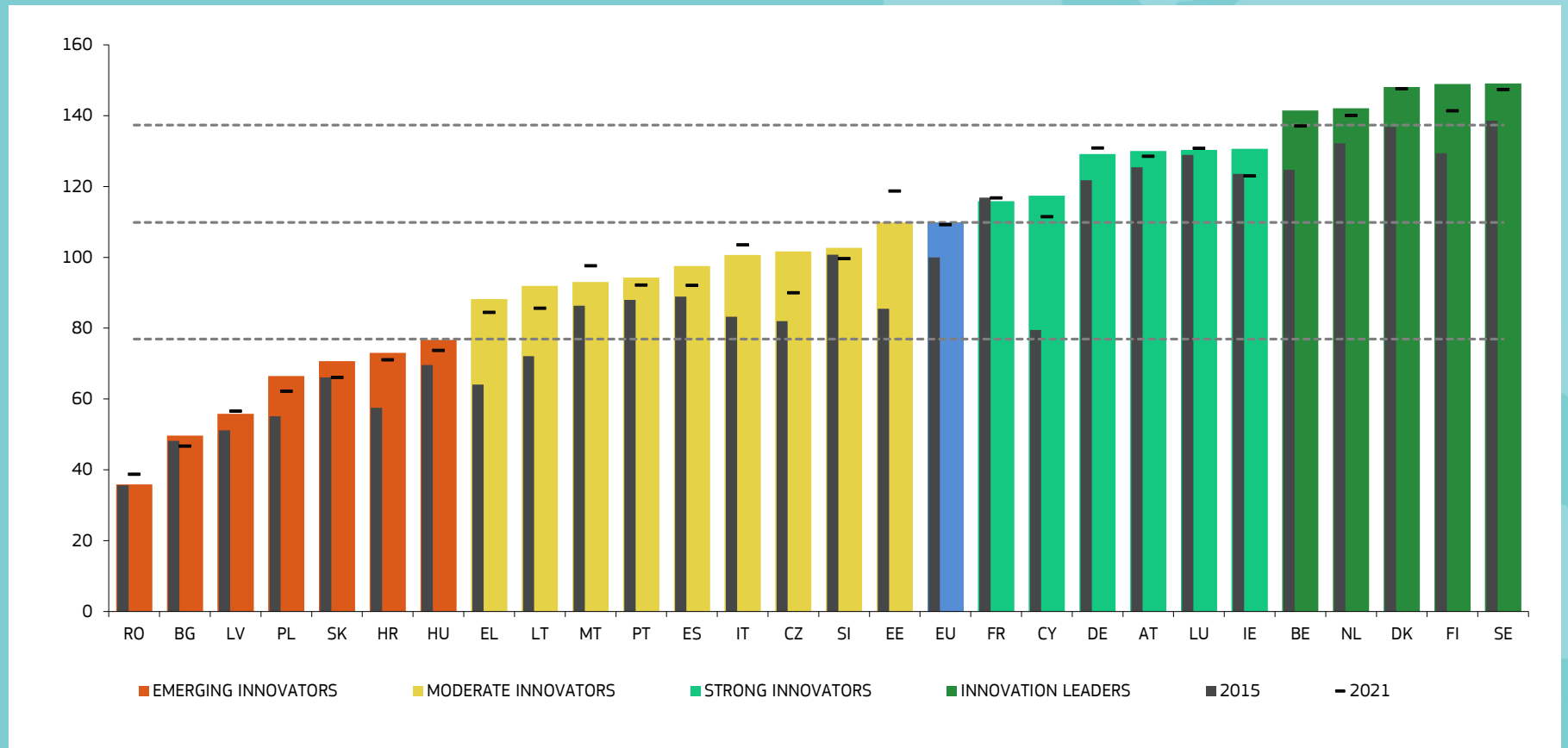


# EIS 2022 ranking (EU)

Countries performance in 2022



Relative to that in 2015 and 2021



(See EIS 22 Executive Summary)



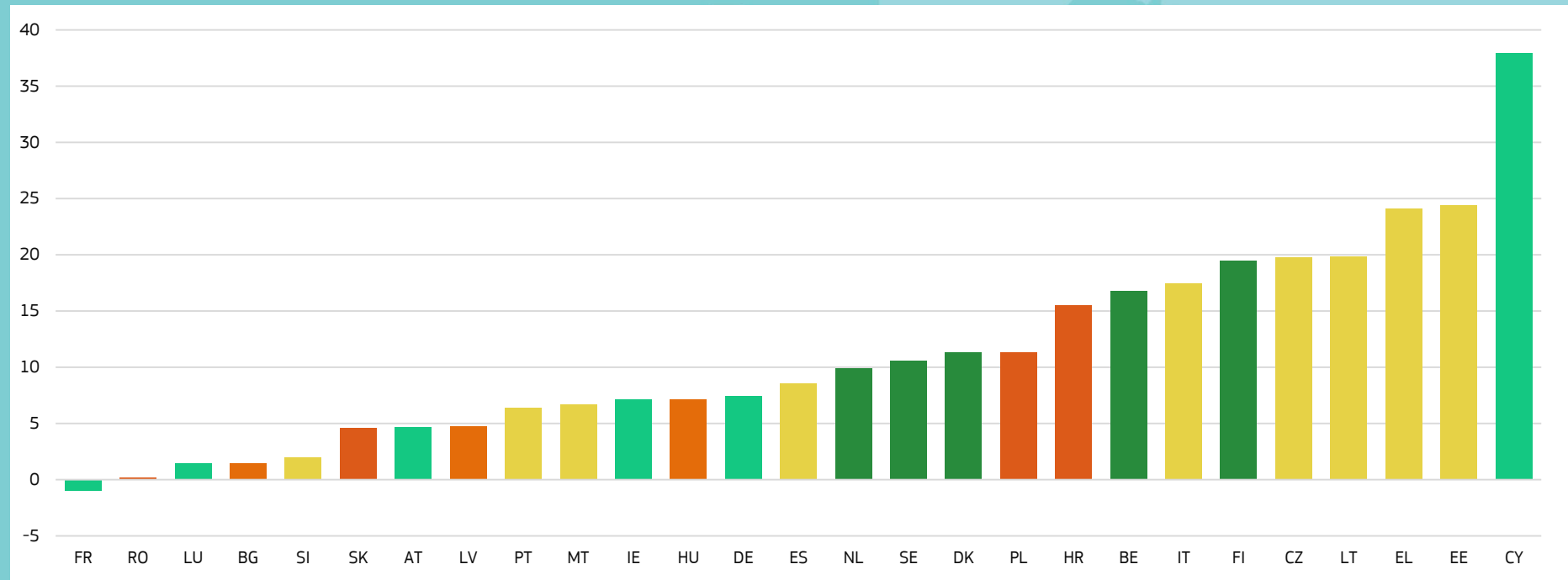
## Performance change over time (2015-2022)

Performance change is measured as the **difference between the 2022 and 2015 scores**



Relative to that of **the EU in 2015**

(See EIS 22 Section 3.3)



Performance change is positive for 26 Member States with **Cyprus** showing the highest performance change



**11 different Member States** are the best performer in one innovation dimension.

**Sweden** is the best performer in two dimensions.

(See EIS 22 Section 4)



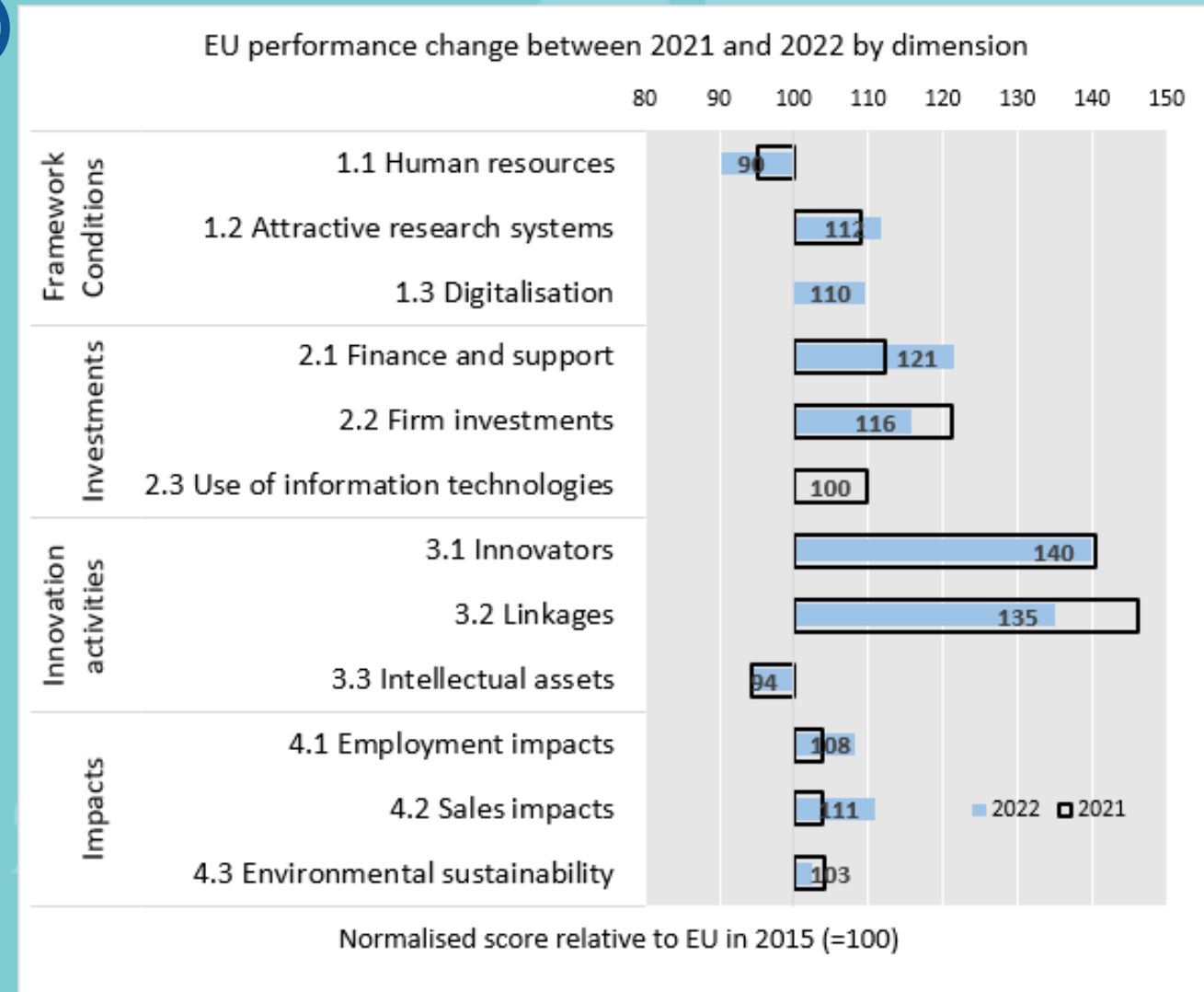


# Performance change (2021-2022) by dimension

Between 2021 and 2022, the EU has **increased performance** in the following dimensions:

- Attractive research systems
- Digitalisation
- Finance and support
- Employment impacts
- Sales impacts

(See EIS 22 Section 3.2)



# EIS 2022 EU + neighbours



Switzerland – Innovation Leader

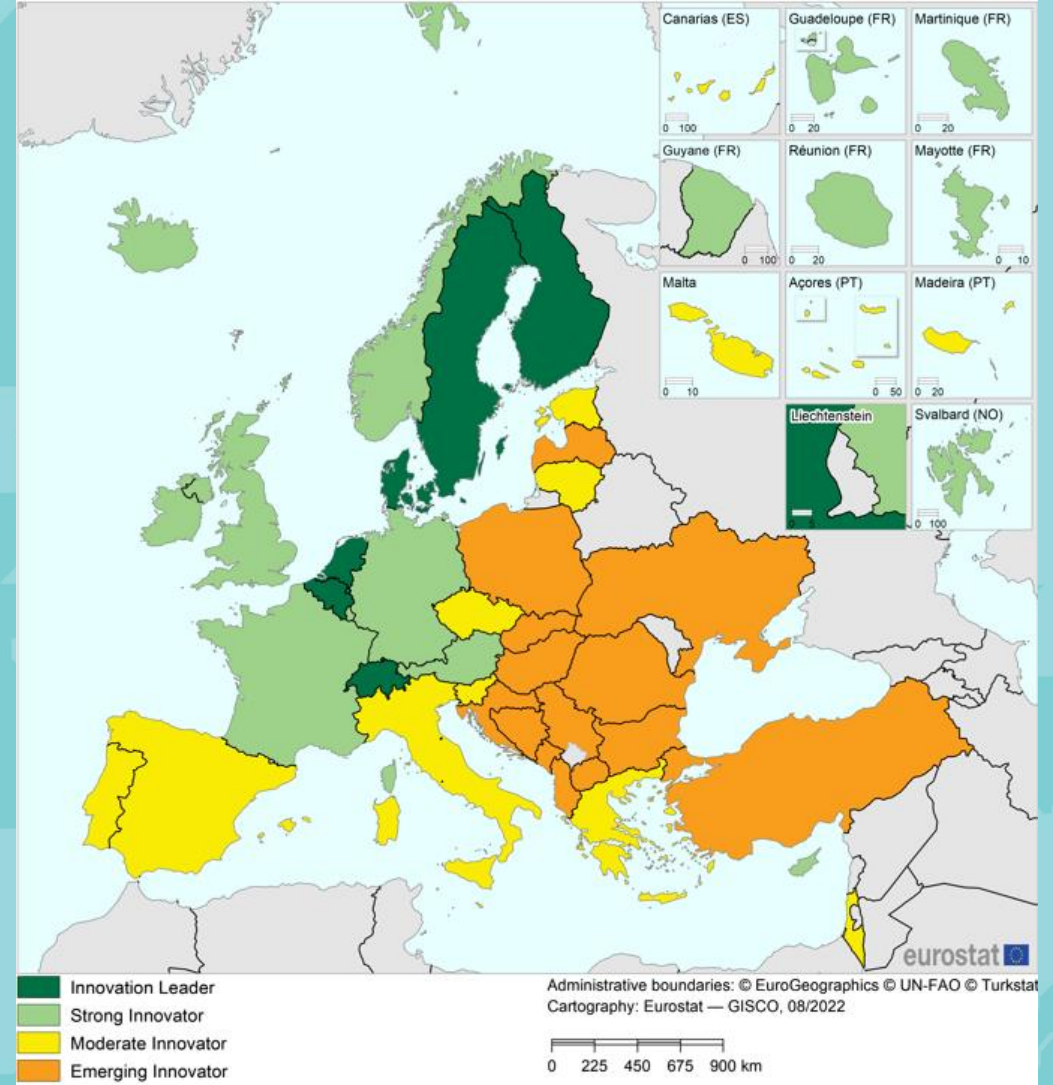
Iceland  
Norway  
United Kingdom

Strong Innovators

Israel – Moderate Innovator

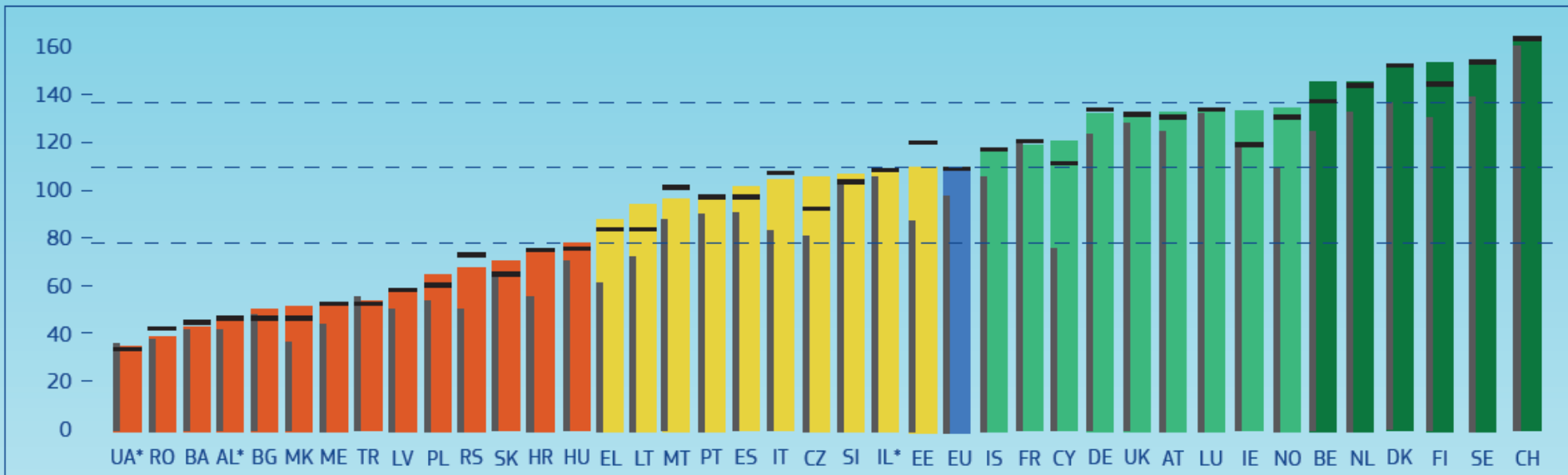
Bosnia and Herzegovina  
Montenegro  
North Macedonia  
Serbia  
Turkey  
Ukraine  
Albania

Emerging innovators



(See EIS 22 Section 5.1)

## Performance of European and neighbouring countries' systems of innovation



Coloured columns show countries' performance in 2022, using the most recent data for 32 indicators, relative to that of the EU in 2015. The horizontal hyphens show performance in 2021, using the next most recent data, relative to that of the EU in 2015. Grey columns show countries' performance in 2015 relative to that of the EU 2015. The dashed lines show the threshold values between the performance groups, where the threshold values of 70%, 100%, and 125% have been adjusted upward to reflect the performance increase of the EU between 2015 and 2022.



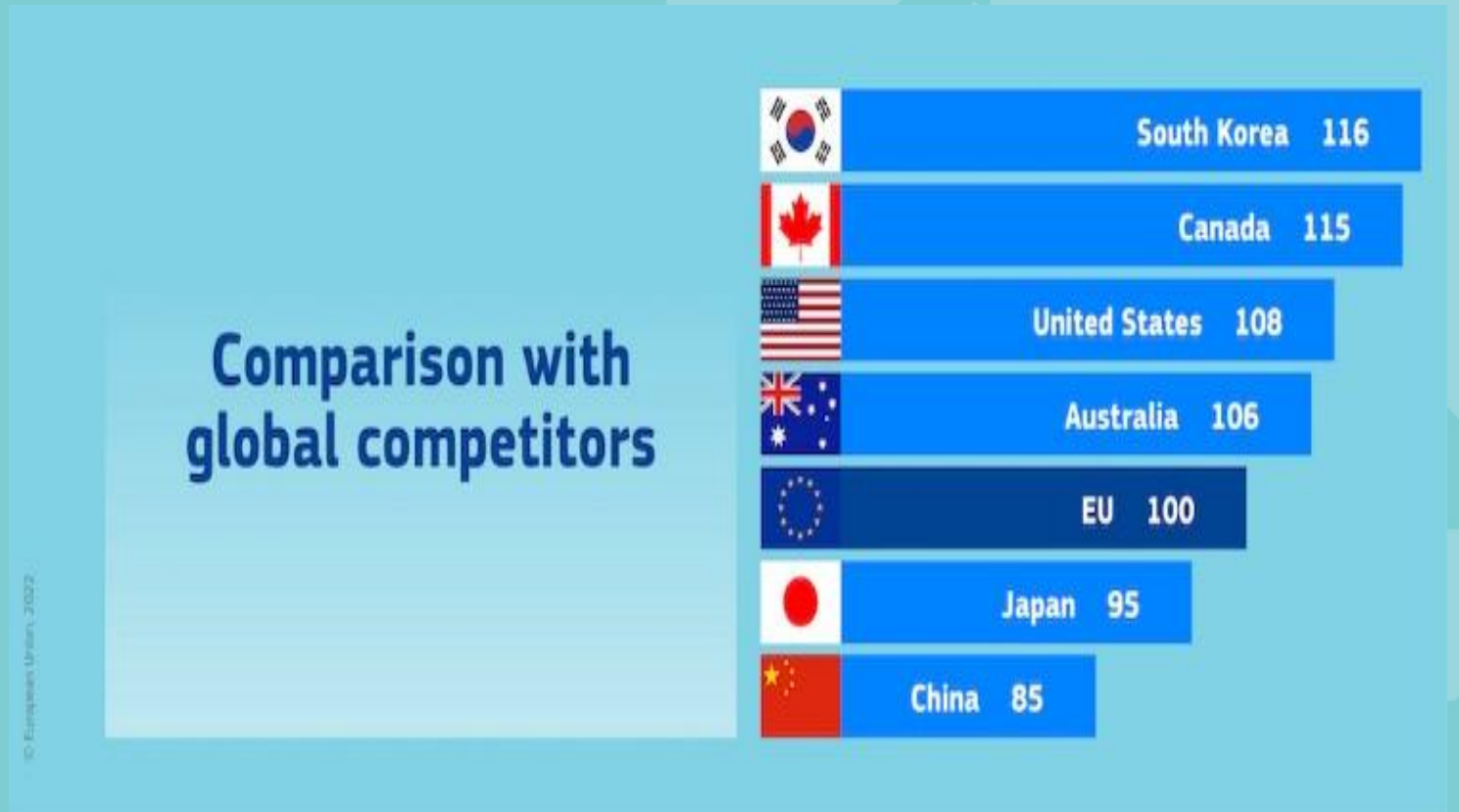
## EIS 2022 international benchmarking

The EU is **performing less well than:**

- Republic of Korea
- Canada
- United States
- Australia

The EU is **outperforming:**

- Japan
- South Africa
- China
- Mexico
- Brazil
- India
- Chile

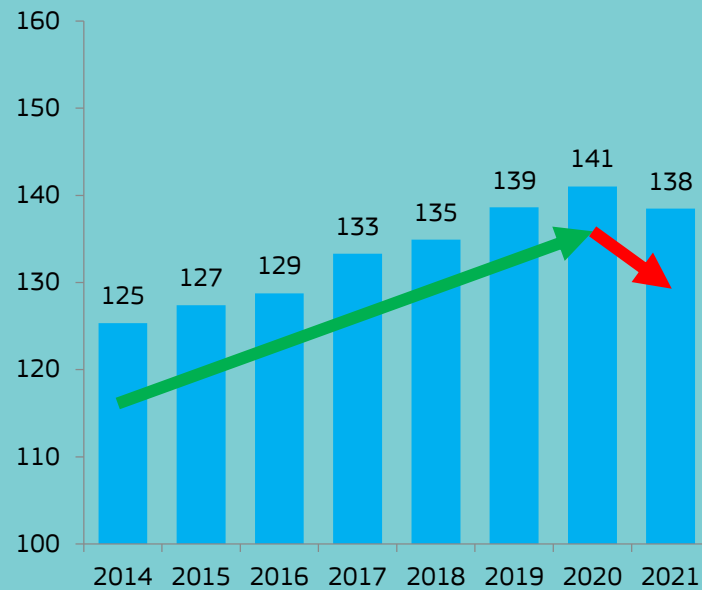


(See EIS 22 Section 5.2)

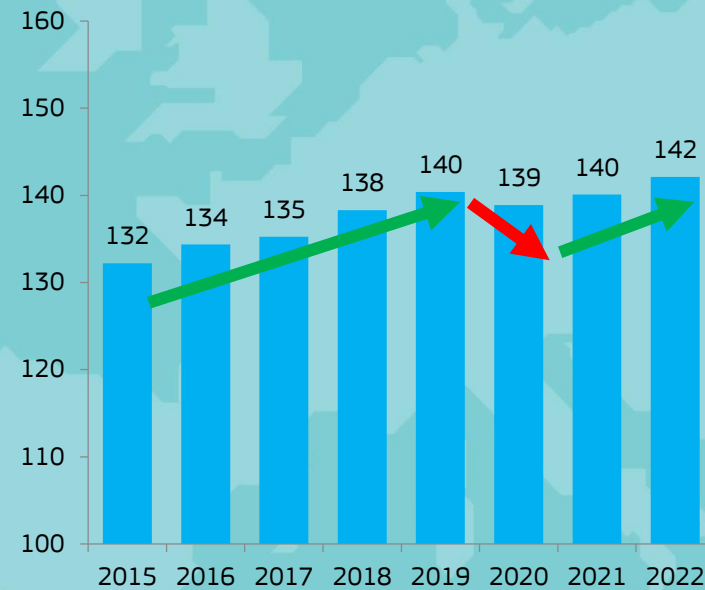


# Results of different reports are not comparable:

## EIS 2021



## EIS 2022





## Normalisation: different MIN MAX values

- Normalised values can change, even if the indicator score remains constant:

$$\text{Normalised score} = \frac{(\text{Value} - \text{MIN})}{(\text{MAX} - \text{MIN})}$$

Value	MAX	MIN	Normalised	
0.450	0.600	0.200	0.625	
0.450	0.605	0.200	0.617	Normalized score declines because MAX goes up
0.450	0.605	0.205	0.613	Normalized score declines because MIN goes up



# European Innovation Scoreboard 2022



Spain's performance in the EIS 2022





88.8



Change over time: 8.6

89.7 Moderate Innovators

Spain	Performance relative to EU in 2022	Performance change 2015-2022	Performance change 2021-2022
<b>SUMMARY INNOVATION INDEX</b>	<b>88.8</b>	<b>8.6</b>	<b>5.5</b>
<b>Human resources</b>	<b>127.6</b>	<b>0.0</b>	<b>0.0</b>
Doctorate graduates	100.0	0.0	0.0
Population with tertiary education	145.9	0.0	0.0
Lifelong learning	140.0	0.0	0.0
<b>Attractive research systems</b>	<b>96.6</b>	<b>15.0</b>	<b>5.3</b>
International scientific co-publications	93.4	50.3	13.8
Most cited publications	92.5	-2.4	1.0
Foreign doctorate students	108.5	20.5	6.9
<b>Digitalisation</b>	<b>149.8</b>	<b>12.7</b>	<b>12.7</b>
Broadband penetration	146.2	24.2	24.2
People with above basic overall digital skills	154.5	0.0	0.0
<b>Finance and support</b>	<b>74.5</b>	<b>7.7</b>	<b>6.3</b>
R&D expenditures in the public sector	75.8	3.2	12.9
Venture capital expenditures	99.6	49.6	18.0
Government support for business R&D	38.8	-29.4	-14.6
<b>Firm investments</b>	<b>62.4</b>	<b>16.5</b>	<b>6.0</b>
R&D expenditure in the business sector	49.3	7.8	6.2
Non-R&D Innovation expenditures	81.3	18.4	-2.6
Innovation expenditures per employee	58.7	22.9	14.5
<b>Use of information technologies</b>	<b>91.3</b>	<b>-6.5</b>	<b>-6.5</b>
Enterprises providing ICT training	100.0	-12.5	-12.5
Employed ICT specialists	81.8	0.0	0.0
<b>Innovators</b>	<b>50.1</b>	<b>19.4</b>	<b>20.6</b>
Product innovators (SMEs)	59.6	42.3	22.9
Business process innovators (SMEs)	41.8	-4.9	18.1
<b>Linkages</b>	<b>88.5</b>	<b>39.8</b>	<b>-6.7</b>
Innovative SMEs collaborating with others	57.0	7.5	3.6
Public-private co-publications	114.7	60.9	18.2
Job-to-job mobility of HRST	102.1	58.8	-26.5
<b>Intellectual assets</b>	<b>78.1</b>	<b>-4.1</b>	<b>1.0</b>
PCT patent applications	64.2	-4.7	2.0
Trademark applications	109.8	7.7	3.0
Design applications	63.8	-12.4	-1.7
<b>Employment impacts</b>	<b>58.8</b>	<b>-5.9</b>	<b>5.6</b>
Employment in knowledge-intensive activities	81.8	0.0	0.0
Employment in innovative enterprises	40.5	-11.3	10.7
<b>Sales impacts</b>	<b>96.6</b>	<b>29.1</b>	<b>26.6</b>
Medium and high-tech goods exports	71.9	-3.3	-5.1
Knowledge-intensive services exports	63.9	46.9	42.8
Sales of innovative products	169.2	50.8	49.3
<b>Environmental sustainability</b>	<b>102.4</b>	<b>-10.6</b>	<b>-9.3</b>
Resource productivity	136.6	0.1	-19.3
Air emissions by fine particulate matter	92.5	5.9	-1.3
Environment-related technologies	83.5	-37.6	-12.2

The second column shows performance relative to that of the EU in 2022. Colours next to the column show matching colour codes: dark green: above 125% of the performance of the EU in 2022; light green: between 100% and 125%; yellow: between 70% and 100%; orange: below 70%. Normalised performance uses the data after a possible imputation of missing data and transformation of the data. The next columns show performance change over time between 2015 and 2022 and between 2021 and 2022, with scores relative to those of the EU in 2015. Positive performance changes are shown in green, negative performance changes in red.

**SPAIN** is a **Moderate Innovator** with performance at 88.8% of the EU average. Performance is below the average of the Moderate Innovators (89.7%). Performance is increasing (8.6%-points) at a rate lower than that of the EU (9.9%-points). The country's performance gap to the EU is becoming larger.

### Relative strengths

- Sales of innovative products
- People with above basic overall digital skills
- Broadband penetration
- Population with tertiary education
- Lifelong learning

### Relative weaknesses

- Government support for business R&D
- Employment in innovative enterprises
- Business process innovators
- R&D expenditure in the business sector
- Innovative SMEs collaborating with others

### Strong increases since 2015

- Public-private co-publications
- Job-to-job mobility of HRST
- Sales of innovative products

### Strong decreases since 2015

- Environment-related technologies
- Government support for business R&D
- Enterprises providing ICT training

### Strong increases since 2021

- Sales of innovative products
- Knowledge-intensive services exports
- Broadband penetration

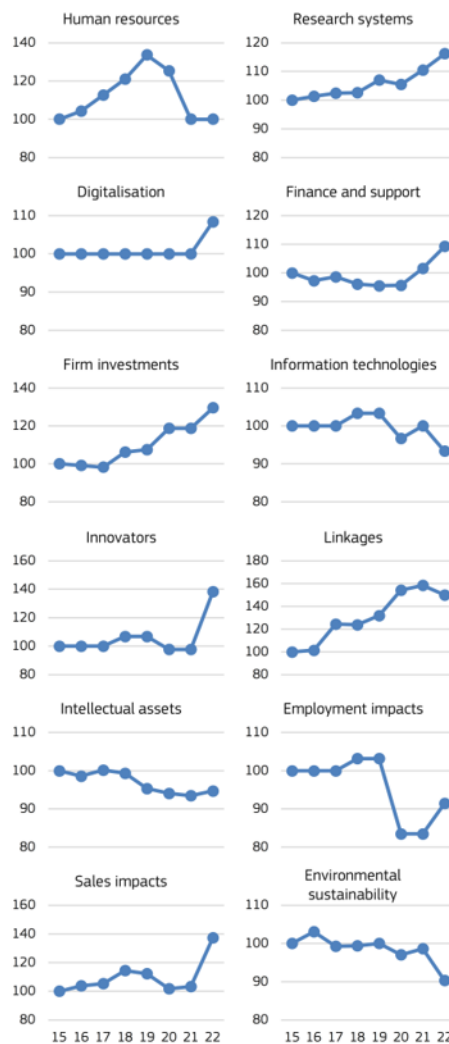
### Strong decreases since 2021

- Job-to-job mobility of HRST
- Resource productivity
- Government support for business R&D



The graph on the left shows the evolution of **innovation performance over time** against the performance of the country in 2015. Innovation performance increased between 2015 and 2019 and declined in 2020 and 2021. Performance increased more strongly in 2022 contributing to an overall increase of 10% over time.

The graphs below show the evolution of innovation performance in the different **innovation dimensions** against the performance of the country in 2015. Performance increased strongly for Innovators, Linkages and Sales impacts. Performance did not change for Human resources and declined for Information technologies, Intellectual assets, Employment impacts and Environmental sustainability.



### Structural differences with the EU are shown below:

- Spain has lower per capita income and a slower growing economy. Business services takes up a larger share of the economy, with SMEs accounting for a larger share of turnover.
- Enterprise births and FDI net inflows add positively to the innovation climate, entrepreneurial activities and top R&D spenders add negatively.
- Spain has a much higher share of non-innovators with potential to innovate, and a below average share of in-house product innovators with and without market novelties.
- It is more difficult to start a new business. Entrepreneurial training and government procurement are at par with the EU as drivers of research and innovation.
- Spain shows a below average performance on Climate change related indicators, particularly on the circular material use rate.

	ES	EU
<b>Performance and structure of the economy</b>		
GDP per capita (PPS)	26,900	31,200
Average annual GDP growth (%)	-3.4	-0.4
Employment share Manufacturing (NACE C) (%)	12.5	16.4
of which High and Medium high-tech (%)	32.0	38.0
Employment share Services (NACE G-N) (%)	48.2	41.1
of which Knowledge-intensive services (%)	32.1	35.8
Turnover share SMEs (%)	37.0	34.8
Turnover share large enterprises (%)	42.3	48.2
Foreign-controlled enterprises – share of value added (%)	10.1	11.7
<b>Business and entrepreneurship</b>		
Enterprise births (10+ employees) (%)	1.4	1.0
Total Entrepreneurial Activity (TEA) (%)	5.6	7.3
FDI net inflows (% GDP)	2.8	1.0
Top R&D spending enterprises per 10 mln. population	5.0	18.3
Buyer sophistication (1 to 7 best)	3.5	3.7
<b>Innovation profiles</b>		
In-house product innovators with market novelties	6.2	10.7
In-house product innovators without market novelties	7.1	12.3
In-house business process innovators	10.6	11.0
Innovators that do not develop innovations themselves	3.5	11.6
Innovation active non-innovators	2.8	3.3
Non-innovators with potential to innovate	43.2	19.9
Non-innovators without disposition to innovate	26.6	31.3
<b>Governance and policy framework</b>		
Ease of starting a business (0 to 100 best)	77.8	76.5
Basic school entrepreneurial education and training	3.3	3.5
Govt. procurement of advanced tech. products	3.2	3.5
Rule of law (-2.5 to 2.5 best)	1.0	1.1
<b>Climate change indicators</b>		
Circular material use rate	4.3	12.2
Greenhouse gas emissions intensity of energy consumption	79.7	82.8
Eco-Innovation Index	95.9	100.0
<b>Demography</b>		
Population size	47.2	447.0
Average annual population growth (%)	0.5	0.1
Population density	93.2	108.8

Performance is measured relative to that of the country in 2015 (=100).



# 1. Key results

- **SPAIN** is a **Moderate Innovator** with performance at 88.8% of the EU average.
- Performance is below the average of the Moderate Innovators (89.7%).
- Performance is increasing (8.6%-points) at a rate lower than that of the EU (9.9%-points).



## 2. Relative strengths and weaknesses

### Relative strengths

- Sales of innovative products
- People with above basic overall digital skills
- Broadband penetration
- Population with tertiary education
- Lifelong learning

### Relative weaknesses

- Government support for business R&D
- Employment in innovative enterprises
- Business process innovators
- R&D expenditure in the business sector
- Innovative SMEs collaborating with others



## 3. Performance over time

### **Strong increases since 2015**

- Public-private co-publications
- Job-to-job mobility of HRST
- Sales of innovative products

### **Strong decreases since 2015**

- Environment-related technologies
- Government support for business R&D
- Enterprises providing ICT training

### **Strong increases since 2021**

- Sales of innovative products
- Knowledge-intensive services exports
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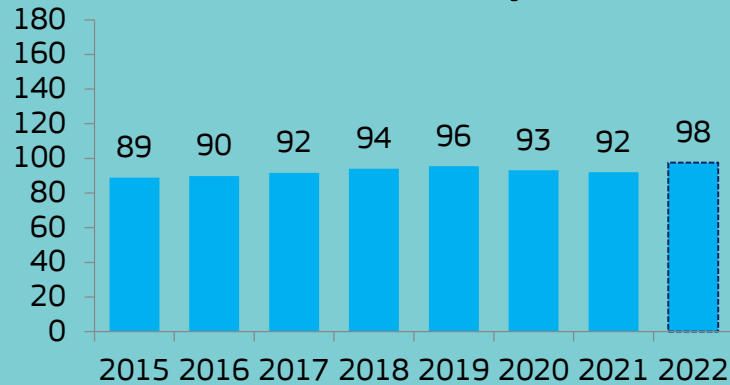
### **Strong decreases since 2021**

- Job-to-job mobility of HRST
- Resource productivity
- Government support for business R&D

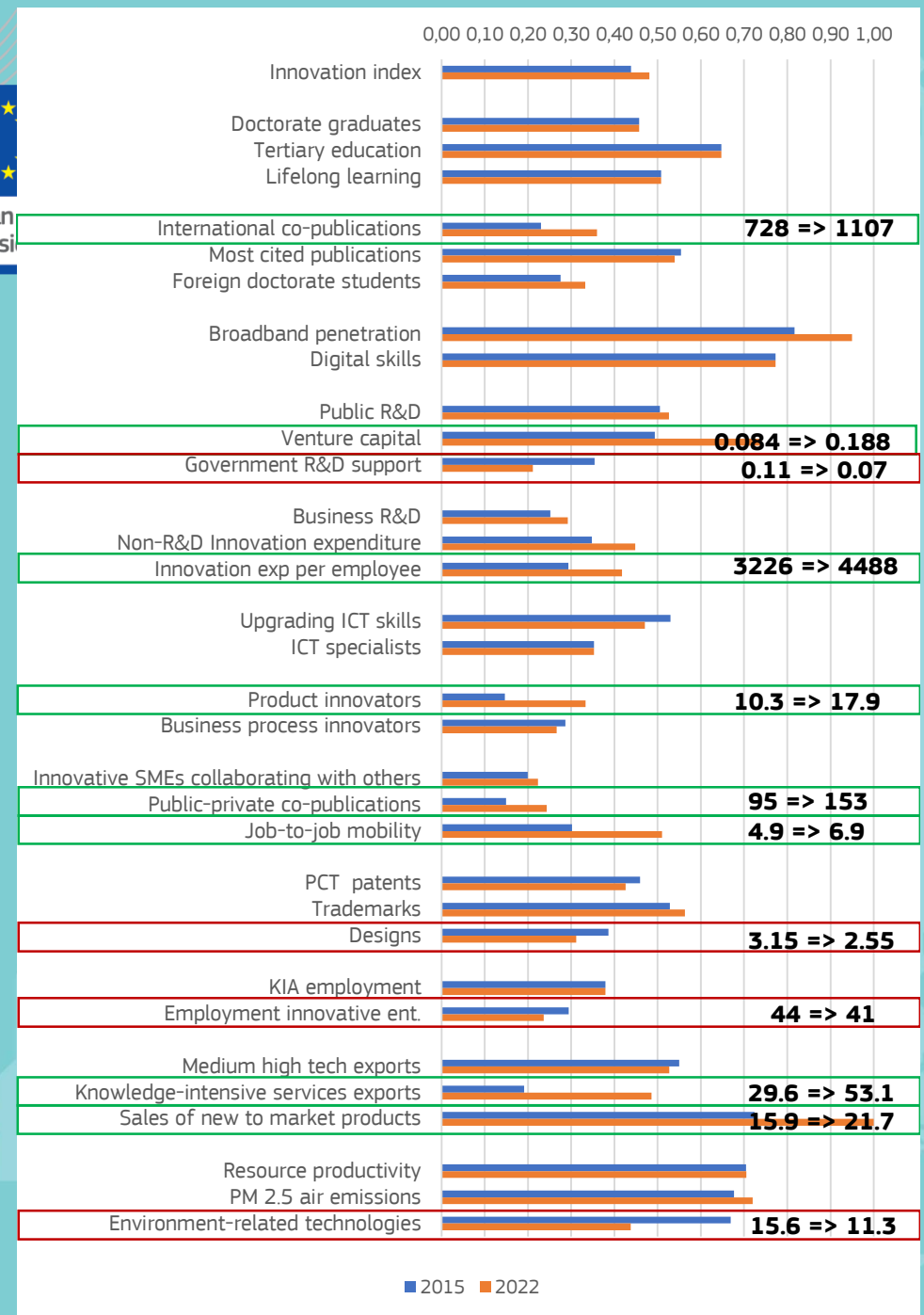
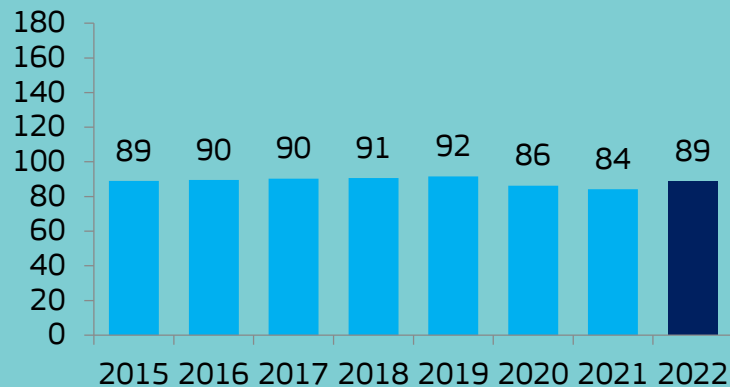
# Performance over time



## Relative to EU in 2015 (same base year)



## Relative to EU in same year





## EIS related studies, Gender Dimension

The objective of the analysis is to explore how the gender dimension can be Introduced in the current EIS/RIS framework conceptually and with the use of existing/new indicators.

### Timeline of the key activities



In depth literature review June-August 2022



Expert Workshop 28<sup>th</sup> Sept. 2022



Finalisation of the technical note October 2022

- a) *highlight the linkages between gender and innovation,*
- b) *pinpoint any gaps in measurements, and potential areas to be further analysed.*
- c) *identify new and existing indicators that could capture the gender dimension of innovation*



# EIS related studies, European Start-up Scoreboard

## Study Steps

#1

### Mapping Definitions

Single set of international operational definitions regarding the start-up ecosystem.

#2

### Assessing EU Performance

Analysis of existing reports that assess the EU's start-up performance based on quantitative and qualitative evidence.

#3

### Start-up Innovation Scoreboard

Provide a comparative assessment of the main elements or indicators that can compose the Scoreboard of the start-up ecosystem.

#4

### Synergies with the EIS 21

Synergies will be identified between the proposed indicators and the EIS 21 framework. From this, a couple of indicators will be presented as fitted to integrate future EIS.

**Final report**



**January 2023**



# EIS Interactive Tool

## European and Regional Innovation Scoreboards Edition 2022

The European Innovation Scoreboard provides a comparative assessment of the research and innovation performance in EU countries, other European countries, and regional neighbours. It assesses relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address.

The European and Regional Innovation Scoreboards Interactive Tool allows for custom comparisons of performance scores, for country profiles comparisons, as well as for testing of correlations between scores.



### Overview

This module allows the users to visualise the performance of all countries with respect to one indicator.

Discover



### Country/Region Profile

This module allows the users to view all data related to a specific country, either for a given year or evolution over the years.

Discover



### Country/Region Profile Over Time

This module allows the users to compare the performances of selected countries with respect to selected indicators, either a subset of countries for multiple indicators, or all countries with respect to a single indicator.

Discover



### Country/Region Comparison

This module allows the users to compare the performances of selected countries with respect to selected indicators, either a subset of countries for multiple indicators, or all countries with respect to a single indicator.

Discover

### Information

The scoreboard has been technically upgraded on May 2021. Some functionalities have been enhanced. See help for more information.

Help

For best viewing performance please use a recent and modern browser such as [Google Chrome](#), [Firefox](#), [Safari](#) or [MS Edge](#).

Feedback? Found an error in the data? Suggestion?

Let us know





**Thank you!**