Monitoring industrial ecosystems

EU MEMBER STATES FACT SHEETS

Cyprus

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Key Highlights

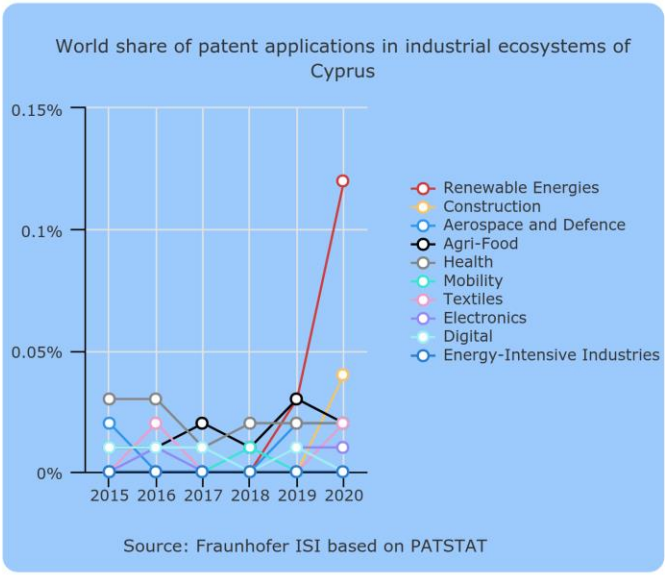
This country report has been developed as part of the '**European Monitor of Industrial Ecosystems'** project of the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs and the European Innovation Council and SMEs Executive Agency. It provides data insights 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:

- In a global comparison, Cyprus has some relative advantages in **Renewable Energies and Construction** related technologies, where it shows positive recent dynamics.

Digital and green transition technologies:

- Within the country, Cyprus had the highest share of its patent applications in generating technologies related to **Micro and Nanoelectronics**.
- Trends over time indicate a substantial decrease in the world share of Cyprus in various digital technologies over the period from 2016 to 2020 for example in **Big Data, Artificial Intelligence and Digital Mobility.**
- Cyprus had the highest percentage of its patent applications in the field of **Renewable Energy Technologies** among green technologies. Additionally, it has been able to increase its global share over time.



Capacity to produce goods based on digital and green technologies:

- The Cyprus share of production of digital technologies is highest in the field of **Digital Mobility, Big Data, and Advanced Manufacturing and Robotics** related technology-based products.
- Cyprus' global share has increased in the case of Big Data. Nonetheless, it has been gradually decreasing in Advanced Manufacturing and Robotics over the period from 2010.
- Cyprus' share in **Advanced Materials, Energy Saving Technologies and Renewable Energy Technology**-based products within global production indicates an increase until 2020 but a decrease 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[1] 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[2].

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
Advanced Materials and Nanotechnology
Biotechnology (for sustainability)
Energy Saving Technologies
Renewable Energy Technologies
Solar Power
Wind Power
other (geothermal, hydropower, biomass)

Digital technologies
Advanced Manufacturing & Robotics
Advanced Manufacturing
Robotics
Artificial Intelligence
Big Data
Digital Security & Networks/ Cybersecurity
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 Lena Tsipouri, from the University of Athens for the European Commission. However, it does not necessarily reflect the views of the European Commission.

[1] 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

[2] 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[3] or at the European Patent Office[4] 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[5] 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[6] 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.

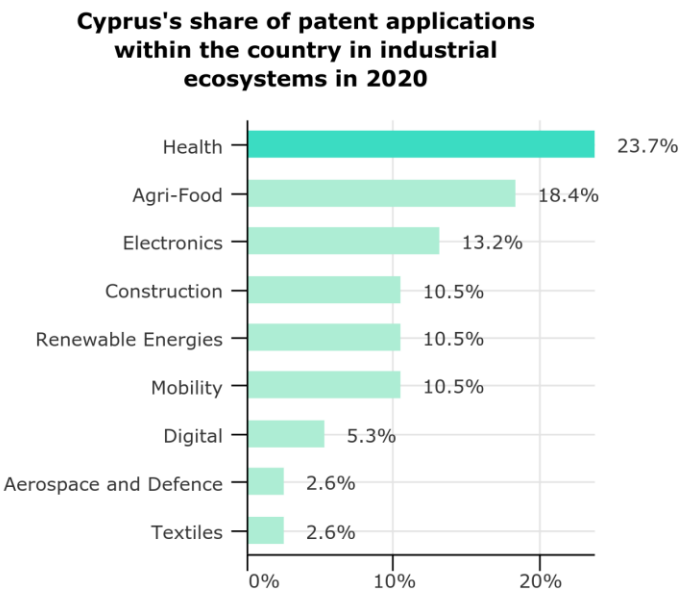
Crunchbase data[7] were used to analyse entrepreneurial dynamics and private equity and venture capital investment. Crunchbase is a widely trusted source of information on venture capital backed innovative companies. Technology startups represent key building blocks in the transition towards a more digital, 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.

[3] World Intellectual Property Organization, WIPO Patent Cooperation Treaty (PCT) https://www.wipo.int/pct/en/
[4] European Patent Office, Supporting Innovation and Patents in Europe https://www.epo.org/en
[5] United Nations Comtrade, UN Comtrade Plus-International Trade Data Platform https://comtradeplus.un.org/
[6] Eurostat, Eurostat PRODCOM-European Union Production and Trade Statistics https://ec.europa.eu/eurostat/web/prodcom
[7] Crunchbase, Business Information and Networking Platform https://www.crunchbase.com/

2.2. Technology development in industrial ecosystems

Regarding technology development, Cyprus had the highest share of patent applications in the Health and Agri-Food industrial ecosystems within the country in 2020 as captured by patent data. In a global comparison, it ranked highest (16th position) in technologies related to the Renewable Energies ecosystem within the EU27 countries.

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



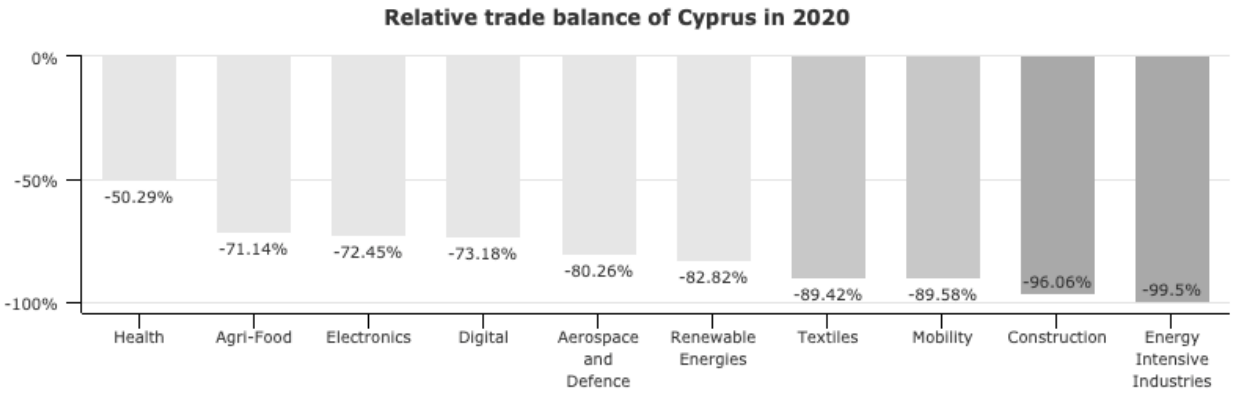
Ranking of Cyprus within EU27 in terms of its share of global patent applications in 2020 (1 - best performer, 27 worst performer)

Renewable Energies	**16**
Aerospace and Defense	23
Construction	24
Agri-Food	25
Mobility	25
Electronics	26
Health	26
Textiles	26
Digital	27

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. Cyprus registered a negative trade balance in technology-based products related to all industrial ecosystem relevant technologies.

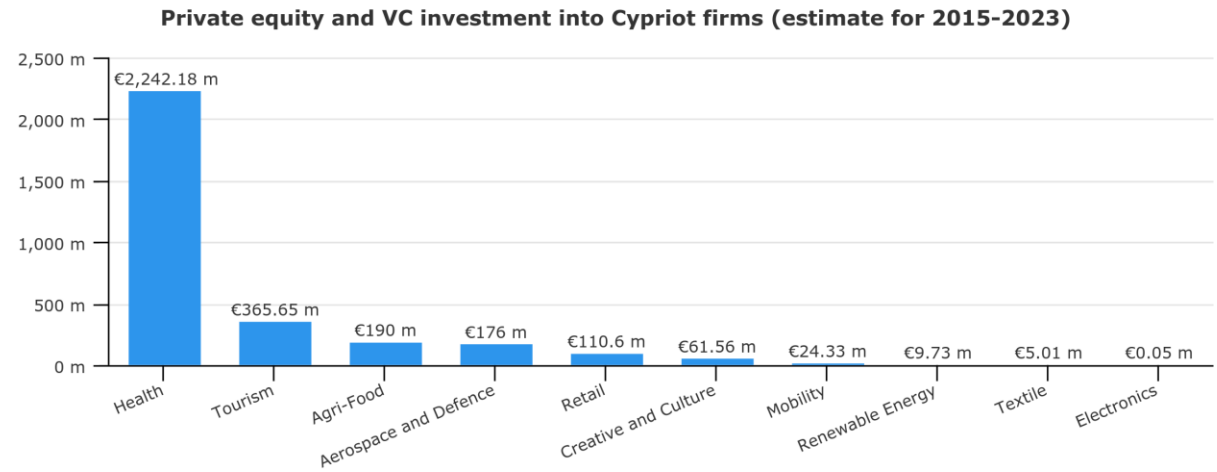
Figure 2: Trade balance in relation to overall trade volume ((exp - imp)/(exp+imp)) (2020)



Source: Fraunhofer ISI based on UNCOMTRADE

Most private equity and venture capital investment in Cyprus went into Health and Tourism, over the period from 2015 to 2020. Most venture capital investment in the health sector is primarily driven by a startup based in Nicosia specialised in infection diagnostics.

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

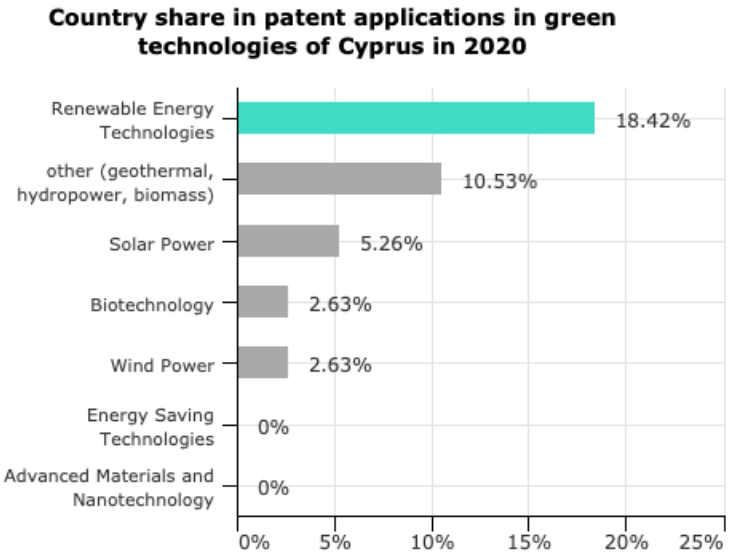


Source: Technopolis Group based on Crunchbase

2.3. Green transformation

Cyprus had the highest country share of its patent applications in technologies related to Renewable Energy Technologies in 2020, which have the potential to drive the green transformation of its industries. Similarly, in a global comparison Cyprus has ranked at the 16th place among the EU27 Member States in generating technologies related to Renewable Energy.

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



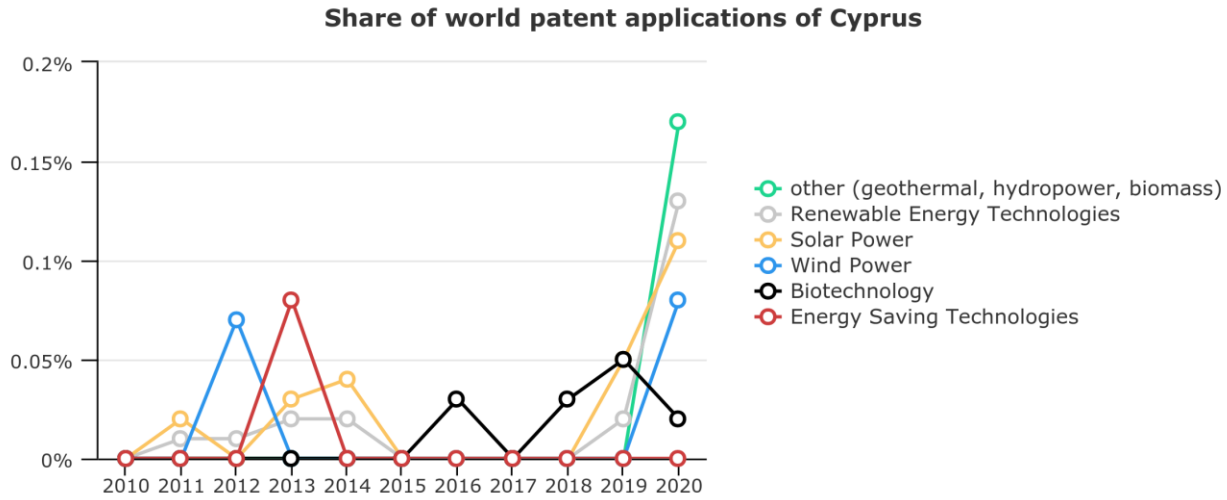
Ranking of Cyprus within EU27 in terms of its share of global patent applications in 2020 (1 - best performer, 27 worst performer)

Renewable Energy	**16**
Biotechnology	24
Advanced Materials and Nanotech	27
Energy Saving Technologies	27

Source: Fraunhofer ISI based on Patstat

The trends in global patent applications indicate that Cyprus has been increasing its share in Renewable Energy Technologies over time. This increase is particularly notable in Other Renewables, including Geothermal, Hydropower, Biomass, and Solar Power.

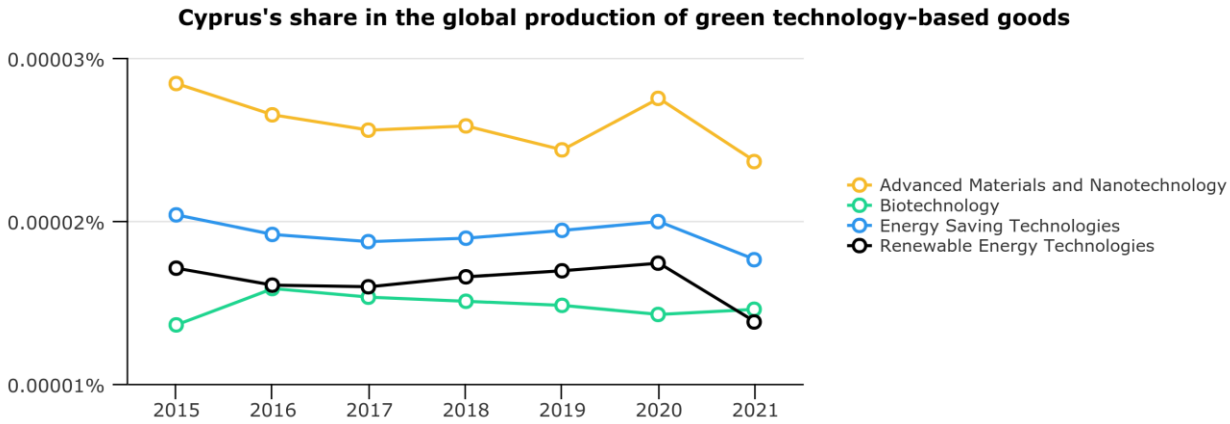
Figure 5: Trends over time in Cyprus's share in world patent applications



Source: Fraunhofer ISI based on Patstat

The indicators based on Prodcom data measure the share of Cyprus in advanced technology-related production for a given year and capture the countries' share in the global production of manufacturing goods. Cyprus' share in Advanced Materials, Energy Saving Technologies and Renewable Energy Technology-based products within global production indicates an increase until 2020 but a decrease from 2020 to 2021.

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

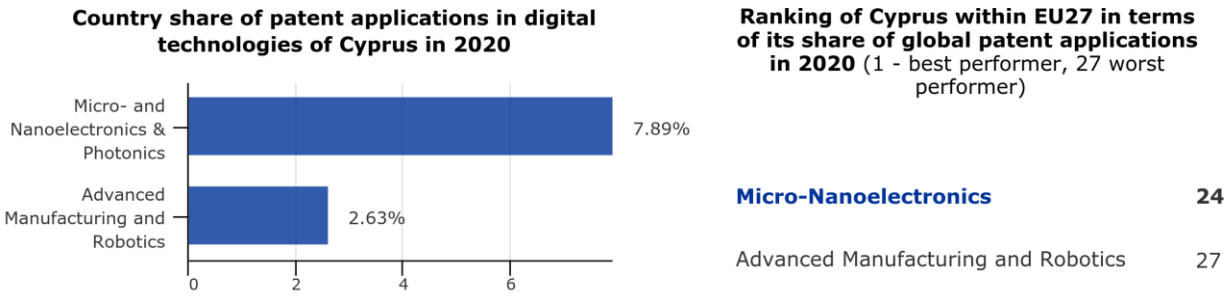


Source: IDEA Consult based on Prodcom data

2.4. Digital transformation

Among the digital technologies monitored in this project, Cyprus had the highest share of patent applications in Micro- and Nanoelectronics within the country in 2020. Regarding its global share in patent applications, it ranked among the last across all digital technologies.

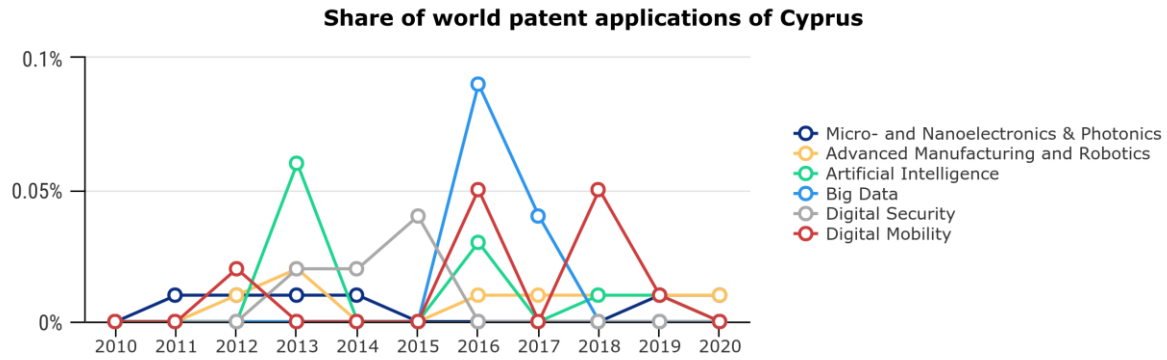
Figure 7: Country share and world share (expressed in terms of ranking) in digital technology related patent applications of Cyprus



Source: Fraunhofer ISI based on Patstat

Trends over time indicate a substantial decrease in the world share of Cyprus in various digital technologies over the period from 2016 to 2020 for example in Big Data, Artificial Intelligence and Digital Mobility.

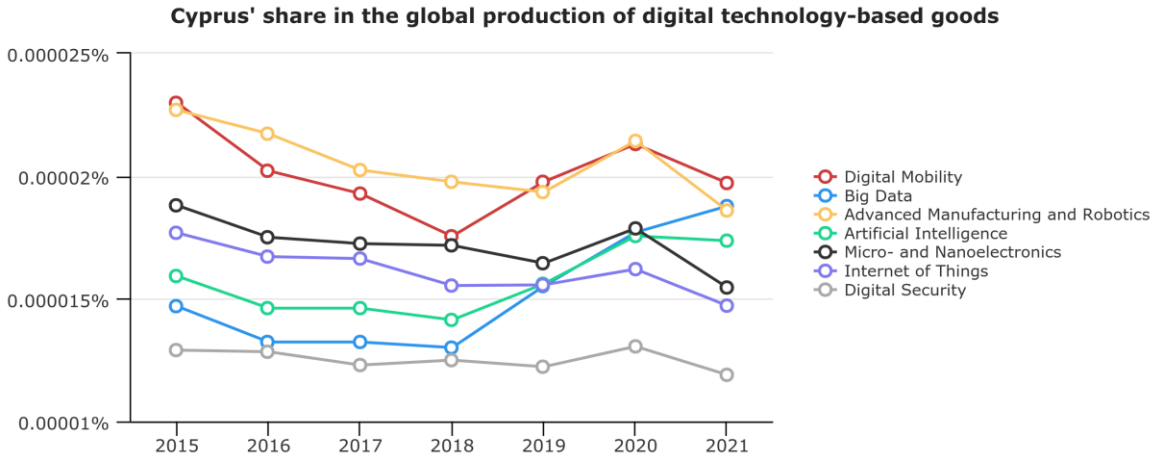
Figure 8: Trends over time in Cyprus's share of world patent applications



Source: Fraunhofer ISI based on Patstat

Cyprus' share of production in digital technologies over global production indicates that it had created the highest value by the deployment of Digital Mobility, Big Data, and Advanced Manufacturing and Robotics technologies across manufacturing goods in 2021. Cyprus' global share has increased in the case of Big Data. Nonetheless, it has been gradually decreasing in Advanced Manufacturing and Robotics over the period from 2010.

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



Source: IDEA Consult based on Prodcom data

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