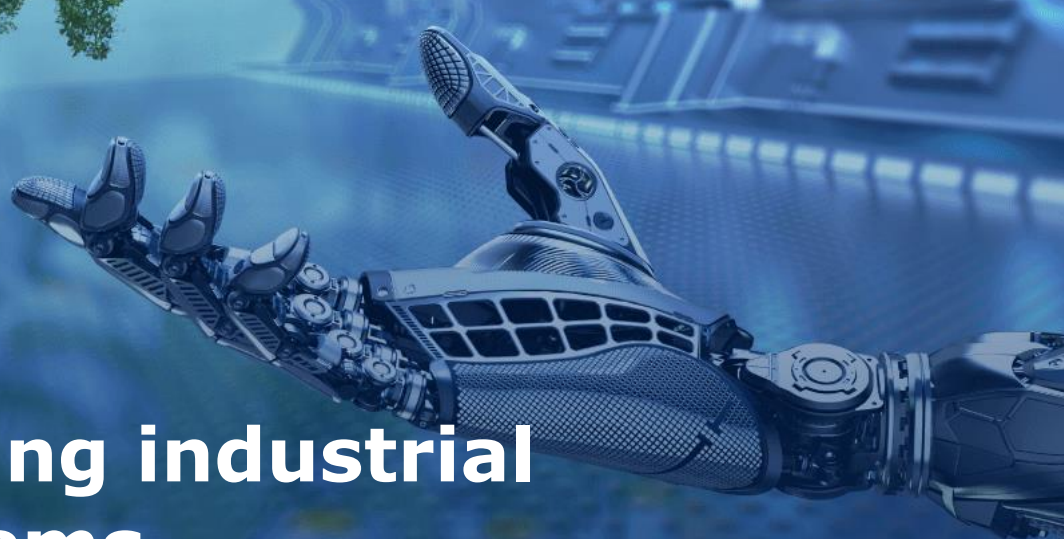




European  
Commission



# Monitoring industrial ecosystems

EU MEMBER STATES FACT SHEETS

Slovenia

## EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs  
Directorate D – Networks & Governance  
Unit GROW.D.2 – Industrial Forum, Alliances, Clusters

European Innovation Council and SMEs Executive Agency (EISMEA)  
Unit I.02 – SMP/COSME Pillar  
E-mail: EISMEA-SMP-COSME-ECOSYSTEMS@ec.europa.eu

*European Commission  
B-1049 Brussels*

## LEGAL NOTICE

This document has been prepared for the European Commission however it reflects the views only of the authors, and the European Commission is not liable for any consequence stemming from the reuse of this publication. More information on the European Union is available on the Internet (<http://www.europa.eu>).

PDF	ISBN: 978-92-9469-740-0	doi: 10.2826/672218	EA-06-24-014-EN-N
-----	-------------------------	---------------------	-------------------

Luxembourg: Publications Office of the European Union, 2024  
© European Union, 2024



The reuse policy of European Commission documents is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under a Creative Commons Attribution 4.0 International (CC-BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated.

For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders.

# TABLE OF CONTENTS

<b>Key Highlights .....</b>	<b>4</b>
<b>1. Introduction .....</b>	<b>5</b>
<b>2. Advanced technologies fostering the green and digital transition of industrial ecosystems.....</b>	<b>6</b>
2.1. Data sources .....	6
2.2. Technology development in industrial ecosystems .....	7
2.3. Green transformation .....	8
2.4. Digital transformation.....	9

## TABLE OF FIGURES

Figure 1: Country share and world share (expressed in terms of ranking) in patent applications in industrial ecosystems related technologies .....	7
Figure 2: Trade balance in relation to overall trade volume ((exp - imp)/(exp+imp)) (2020) .....	7
Figure 3: Private equity and venture capital investment into tech companies related to industrial ecosystems in Slovenia .....	8
Figure 4: Country specialisation and world share (expressed in terms of ranking) in patent applications of Slovenia .....	8
Figure 5: Trends over time in Slovenia's share in world patent applications.....	9
Figure 6: Production of advanced technology-based products in Slovenia .....	9
Figure 7: Country share and world share (expressed in terms of ranking) in digital technology related patent applications of Slovenia .....	10
Figure 8: Trends over time in Slovenia's share of world patent applications .....	10
Figure 9: Production of advanced technology-based products in Slovenia .....	11

# Key Highlights

This country report has been developed as part of the 'European Monitor of Industrial Ecosystems' project of the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs and the European Innovation Council and SMEs Executive Agency. It provides data insights into the twin transition and the technological performance of industrial ecosystems. The key findings of the report are summarised below:

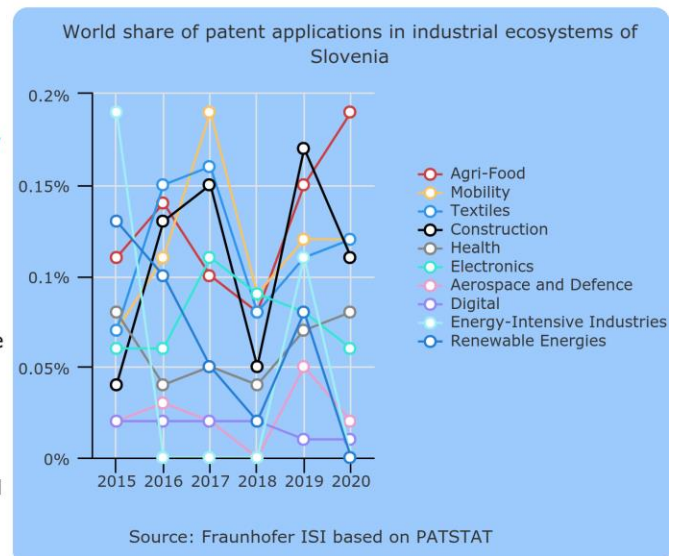


## Technological performance in industrial ecosystems:

- Regarding technology development, Slovenia had the highest share of its country patent applications in the Agri-Food, Health and Electronics industrial ecosystems. In a global comparison, it had relative advantage in technologies related to **Agri-Food**, followed by **Mobility**.

## Digital and green transition technologies:

- In the field of green technologies, Slovenia has been the most specialised in generating technologies related to **Advanced Materials and Biotechnology**, which have the potential to drive the green transformation of its industries.
- Trends over time shows that Slovenia's global share in most fields followed an oscillating trend, and overall it decreased from 2019 to 2020 for the majority of green technologies.
- Among the digital technologies, Slovenia has been the most specialised in **Micro- and Nanoelectronics and Photonics**.
- Trends over time indicate a downward trend in the world share of Slovenia in most of the digital technologies and in particular a sharp drop in the field of the Internet of Things from 2010 to 2020.



## Capacity to produce goods based on digital and green technologies:

- The Slovenian share of production of digital technologies was highest in the field of **Micro- and Nanoelectronics and Advanced Manufacturing**. Trends over the period from 2010 to 2021 show however a downward trend. Some of the fields that had a relative recent increase include AI and Big Data.
- Slovenia had the highest share of production in green technologies in particular in **Energy Saving Technologies**. Its global share increased from 2020 to 2021.



# 1. Introduction

This country report has been prepared within the '**European Monitor of Industrial Ecosystems**' (EMI) project, initiated by the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs and the European Innovation Council and SMEs Executive Agency (EISMEA). The overall goal of the project is to **analyse the green and digital transformation of industrial ecosystems**.

The EU's updated industrial strategy from May 2021<sup>1</sup> has outlined 14 industrial ecosystems that are in the focus of the project. The 14 industrial ecosystems include *aerospace and defence, agri-food, construction, cultural and creative industries, digital, electronics, energy intensive industries, energy-renewables, health, mobility – transport – automotive, proximity, social economy and civil security, retail, textile and tourism*. The industrial strategy defined industrial ecosystems as encompassing all players operating in a value chain: from the smallest startups to the largest companies, from academia to research, service providers to suppliers<sup>2</sup>.

The objective of this report is to **present key findings from data** collected within the framework of this project at country level notably on **patent applications, production data, trade** (available only for ten industrial ecosystems), **private equity and venture capital** investments. Nonetheless, this report does not aim to be comprehensive; the data presented here only complement other important statistics on technology development in each country.

The monitoring framework has a technological focus. Industrial transition is driven by technological, economic, and social changes, and in particular by digital technologies and the shift to a green and circular economy. The green and digital technologies that have been taken into account are presented in the table below.

*Table 1: Technologies monitored in the project by patent, trade and prodcom data*

Green technologies	Digital technologies
Advanced Materials and Nanotechnology	Advanced Manufacturing & Robotics
Biotechnology (for sustainability)	Advanced Manufacturing
Energy Saving Technologies	Robotics
Renewable Energy Technologies	Artificial Intelligence
Solar Power	Big Data
Wind Power	Digital Security & Networks/ Cybersecurity
other (geothermal, hydropower, biomass)	Digital Technology for Mobility
	Internet of Things
	Micro- and Nanoelectronics & Photonics
	Micro- and Nanoelectronics
	Photonics

*Source: Technopolis Group, IDEA Consult and Fraunhofer ISI*

The methodological report that sets the conceptual basis and explains the technical details of each indicator is available on the [EMI website](#). This report was prepared by Kincső Izsak, Technopolis Group for the European Commission. However, it does not necessarily reflect the views of the European Commission.

<sup>1</sup> European Commission (2021). Communication on Updating the 2020 New Industrial Strategy, COM(2021)350 final [https://commission.europa.eu/system/files/2021-05/communication-industrial-strategy-update-2020\\_en.pdf](https://commission.europa.eu/system/files/2021-05/communication-industrial-strategy-update-2020_en.pdf)

<sup>2</sup> European Commission (2020). A New Industrial Strategy for Europe, COM/2020/102 final [Commission Communication: A New Industrial Strategy for Europe | European Commission \(europa.eu\)](#)

## 2. Advanced technologies fostering the green and digital transition of industrial ecosystems

### 2.1. Data sources

This chapter outlines a set of indicators that capture the capacities of EU Member States to generate technologies that foster the green and digital transformation of industrial ecosystems. Industries that are underpinned by a strong technology basis and supported by vibrant entrepreneurial communities have better conditions for success. The production of technology-based products indicates that technologies are commercialised, while a positive trade balance in technologies is a sign of international competitiveness.

**Patent analysis** is a widely used method for tracking technological development activities. With a view to industrial ecosystems under study in this project, technology generation and hence patenting takes place in a relatively limited number of ecosystems, while others mainly profit from technologies generated elsewhere. Technology development drives industrial transformation in a general way. The patent analysis is based on transnational patents, notably those filed through the WIPO PCT procedure<sup>3</sup> or at the European Patent Office<sup>4</sup> directly. They have been localised based on the address of the applicant. The different advanced technologies have been identified based on International Patent Classification (IPC) codes and keyword searches.

**Trade data**, more specifically export data, is a further relevant indicator to document industrial development at higher technology readiness levels. It informs on countries' competitive advantage in specific technology-based product areas. While somewhat simplistic, export strengths in certain technological areas still mark a specific relevance of technology relevant goods for the economy and remain among the reliable indicators of performance. The analysis focuses on trade balances based on UN Comtrade<sup>5</sup> statistics processed specifically for the purposes of this project. The trade balance can help reveal how nations are intricately involved in supply chains with substantial imports and relevant exports. By putting exports in relation to parallel imports, it is possible to assess whether a country displays strength in production.

**Prodcom data**<sup>6</sup> allows the monitoring of technology diffusion. Prodcom provides statistics on the production of manufactured goods carried out by enterprises on the national territory of the reporting countries. It helps measuring the uptake of technology through the production of manufactured goods by focusing on the specific components and elements enabled by green and digital technologies. Production data allows to measure to what extent technology-related products are being produced in the country. The production indicators are calculated based on product-level data from the Eurostat's Prodcom database.

**Crunchbase data**<sup>7</sup> were used to analyse entrepreneurial dynamics and private equity and venture capital investment. Crunchbase is a widely trusted source of information on venture capital backed innovative companies. Technology startups represent key building blocks in the transition towards a more digital, green and resilient economic model. Entrepreneurial activity helps accelerate the diffusion of technologies in industrial ecosystems and startups that provide green and digital solutions are relevant indicators of how the industrial ecosystem is transforming itself to reach environmental sustainability objectives. More information about these data sources can be found in the methodological report of the project.

---

<sup>3</sup> World Intellectual Property Organization, WIPO Patent Cooperation Treaty (PCT) <https://www.wipo.int/pct/en/>

<sup>4</sup> European Patent Office, Supporting Innovation and Patents in Europe <https://www.epo.org/en>

<sup>5</sup> United Nations Comtrade, UN Comtrade Plus-International Trade Data Platform <https://comtradeplus.un.org/>

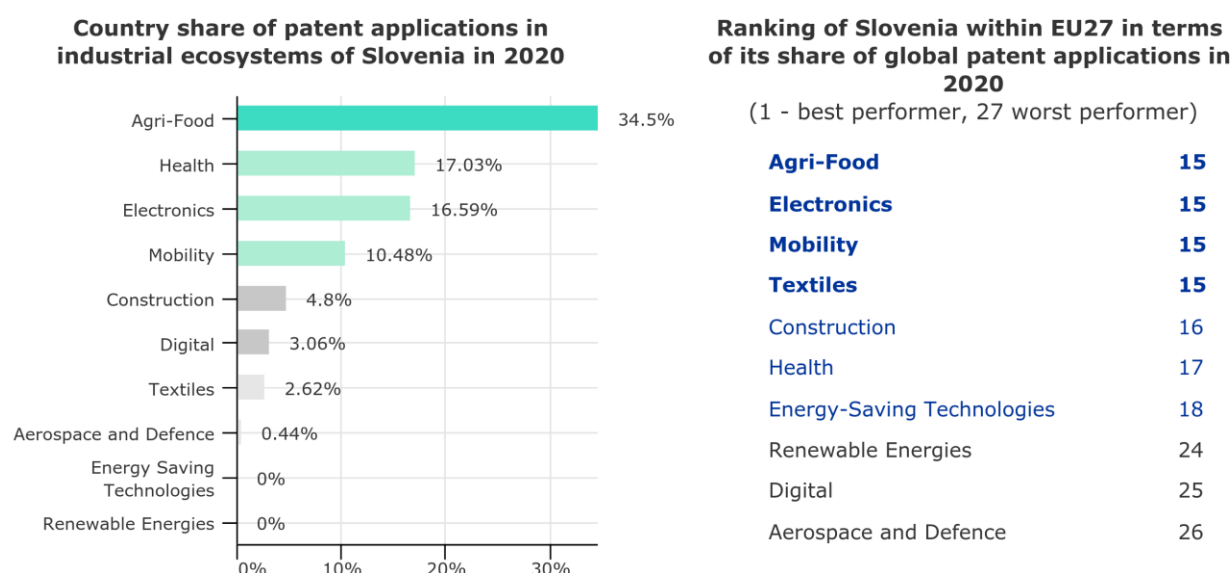
<sup>6</sup> Eurostat, Eurostat PRODCOM-European Union Production and Trade Statistics <https://ec.europa.eu/eurostat/web/prodcom>

<sup>7</sup> Crunchbase, Business Information and Networking Platform <https://www.crunchbase.com/>

## 2.2. Technology development in industrial ecosystems

Regarding technology development, Slovenia has been the most specialised in generating technologies related to the Agri-Food, Health and Electronics industrial ecosystems in 2020. Slovenia ranked relatively well in Agri-Food, Electronics Mobility and Textiles within the EU27 countries, but it occupied the last positions in technology development related to the Digital and the Aerospace and Defence industrial ecosystems.

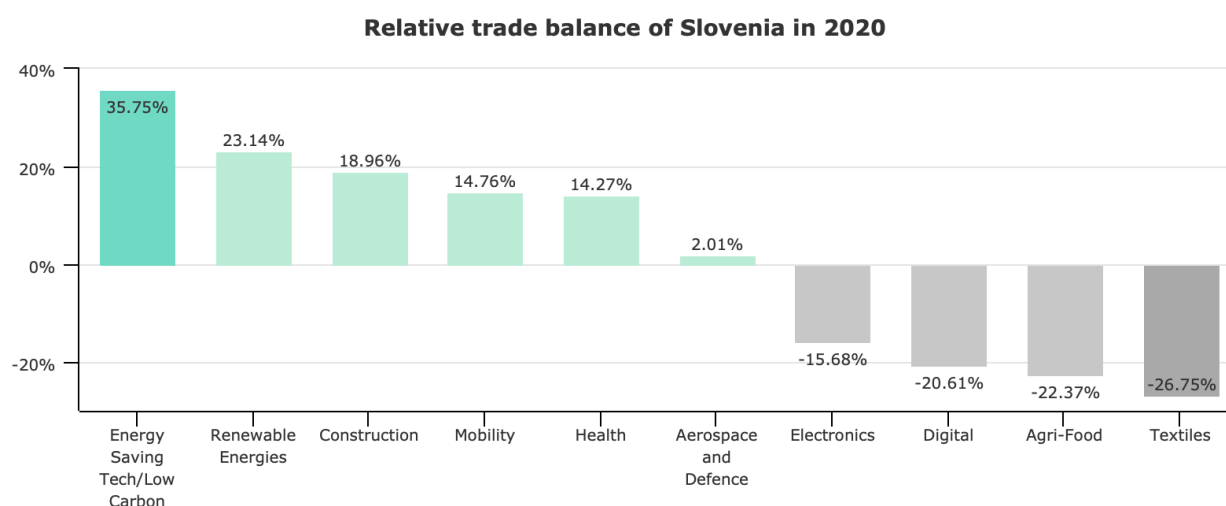
Figure 1: Country share and world share (expressed in terms of ranking) in patent applications in industrial ecosystems related technologies



Source: Fraunhofer ISI based on Patstat

Trade is a common indicator of international competitiveness because it shows how attractive a country's products are outside of its domestic market. Total exports provide evidence about a country's role as a producer, and trade balance captures its sovereignty in certain areas of production. Figure 2 displays the trade balance in relation to overall trade volume by technology development in industrial ecosystems. Slovenia registered a trade surplus in technology-based products related to Energy Saving, Renewable Energies, Construction, Automotive, Health and Aerospace and Defence ecosystems.

Figure 2: Trade balance in relation to overall trade volume  $((exp - imp)/(exp+imp))$  (2020)



Source: Fraunhofer ISI based on UNCOMTRADE

Most private equity and venture capital investment in Slovenia went into innovative companies operating in Mobility, followed by Renewable Energy and Agri-Food over the period from 2015 to 2023.

Figure 3: Private equity and venture capital investment into tech companies related to industrial ecosystems in Slovenia

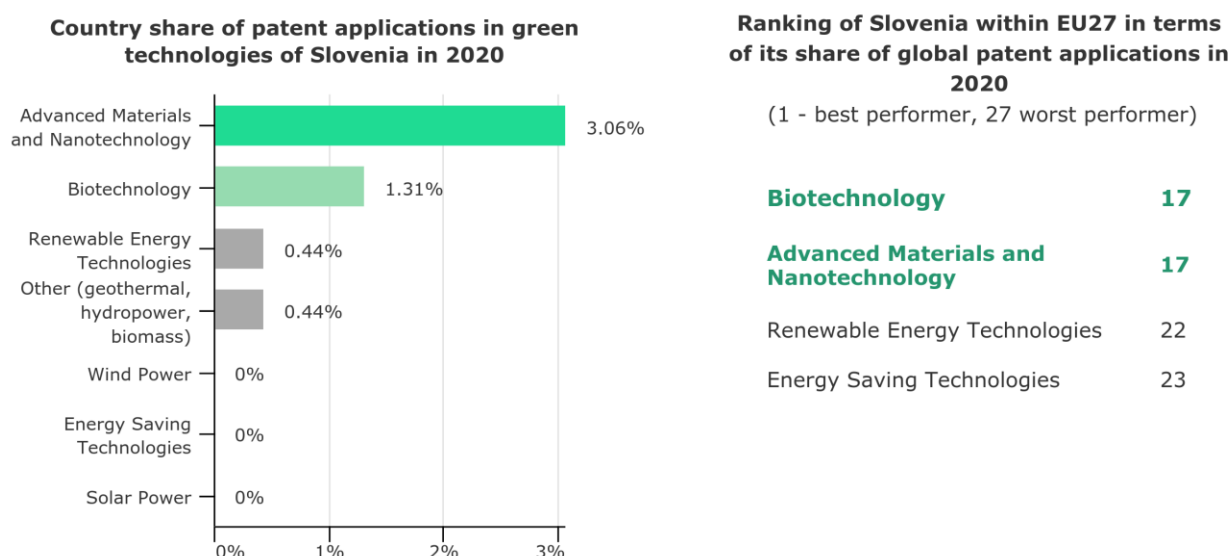


Source: Technopolis Group based on Crunchbase

## 2.3. Green transformation

Within the country, Slovenia has been the most specialised in generating technologies related to Advanced Materials and Biotechnology, which have the potential to drive the green transformation of its industries. In a global comparison, Slovenia has ranked at the 17<sup>th</sup> place among the EU27 Member States in generating technologies related to Advanced Materials and Biotechnology.

Figure 4: Country specialisation and world share (expressed in terms of ranking) in patent applications of Slovenia

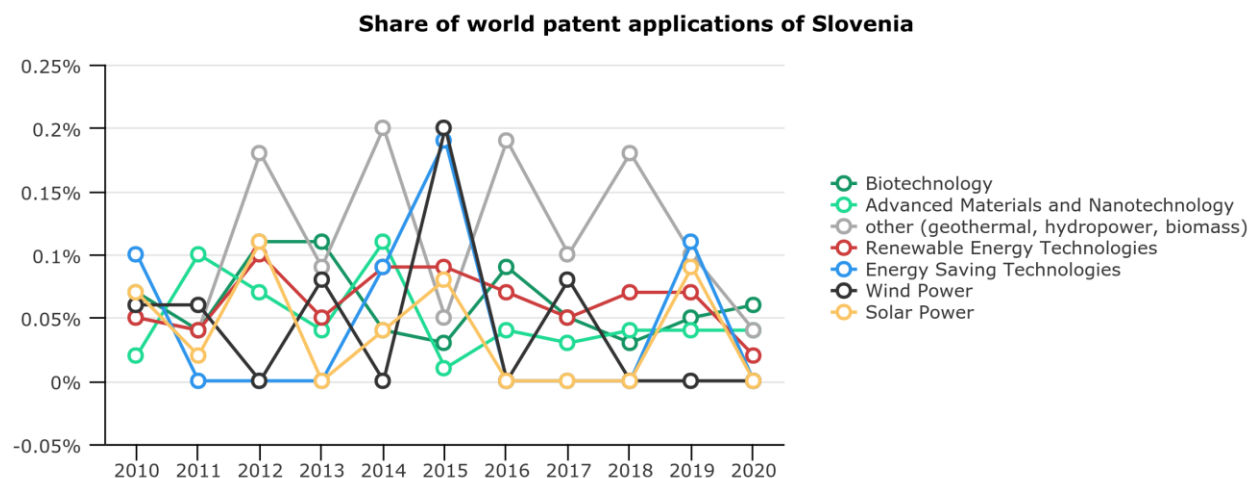


Source: Fraunhofer ISI based on Patstat

Evolution of the world's patent applications between 2010 and 2020 shows that Slovenia's global share in most fields followed an oscillating trend, especially for what concerns its share in Wind Power and Geothermal, Hydropower and Biomass. The share of world patent applications decreased from 2019 to 2020 for the majority of green technologies.



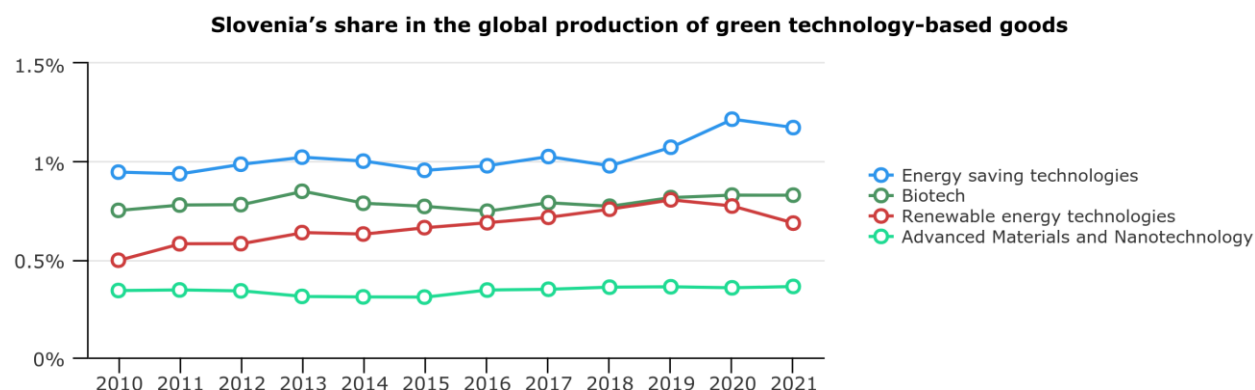
Figure 5: Trends over time in Slovenia's share in world patent applications



Source: Fraunhofer ISI based on Patstat

The Prodcom-based indicator measures the share of advanced technology-related production in Slovenia for a given year. The share of production in a certain technology over Slovenia's total production indicates an increase Energy Saving Technologies from 2010 to 2020, ranking the highest among green technologies.

Figure 6: Production of advanced technology-based products in Slovenia

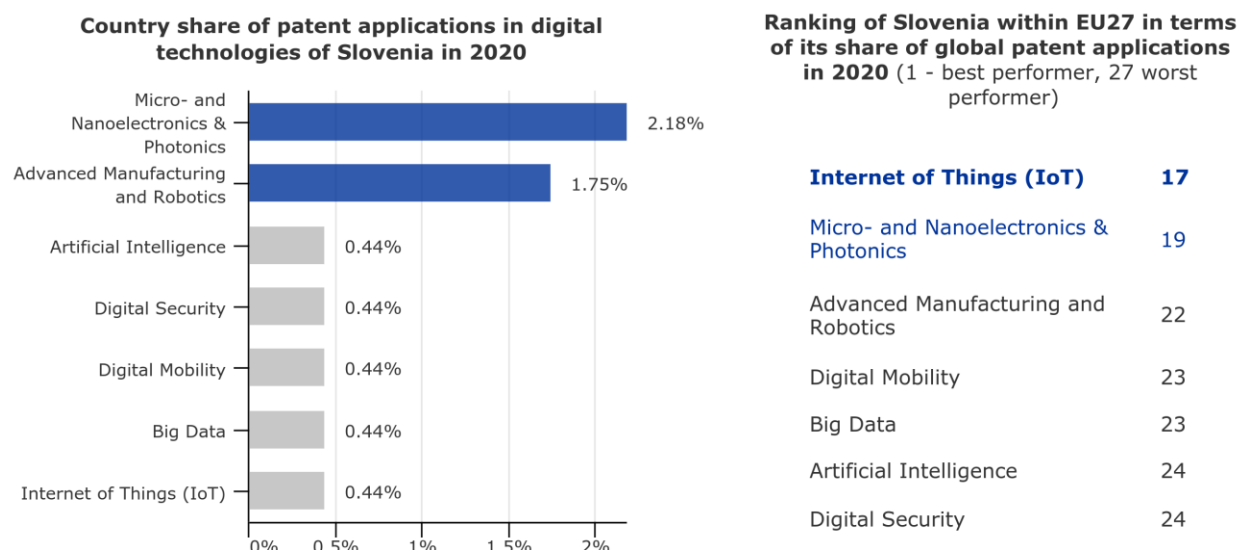


Source: IDEA Consult based on Prodcom data

## 2.4. Digital transformation

Among the digital technologies monitored in this project, Slovenia has been the most specialised in Micro and Nanoelectronics and Photonics. Regarding its global share in patent applications, it had some relative strengths in the Internet of Things and to some extent in Micro- and Nanoelectronics and Photonics.

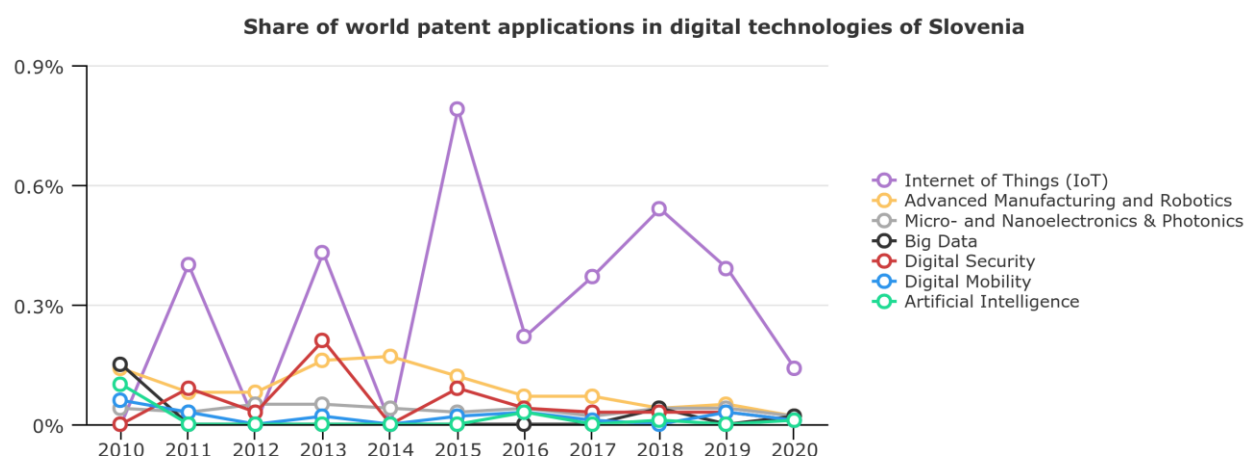
Figure 7: Country share and world share (expressed in terms of ranking) in digital technology related patent applications of Slovenia



Source: Fraunhofer ISI based on Patstat

Trends over time indicate a downward trend in the world share of Slovenia in most of the digital technologies and in particular a sharp drop in the field of the Internet of Things from 2010 to 2020.

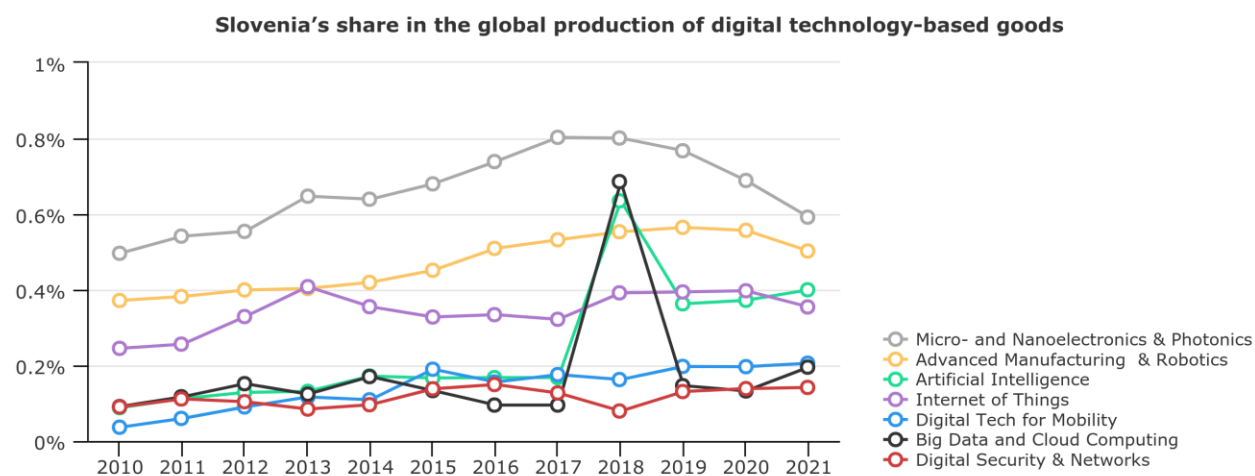
Figure 8: Trends over time in Slovenia's share of world patent applications



Source: Fraunhofer ISI based on Patstat

The Prodcom-based indicator measures the share of Slovenia in advanced technology-related production for a given year. The share of production in a particular technology over Slovenia's total production indicates that Slovenia has the largest share in the field of Micro and nanoelectronics, and Advanced manufacturing and robotics technology-based products.

Figure 9: Production of advanced technology-based products in Slovenia



Source: IDEA Consult based on Prodcorn data

