



AGÊNCIA NACIONAL
DE INOVAÇÃO

National Innovation Report

COFINANCIADO POR:



UNIÃO EUROPEIA
Fundo Europeu
de Desenvolvimento Regional



National Innovation Report





Acknowledgements

Recognition must be given to the progress made in our country in terms of innovation capacity over the last two decades, and to the fact that Portugal has been included in the group of 'highly innovative' countries in the European Union since 2020.

The National Innovation Report, which is presented here, is the result of a desire to create a portrait of innovation in Portugal over time.

Prepared by the National Innovation Agency (ANI), within the framework of the Strategy for Technological and Business Innovation 2018-2030, the aim is to describe, on a biennial basis, the diversity of actors belonging to the National Innovation System (NIS), the different tools supporting knowledge and innovation and their implementation, as well as to collect testimonials or examples of best practices in these areas in Portugal.

This Report aims to provide quantitative and qualitative information on the evolution of these areas, in order to build the most comprehensive report possible, incorporating the different areas of knowledge and innovation that are worked on by different public and private, horizontal and sectoral entities. It is also intended to complement the analyses on the country prepared by different organisations, both domestic and international.

The National Innovation Report was prepared with the contributions of various entities, to which ANI would like to thank for all the availability to collaborate in the first edition of this work:

- IAPMEI – Agência para a Competitividade e Inovação
- NPI – Instituto Nacional da Propriedade Industrial
- IEFP – Instituto de Emprego e Formação Profissional
- PME Investimentos, currently Banco Português de Fomento
- DGPM – Direção-Geral de Política do Mar
- Startup Portugal

With a biennial periodicity, this Report should be increasingly comprehensive in terms of contributions and partner entities, in order to better portray the Portuguese reality in terms of knowledge and innovation, which, despite still having much untapped potential, has had considerably positive results in recent years.

The Board of Directors of The National Innovation Agency:
Eduardo Maldonado, António Bob Santos, Filomena Egreja.



Preface

Prepared under
the Strategy for
Technological
and Business
Innovation
2018–2030

As a result of the globalisation process and the increasingly international competition dynamics, the Portuguese economy has faced multiple challenges and profound structural transformations, imposed by the opening of new markets, changes in consumer patterns, and by the process of digital and environmental transformation.

In this demanding scenario, Portugal's growth model has been, over the last decade, defined by the creation of value and the exploration of exporting potential, so as to promote a resilient, long-lasting and sustainable development, targeted at the incorporation of knowledge and innovation into the productive system, and the increase in productivity and competitiveness of the business fabric.

Thus, recognising the need to prioritise innovation when designing public policies, and striving for an effective allocation of the community funds made available under QREN and Portugal 2020, there were several initiatives aimed at strengthening the National Innovation System, complemented by the INTERFACE Programme, as well as by fiscal, risk capital of entrepreneurship support instruments.

As a result, according to the European Innovation Scoreboard, since 2016, Portugal has ranked fourth in the European Union in terms of innovation development, and is now considered, for the first time, a 'strongly innovative' country. This was also a period of convergence with other European economies, in which Portugal has managed to stand out for the quality and specialisation of its products and assert itself in the international market.

However, the COVID-19 pandemic generated an unprecedented impact on a global scale, with repercussions in terms of consumption, production and employment, the consequences of which are felt in a wide range of sectors of society. Once more, through innovation resulting from partnerships between businesses and knowledge centres, it was possible to create quick responses to new needs, including in terms of individual protection equipment certification, development of ventilators, or screening and contagion prevention solutions.

The coming years will certainly be a challenging period, as we recover from the current pandemic crisis. The new framework will also be an opportunity to equip new businesses with tools that increase productive expertise in activities that are more knowledge-intensive and add greater value, as well as to expand the boundaries of knowledge. Such a recovery process requires dynamic and coordinated cooperation between public and private actors, so as to strengthen collaborative networks and increase investment in R&D and in the training and skills of our professionals.

And thanks to the cooperation between different entities that strive for the promotion of innovation, this report contributes to a reflection on the past, present and future of innovation in Portugal, namely the characterisation of the actors, the sharing of best practices, the monitoring of implemented measures and the discussion of future trends.



João Correia Neves

Deputy State Secretary of the Ministry of Economic Affairs

National Innovation Report



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1 Framework

In recent years, the world economy has faced different and demanding challenges. The economic and geopolitical context has suffered numerous shocks, such as the 2008 international financial crisis (the 'subprime' crisis), the 2010–2012 sovereign debt crisis, Brexit and, more recently, the pandemic caused by the novel coronavirus.

Portugal has been able to respond to the challenges posed by the international events and shocks that have marked the last decade, improving its economic and social situation and the balance of public accounts and regaining its credibility among international creditors. The gradual reduction of budget deficits and the achieving of a surplus in 2019, for the first time since the beginning of the democracy, is one of the many indicators that show the efforts made by public and private agents to create value in the country.

Figure 1. GDP at market prices: 100 = 2005 Index



Source: Eurostat²

The growth of the Gross Domestic Product (GDP) is an important result to highlight, as it reached pre-international financial crisis figures (Figure 1). Taking into account the most recent annual results, the Portuguese

GDP grew over 2% in 13 of the last 14 quarters³ (Q3 2016 – Q4 2019). Exports also grew from 27.3% to 44% of GDP in 10 years⁴; unemployment fell, with the best figures since 2003 (6.5%) being achieved in 2019⁵ and investment (gross fixed capital formation) recovered, nearing pre-crisis figures, with 18.3% of GDP in 2019⁶.

However, for the year 2020, and according to the European Commission (July/2020), the projections for economic performance have been negatively affected by the impacts of the pandemic, with the economy expected to shrink by 9.8% of GDP. This latest projection puts Portugal below the recorded figures for both the European Union and the Eurozone⁷. In October 2020, the Public Finance Council also published a summary of the projections of six entities, including international organisations, the Bank of Portugal and the Ministry of Finance. The most negative scenario is projected by the International Monetary Fund, which predicts that the Portuguese GDP will contract by 10% in 2020. However, all six institutions expect a growth of at least 4.8% in 2021⁸.

In line with macroeconomic performance, the country's progress is also visible in other areas, such as science and technology, as well as the improvements in the qualifications of the population: in 2020, 12 of Portugal's higher education institutions are listed among the best 1000 in the world, whereas, in 2011, no Portuguese entity appeared in these rankings⁹. In terms of new higher education institutions (up to 50 years old), Portugal had 6 entities in the top 200 in 2019, 2 of which were in the top 150¹⁰.

¹ https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=406887673&DESTAQUESmodo=2

² https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en

³ https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&contexto=pi&indOcorrCod=0009887&selTab=tab0

⁴ <https://www.pordata.pt/Portugal/Balan%C3%A7a+comercial+em+percentagem+do+PIB-2595>

⁵ [https://www.pordata.pt/Portugal/Taxa+de+desemprego+total+e+por+sexo+\(percentagem\)-550](https://www.pordata.pt/Portugal/Taxa+de+desemprego+total+e+por+sexo+(percentagem)-550)

⁶ <https://www.pordata.pt/Portugal/>

⁷ https://ec.europa.eu/info/sites/info/files/economy-finance/ip132_en.pdf

⁸ <https://www.cfp.pt/pt/dados/projecoes-macroeconomicas>

⁹ https://www.timeshighereducation.com/world-university-rankings/2011/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/undefined

¹⁰ https://www.timeshighereducation.com/world-university-rankings/2019/young-university-rankings#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats

115% Increase

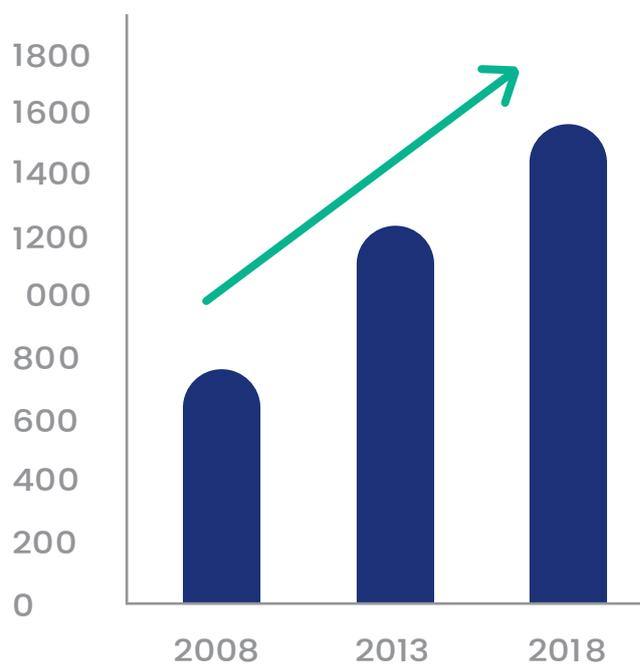
In terms of graduates, **regardless of degree,**

a comparison between the 2007/2008 and 2018/2019 school years has shown figures equivalent to those recorded in the pre-crisis period. In addition, the most recent school year saw around 5,000 more graduates and almost double the number of PhDs than in 2007/2008. Between these two academic years, the areas with the highest growth in the number of graduates are Business Science, Administration and Law (21%), Information and Communication Technologies (33%) and Services (44%). For the most recent school year, the areas with the highest number of graduates are Business, Administration and Law (20%), Engineering, Manufacturing and Construction (20%) and Health and Social Protection (17%)¹¹.

As a consequence of this increase in the number of graduates in Portugal, especially those linked to research activities, the number of scientific publications also grew between 2008 and 2018, as shown by the number of publications indexed on the Web of Science platform¹². Overall, there was an increase of 873 publications per million inhabitants (making Portugal the 8th fastest growing country in the 28 European countries), which translates into a relative increase of around 115% (Portugal being the 6th fastest growing country in the 28 European countries (Figure 2).

This increase in formal qualifications and in the results of scientific research, as well as positive macroeconomic developments, were factors which, besides contributing to improving the competitiveness of businesses over the last decade¹³, also strengthened the country's innovation capacity, as its agents have access to a broader set of factors necessary for value creation.

Figure 2. Publications (indexed on the Web of Science database) per one thousand inhabitants



Source: Own Elaboration based on data from DGEEC

As this report is intended to be a snapshot of the country's capacity for innovation, identifying the main innovative agents, the instruments available to encourage innovation and the results achieved, the concept of 'innovation' should first be clarified, based on the 2018 edition of the Oslo Manual.

¹¹ <https://www.dgeec.mec.pt/np4/EstatDiplomados/>

¹² <https://www.dgeec.mec.pt/np4/210/>

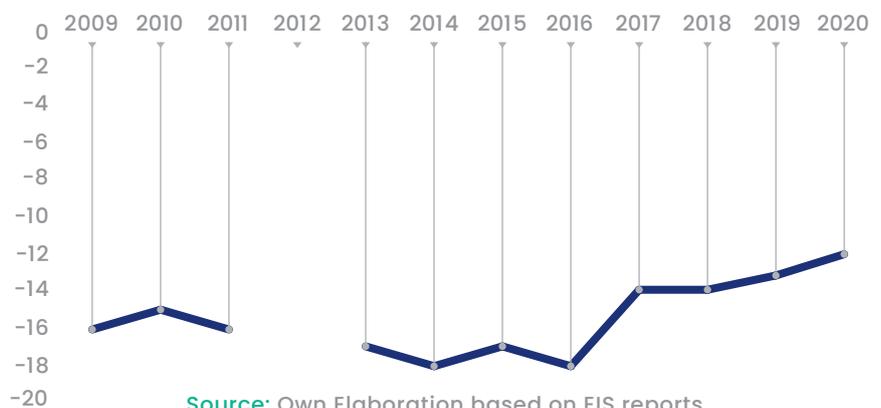
¹³ This is shown by the positive development of the level of exports in the last decade and their weight in GDP, which reflects the increased competitiveness of our companies in international markets. See PORDATA: <https://tinyurl.com/y3awvzvb>



Innovation in Portugal – recent developments

Innovation has been one of the main elements contributing to improve Portugal's international image. The quality of its technological infrastructures, the competence of the entities and the talent of the human resources, not only contributed to the emergence of new “made in Portugal”, solutions, but also attracted investment from large international groups focusing on high technology activities, which increasingly establish high value-added activities in the country.

Figure 3. Positioning of Portugal in the European Innovation Scoreboard (2009–2019)



Source: Own Elaboration based on EIS reports

In the European context, and after the period of disinvestment in R&D and innovation comprised between 2011–2015 (the 'troika' period), which had a negative impact on the national innovation capacity, Portugal has recorded a rather positive evolution, according to the annual reports of the European Innovation Scoreboard (EIS) (Figure 3).

The most recent data shows that Portugal is the 12th most innovative country in the EU27¹⁴, being considered, for the first time, a 'strongly innovative' country. Portugal obtained good results in the 'Innovators' (2nd place) and 'Innovation-friendly environment' (10th) categories, while less good results appear in the 'Sales impacts'; 'Linkages' and 'Intellectual Assets' categories. Portugal ranks highest for the following indicators: 'SMEs with product or process innovations', 'SMEs innovating in-house' and 'Broadband penetration'.

In addition, looking at performance between 2012 and 2019, Portugal was the fourth highest performing EU country¹⁵ (21.5 percentage points).

From a different angle, also on innovation, but now focusing on regions at a European level (238 regions from 23 Member States), the RIS - Regional Innovation Scoreboard report presents the performance of the different territories. In the 2019 edition of this ranking¹⁶, the country presents three regions as 'strong innovators' (North, Centre, Lisbon and Vale do Tejo) and 4 regions as 'moderate innovators' (Alentejo, Algarve, Azores and Madeira).

¹⁴ <https://ec.europa.eu/docsroom/documents/42981>

¹⁵ European Innovation Scoreboard 2020, p. 15.

¹⁶ https://ec.europa.eu/growth/industry/policy/innovation/regional_en

This report strengthens the country's position in the European Innovation Scoreboard, with these Portuguese regions standing out in business innovation, especially among SMEs: in terms of in-house innovation, all Portuguese regions are in the top 20¹⁷ and in terms of product or process innovation, they are among the top 24¹⁸.

It is also worth mentioning that Madeira came 7th in terms of most cited publications; in terms of organisational or marketing innovation, the Algarve region came 10th, Lisbon 13th and the Azores 14th; and finally, the Norte region, came 16th in non-R&D innovation spending, 19th in brand registration and 25th in design protection.

Taking into account the evolution of thought and strategies for national and community growth and, obviously, taking into account all the assessments and recommendations from national or international agents, innovation policy over the last decade in Portugal has been mainly oriented towards the consolidation of the National Innovation System (NIS), namely through the advanced qualification of human resources, the support for technological and business innovation and entrepreneurship, the promotion of collaborative innovation networks (e.g. through the Clusters policy and the Interface Programme) and greater coordination between businesses and entities producing advanced knowledge.

This policy has been largely supported by European Structural and Investment Funds, which finance a large part of public and private initiatives in support of innovation and R&D. There are positive developments in the application of these funds to networking, collective efficiency and collaborative innovation, if we compare the NSRF (2007-2013) and Portugal 2020 (2014-2020) programmes. In addition to these Funds, other instruments have been developed, such as SIFIDE (existing since 1997, but updated) and a series of initiatives linked to Venture Capital, led by various public entities such as Portugal Ventures, IFD - Development Finance Institution or SME Investments, financial instruments backed by the State (through the Portuguese Mutual Guarantee Society), business capacity building initiatives, through IAPMEI, or advanced human resources training initiatives, through FCT.

The emergence of these new instruments and the mobilisation of increasingly greater allocations for these areas is justified by the increased strategic interest in collaborative R&D and Innovation as a structural reform, the frequency of knowledge-intensive business activities and the emergence of more skills and results in different technological areas. Without prejudice to others, the following developments in national public innovation and R&D policies in recent years are noteworthy:

- The National Strategy for Entrepreneurship - **Startup Portugal**¹⁹, incorporating several initiatives to support the stimulation of entrepreneurship and the Portuguese ecosystem (several initiatives carried out by Startup Portugal are listed in the respective annex);
- The **Industry 4.0**²⁰ Programme, aimed at strengthening the awareness and responsiveness of Portuguese companies to the development of national industry and services within the new paradigm of the Digital Economy;
- The **INTERFACE Programme**²¹, aimed at promoting cooperation between universities / research centres and businesses, namely by strengthening the policy of Clusters, Interface Centres (CIT), the creation of Collaborative Laboratories (CoLAB) and Supplier Clubs;
- The **Born from Knowledge Programme**²², which aims to promote and add value to ideas, projects and companies based on collaborative scientific and/or technological knowledge, with an impact on society and the development of the economy;
- The National Initiative for Digital Skills - INCoDe.2030²³, the National Strategy for Advanced Computing²⁴, the National Strategy for Artificial Intelligence²⁵ and the Open Data Strategy;
- The **National Strategy for Cyberspace Security**²⁶, to be implemented between 2019 and 2023 and aiming at guaranteeing three strategic objectives: Maximise resilience, promote innovation and generate and secure resources;
- The launch of **Thematic R&I Agendas** so that, through dialogue between the different agents, medium- and long-term visions in different areas can be defined and carried out: Agri-food, Forests and Biodiversity; Climate Change; Portuguese Architecture; Urban Science and Cities for the Future; Culture and Cultural Heritage; Circular Economy; Space and Earth Observation; Social Inclusion and Citizenship; Industry and Manufacturing; Sea; Health, Clinical and Translational Research; Cyber Physical Systems and advanced forms of Computing and Communication; Sustainable Energy Systems; Work, Robotisation and Employment Qualification in Portugal; Tourism, Leisure and Hospitality;
- The **+Superior**²⁷ programmes, aimed at providing mobility grants, encouraging and supporting higher education attendance in regions of the country with lower demand, contributing to territorial cohesion and achieving targets related to the percentage of youths with higher education;

17 Norte (10th); Algarve (2nd); Centro (3rd); Lisboa (4th); Alentejo (6th); Azores (5th) and Madeira (20th)

18 Norte (15th); Algarve (3rd); Centro (5th); Lisboa (4th); Alentejo (9th); Azores (11th) and Madeira (24th)

19 <https://www.portugal.gov.pt/pt/gc21/comunicacao/documento?i=estrategia-nacional-para-o-empreendedorismo-2-anos-de-startup-portugal>

20 <https://www.iapmei.pt/Paginas/Industria-4-0.aspx>

21 <https://www.programainterface.pt/pt>

22 <http://bfk.ani.pt/pt/>

23 <https://dre.pt/application/file/a/114835001>

24 https://www.incode2030.gov.pt/sites/default/files/out_acp_pt.pdf

25 https://www.incode2030.gov.pt/sites/default/files/julho_incode_brochura.pdf

26 <https://dre.pt/application/file/a/122498847>

27 <https://dre.pt/application/file/a/123238681>

- The **GoPortugal**²⁸ Programme, with the renewal, in 2019, of a series of agreements between Portugal and international bodies to promote the mobility of persons and cooperation between national bodies and the aforementioned international bodies.
- The **Qualifica Programme**²⁹ and regulations of the Qualifica Centres, focused on the education and vocational training of adults aged 18 and over who are seeking a qualification and, exceptionally, youths who are not attending education or training courses and are not in the labour market;
- The **Simplex+ Programme**³⁰ (following Simplex, which was launched in 2006 and suspended in 2011), has already had 5 editions since 2016. In the most recent edition, measures were launched to simplify and facilitate the lives of citizens, businesses and other entities, particularly in situations caused by the novel coronavirus.
- The **Qualifica AP Programme**³¹, which aims to provide Public Administration workers with the qualifications and skills that will enhance the development of their professional careers, enabling their integration with qualifications adapted to the needs of the different bodies and services;
- The **Strategy for the Digital Transformation of Public Administration**³², aims to stimulate administrative and legislative simplification, in order to make life easier for citizens and businesses in relation to Public Administration;
- The **Stimulation Programme for Scientific Employment**³³⁻³⁴ which aims to reduce the number of PhD holders in non-permanent positions and promote the employment of PhD holders and researchers at companies;
- **Portugal Space 2030**, a strategy for research, innovation and growth for Portugal, which considers space a fundamental resource for the ambitions of the country, its companies and its scientific institutions (the strategy was approved in 2018³⁵ and the Portuguese Space Agency was created in 2019³⁶);
- Initiatives for the development of the **Sea Economy** through the following initiatives: i) The **Blue Growth Programme**³⁷, aimed at increasing value creation and sustainable growth in the Portuguese blue economy, boosting research, education and training in marine and maritime areas; ii) The **Blue School**³⁸, which aims to mobilise society and, in particular, children and youths to understand the influence of the ocean on the population and vice versa; iii) The **Bluetech Accelerator**³⁹, aimed at start-ups willing to work on innovative, bold and disruptive solutions for the Ports and Navigation Industry.
- Approval of the **Action Plan for the Digital Transition**⁴⁰, reinforcing the strategy of digitalisation of the economy and qualified entrepreneurship, based on three fundamental pillars of action: Training and Digital Inclusion of People; Digital Transformation of the Business Fabric and State Digitalisation.



Challenges identified for the next decade

In the context of developments in recent years and taking into account the priorities for both internal and Community innovation, Portugal took on a 2018 Technological and Business Innovation Strategy⁴¹.

Goals are set, including: overall R&D investment equivalent to 3% of GDP by 2030; reaching a level of 60% of 20-year-olds attending higher education courses; 40% of tertiary education graduates in the 30-34 age group by 2020 and 50% by 2030; achieving European leadership in digital skills by 2030; increasing exports of goods and services, with a particular focus on the

technology balance, with the ambition of an export volume equivalent to 50% of GDP by 2025; bringing levels of venture capital investment closer to the European average and increasing the attraction of Foreign Direct Investment.

One of the main objectives of this Strategy is to mobilise public and private players, both in terms of entrepreneurship, investment in new technological companies and the acceleration of the digitalisation of the Portuguese economy, as well as in the strengthening of collaborative strategies for

²⁸ <https://dre.pt/application/file/a/114834999>

²⁹ <https://dre.pt/application/file/a/75217575>

³⁰ <https://www.simplex.gov.pt/>

³¹ <https://dre.pt/application/file/a/119432724>

³² <https://www.simplex.gov.pt/>

³³ <https://dre.pt/application/file/a/75216474>

³⁴ <https://dre.pt/application/file/a/107710692>

³⁵ <https://dre.pt/application/file/a/114842871>

³⁶ <https://dre.pt/home/-/dre/120837266/details/maximized>

³⁷ <https://www.eeagrants.gov.pt/pt/programas/crescimento-azul/>

³⁸ <https://escolaazul.pt/>

³⁹ <https://bluetechaccelerator.com/pt/bluetech-pt/>

⁴⁰ <https://dre.pt/application/file/a/132140881>

⁴¹ <https://dre.pt/application/file/a/114835000>

innovation and technology transfer. The Resolution of the Council of Ministers (RCM) 25/2018, of 8 March, lists eight strategic vectors of action for innovation policy, to be coordinated by the National Innovation Agency (ANI), and in coordination with other entities:

- a) Increased investment in Research and Development
- b) Entrepreneurship
- c) Technology valuation and transfer
- d) Internationalisation
- e) Improving the implementation of European structural and investment funds
- f) Reinforcement of the Interface Centres
- g) Promotion of innovation
- h) Monitoring and evaluation

As the preparation and approval of the next Partnership Agreement is underway⁴², the European Commission has defined a set of priorities for Portugal for the 2021-2027 period, related to innovative and efficient transformation and support for the competitiveness of the Portuguese economy, education and digital skills, climate change and efficient use of energy resources, an ageing population and infrastructures that allow access to quality public services⁴³.

Linked to the next Partnership Agreement is the definition of the next Intelligent Specialisation Strategies (National and Regional), which are admissibility conditions for the submission of the Portuguese proposal for the next Framework Programme to Brussels. In addition to the monitoring and evaluation of the strategies in force, and in coordination with the Agency for Development and Cohesion and the CCDR, the National Innovation Agency has organised a series of forums in order to maximise the debate on priorities and challenges throughout the various territories for the next multi-annual period 2021-2027.

Complementing the work associated with the European Cohesion Policy, in 2019, the European Commission launched the Annual Strategy for Sustainable Growth 2020⁴⁴ as part of the new cycle of the European Semester, setting out the strategic economic and employment policy for the European Union, in line with the guidelines of Ursula von der Leyen, President of the European Commission. The four key dimensions of the strategy for Europe are Environment, Productivity, Stability and Fairness.

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The upcoming decade that begins in 2021 will bring new and demanding challenges for all players in the National Innovation System. In line with the guidelines for Europe's next long-term budget, Horizon Europe, around 80 billion euros are earmarked for research and innovation programmes.

Current Commissioner for Innovation and Research, Mariya Gabriel said, at a conference in March 2020, that 'This programme aims to give Europe a new impetus for global positioning. Horizon Europe shall be the largest and most ambitious innovation and research programme of all time. It builds on the success of Horizon 2020 and further enhances it by promoting stronger support for innovation through the creation of the European Innovation Council'⁴⁵.

The proposal for the next Framework Programme for the 2021-2027 period provides a structure with three main pillars: Excellent Science; Global Challenges and European Industrial Competitiveness; and, lastly, Innovative Europe.

Associated with the definition and implementation of the next Framework Programme, and framed within the proposal presented by Ursula von der Leyen, a sum of 13.5 billion euros under Horizon Europe is proposed to target sectoral measures in Health, Energy and Mobility, Industry and Space, consistent with the objectives of the European Green Agreement, and lastly for the European Innovation Council, to provide additional means for the emergence of new businesses in the area of digitalisation and climate⁴⁶.

These priorities are huge challenges for the National Innovation System in Portugal, which has been strengthening and consolidating itself in order to respond to major societal challenges and to the negative impacts of exogenous shocks, such as those caused by SARS-CoV-2.

⁴² Portugal 2030 Strategy, approved by Resolution 98/2020 of the Council of Ministers, of 13 November (<https://dre.pt/web/guest/pesquisa/-/search/148444002/details/maximized>)

⁴³ <https://ec.europa.eu/portugal/sites/portugal/files/politica-coesao-investimentos-2021-2027-atualizado.pdf>

⁴⁴ <https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:52019DC0650&from=EN>

⁴⁵ <https://cor.europa.eu/en/news/Pages/Horizon-Europe-an-investment-in-and-for-our-future.aspx>

⁴⁶ https://ec.europa.eu/info/sites/info/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_covid19-recovery-factsheet.pdf

2 The National Innovation System

The OECD considers that there are many types of interactions between the different agents that make up a national innovation system, each country having a system with a different composition and structure.

Countries tend to specialise according to certain technological trajectories, influenced by past and present patterns of knowledge accumulation. However, the path a country takes is also determined by institutional factors, often country-specific, including a wide range of interactions

that characterise the national innovation system.

The analysis of the Portuguese Innovation System has been carried out over the last two decades. In recent years, highlight goes to the work developed by the Foundation for Science and Technology (FCT), in 2013, for the Diagnosis of the Portuguese Research and Innovation System⁴⁷, and that developed by the ANI (National Innovation Agency), including the International Comparative Analysis of the Positioning of the National Innovation System (2019)⁴⁸.

These two studies allow for a general characterisation of the Portuguese innovation system. This characterisation takes into account different types of entities and their performance: State; Higher Education and Research; Businesses; Private non-profit institutions; Financing entities and Other entities.

⁴⁷ https://www.fct.pt/esp_inteligente/diagnostico

⁴⁸ https://www.ani.pt/media/4880/relatorio_012_ani.pdf



Organisation of the National Innovation System (NIS)

A (national) innovation system (NIS) is formed by a series of players from different areas and competencies, whose interactions with each other and with other entities contribute to the production, dissemination and valorisation of knowledge.

The players of the National Innovation System – framework and regulatory bodies

In the Portuguese NIS, we can identify the main actors – public and private – responsible for or intervening in innovation policy, as well as the main promoters and coordinators of programmes and initiatives to promote and support R&D and innovation activities.

• **Government and Ministries:** through different government areas, these structures are responsible for defining thematic and/or cross-cutting priorities from different angles of innovation. Thus, as in many European countries, activities or policy initiatives in the area of innovation are carried out by almost all areas of government, from the most cross-cutting areas, such as Economics, Science or Education, to more thematic areas such as Environment, Sea or Defence. Below are six cross-cutting government areas that have a major impact on the National Innovation System:

- **Governmental area of the Economy:** In the recent past, it was responsible for launching programmes aimed at empowering the Portuguese economy through value and knowledge, such as the Interface Programme, the Industry 4.0 Programme or StartUp Portugal. In addition to the public policy initiatives launched, the Government area in charge of the Economy oversees a number of public bodies responsible for implementing and monitoring the initiatives launched, such as IAPMEI, the StartUp Portugal Association or the ANI – National Agency for Innovation⁴⁹.

- **Government area for Science, Technology and Higher Education:** responsible for coordinating higher education and advanced training of human resources, as well as capacity building and support for technological infrastructures and their R&D production capacity and valorisation. In the last legislative cycle, this area was responsible for launching or coordinating a number of initiatives, such as the Collaborative Laboratories (within the Interface Programme), Born From Knowledge, the programme for the development of digital competencies – INCoDe 2030 and several strategies linked to digital technologies such as Portugal Space 2030, the National Strategy for Artificial Intelligence or the National Strategy for the Security of Cyberspace. ANI is also partly under this government area.

- **Government area in charge of Planning:** responsible for coordinating work on the Partnership Agreement between Portugal and the European Commission. The AD&C – Agency for Development and Cohesion leads the discussions for all the multi-annual framework programmes, as well as coordinating the implementation, monitoring and evaluation of funds from the Thematic and Regional Operational Programmes.

⁴⁹ The ANI – National Agency for Innovation has a dual supervision attribution: government areas of Economics and Science, Technology and Higher Education.

- **Government area in charge of Justice:** this is the main government area responsible for designing and implementing actions related to Industrial Property in Portugal. Under the INPI - National Institute of Industrial Property, the government area in charge of justice manages the evaluation and maintenance of patents and utility models, industrial designs, logos and trademarks. It is also the government area responsible for registration and notary affairs, essential for the promotion of a good environment for business and entrepreneurship.

- **Government area in charge of Education:** responsible for vocational education and training (excluding that provided by Higher Education Institutions) in Portugal. Supervising ANQEP - National Agency for Qualifications and Vocational Education (shared supervision with the government area for Labour and Social Security), responsible for the implementation of education and vocational training policies for youths and adults and for ensuring the development and management of the system of recognition, validation and certification of skills.

- **Government area in charge of Administrative Modernisation:** responsible for initiatives aimed at modernising and simplifying public administration. Supervising AMA - Administrative Modernization Agency, responsible for managing the Simplex+ Programme, with the aim of simplifying access and procedures developed by Public Institutions.

• **Parliament⁵⁰:** this is one of the two elected bodies of sovereignty provided for in the Constitution and consists of a single chamber of deputies, called the Assembly of the Republic. Representing all citizens, it has exclusive legislative competence in constitutionally determined matters, as well as supervising the activities of the Government and the Administration and compliance with the Constitution and legislation.

• **Advisory Bodies:** representing the bodies or centres that specialise in specific areas, which act to support and set strategic priorities for the country, give opinions on the design and implementation of public policy initiatives or on their execution or evaluation. Some of these bodies, because they represent certain types of entities linked to Knowledge and Innovation, can also act in the identification of difficulties or opportunities encountered during their current or future activity.

- **National Council for Science, Technology and Innovation:** Under the 'Science Act', enacted in 2019⁵¹, it is a body that works with the members of the Government responsible for the areas of economy and science and technology. Responsible for

collaborating in the development and maintenance of the national scientific and technological system, ensuring scientific advice in the development of policies and the functioning of public services and promoting the transversal and interministerial coordination of science and technology policies.

- **CRUP - Council of Rectors of Portuguese Universities⁵²:** a coordinating body for university education in Portugal, which includes, as full members, a total of 16 public higher education institutions. The focus of its work is, among others, the formulation of national education, science and culture policies, pronouncement on draft legislation and budgetary issues, and proximity with similar international bodies.

- **CCISP - The Portuguese Polytechnics Coordinating Council⁵³:** The CCISP is the body that represents not only the public polytechnic institutes but also the Universities of the Azores, Algarve, Aveiro and Madeira. It also issues opinions and positions on matters related to higher education, namely those coming from the Education and Science Commission of the Portuguese Parliament.

- **CES - Economic and Social Council⁵⁴,** the body responsible for economic and social policy consultation and agreement, which is involved in drawing up economic and social development plans, and gives views on the preliminary drafts of major options and economic and social development plans before they are approved by the government, and on the reports on their implementation.

• **Studies and Statistics:** bodies engaged not only in the collection and processing of information (both general information and information focused on knowledge and innovation), but also in the production of studies and technical reports, including in the area of knowledge and innovation.

- **INE - Statistics Portugal⁵⁵:** aims to produce, in an independent and impartial manner, quality official statistical information, and to promote the coordination, analysis, innovation and dissemination of national statistical activity. It is a partner of the European Union's statistical authority and the statistical authorities of the Member States (which include the national statistical institutes and other national authorities responsible for the development, production and dissemination of European statistics).

- **GEE - Strategy and Studies Office⁵⁶:** aims to provide technical support to the heads of the Ministry of Economy in defining economic policy and strategic planning, as well as support the different bodies by developing studies and collecting and processing information.

50 <https://www.parlamento.pt/>

51 <https://dre.pt/application/conteudo/122317422>

52 <http://www.crup.pt/>

53 <https://ccisp.pt/pt/inicio/>

54 <https://www.ces.pt/index.php>

55 https://www.ine.pt/xportal/xmain?xpgid=ine_main&xpid=INE

56 <https://www.gee.gov.pt/pt/>

DGEEC – Directorate General of Education and Science Statistics⁵⁷: aims to ensure the production and statistical analysis of education and science, providing technical support for policy formulation and strategic and operational planning, to create and ensure the proper functioning of the integrated information system in the same areas, and to observe and evaluate the overall results obtained in conjunction with other services in the areas of education and science.

- GEP – Strategy and Planning Office⁵⁸: aims to ensure technical support for policy formulation and strategic and operational planning, in coordination with financial programming, ensuring the production and dissemination of statistical information in addition to the coordination of scientific and technical information of the Ministry of Labour, Solidarity and Social Security (MTSSS).

• Implementation and execution of the innovation policy: in close relationship with government areas, are the entities that coordinate the design, implementation and monitoring of public policy initiatives, cross-cutting or sectoral.

- ANI – National Innovation Agency⁵⁹: aims to develop actions to support technological and business innovation in Portugal, contributing to the consolidation of the National Innovation System (NIS) and strengthening the competitiveness of the national economy in global markets. The ANI is responsible for pursuing the guidelines for a technological and business innovation strategy for Portugal, 2018–2030, namely by encouraging private investment in research and development (R&D), promoting collaboration between entities of the scientific and technological system and the business fabric, and increasing participation in networks and international programmes by the companies and entities of the national scientific and technological system, namely Higher Education Institutions and Interface Centres, with a view to promoting their skills and competencies, and the results of the innovation support policy. The ANI is also responsible for promoting and disseminating, at a national and international level, in collaboration with other entities, namely IAPMEI, AICEP and FCT, cases of successful innovation in Portugal, helping to portray Portugal as an innovative country and justify growing investments, through returns for the economy and for the well-being and quality of life of the population. In addition, it also has management functions, together with the Development Finance Institution of FITEC – Fund for Innovation, Technology and Circular Economy (see chapter 11)⁶⁰:

- IAPMEI – Agency for Competitiveness and Innovation⁶¹: aims to promote competitiveness and business growth, ensure support for the design, implementation and evaluation of policies aimed at industrial activity, with a view to strengthening innovation, entrepreneurship and business investment in companies operating in areas under the Ministry of Economy, namely small and medium-sized enterprises, with the exception of the tourism sector and the monitoring powers in this area assigned to the Directorate General for Economic Activities. IAPMEI promotes a wide range of programmes, initiatives and services to support enterprises and its intervention focuses on the areas of entrepreneurship and innovation, the stimulation of business innovation and innovation management, and the promotion and monitoring of collective efficiency dynamics, namely clusters.

- FCT – Foundation for Science and Technology⁶²: national public agency to support research in science, technology and innovation in all areas of knowledge. Under the Ministry of Science, Technology and Higher Education, the FCT aims to continuously promote the advancement of scientific and technological knowledge in Portugal, achieve the highest international standards of quality and competitiveness in all scientific and technological fields and stimulate its dissemination and contribution to society and the productive fabric. Currently, the FCT provides a set of funding instruments aimed at scientists, research teams and R&D centres⁶³.

- Startup Portugal – Portuguese Association for the Promotion of Entrepreneurship⁶⁴: public utility association whose mission is developing activities of public interest, in the context of the promotion of entrepreneurship. INE – Statistics Portugal: aims to produce, in an independent and impartial manner, quality official statistical information, and to promote the coordination, analysis, innovation and dissemination of national statistical activity. It is a partner of the European Union's statistical authority and the statistical authorities of the promotion of entrepreneurship based on innovation and added value, in close liaison with public and private entities operating in the national ecosystem of entrepreneurship. Despite its interaction with other government areas and public institutions, Startup Portugal's action supports the National Strategy for Entrepreneurship coordinated by the Ministry of Economy, also supporting IAPMEI's action in the implementation of instruments to support entrepreneurship. It is worth mentioning the very important role of this association in supporting entrepreneurship, with the consolidation of the National Network of Incubators, actions to internationalise Portuguese start-ups or boost support for national start-ups to

⁵⁷ <https://www.dgeec.mec.pt/np4/home>

⁵⁸ <http://www.gep.mtsss.gov.pt/web/gep/inicio>

⁵⁹ <https://www.ani.pt/>

⁶⁰ <https://dre.pt/application/file/a/105658999>

⁶¹ <https://www.iapmei.pt/>

⁶² <https://www.fct.pt/>

⁶³ <https://www.fct.pt/apoios/>

⁶⁴ <https://dre.pt/application/file/a/120464212>

participate in the Web Summit (Road 2 Web Summit).

- **AMA – Administrative Modernization Agency**⁶⁵: the public institute that carries out the tasks of the Ministry of State Modernisation and Public Administration in the areas of administrative modernisation and simplification and electronic administration. Its action is divided into 3 axes: Customer Service, Digital Transformation and Simplification. The AMA has a strong role in coordinating the SIMPLEX+ Programme – a strategy for administrative modernisation across government and central and local public administration services. In 2016, this Programme comprised 255 measures, in 2017, 237 measures, in 2018, 268 measures, and in 2019, 119 measures⁶⁶.

- **AD&C – Agency for Development and Cohesion**⁶⁷: This is a public institute whose task is to coordinate regional development policies and to ensure the general coordination of the European Structural and Investment Funds (ESIF). Responsible for the technical coordination of Portugal 2020 and for providing support for the functioning of the body that ensures policy coordination for all the ESIF.

- **AICEP Portugal Global – Trade & Investment Agency**⁶⁸: a public entity of a business nature geared towards developing a competitive business environment that contributes to the globalisation of the Portuguese economy. In addition to providing support and advice on how best to approach foreign markets and identify international business opportunities, this entity monitors and manages instruments that enhance the attraction of foreign direct investment, through the management of contractual schemes provided for in the Operational Programme for Competitiveness and Internationalisation.

- **Turismo de Portugal**⁶⁹: is the national tourism authority, its aim is the promotion, enhancement and sustainability of tourism activity, bringing together all the institutional skills relating to the stimulation of tourism from supply to demand. Turismo de Portugal is also responsible for controlling, inspecting and regulating the exploitation and practice of gambling in Portugal. This entity has strong links to innovation in the tourism sector, for the reasons mentioned above and also because it coordinates the stimulation of the network of hotel schools, promoting the training of human resources linked to the area and has launched many initiatives, for example, through the European Structural and Investment Funds.

• **Support for Investment and Financing**: these entities are in the Innovation System to provide access to and manage financing instruments necessary for

the development of projects or companies with technological capacity or potential. In addition to providing the instruments to support investment and financing, public and private institutions also support their beneficiaries with technical, administrative and financial intelligence services.

- **IFD – Instituição Financeira de Desenvolvimento**⁷⁰: aims to direct public financial resources, preferably leveraging them with private co-financing, so that SMEs can capitalise and finance their investments. Its products include several initiatives in the area of venture capital and mutual guarantees, and related to the first group are two funds resulting from a partnership with the European Investment Fund (Portugal Growth and Portugal Tech). In addition to its national and international institutional partners and financing programmes, the body has 22 banking institutions, 15 venture capital companies and 35 Business Angels as partners.

- **PME Investimentos – Sociedade de Investimento**⁷¹: created in 1989, its aim is to promote the stimulation and extension of the supply of financing to companies in the non-financial sector through the management of special investment funds, public policy vehicles to support the financing of companies, in equity and credit. This body manages the 200M Fund^{72 73}, FINOVA – Fund to Support Financing for Innovation⁷⁴ (see Chapter 8), the Syndication Fund and FACCE – Autonomous Fund to Support Company Merger and Consolidation Operations, aimed at promoting entrepreneurship, innovation, competitiveness and internationalisation of the Portuguese business sector. It has 30 investment partners and 54 business angel entities as partners. Additionally, the Social Innovation Fund (SIF)^{75 76} (see Chapter 11).

- **SPGM – Sociedade de Investimento**⁷⁷: coordinates the Portuguese Mutual Guarantee System whose aim is to provide financial guarantees for national companies. This system is also composed of four mutual guarantee societies (Norgarante⁷⁸, Lisgarante⁷⁹, Garval⁸⁰ and Agrogarante⁸¹) spread out geographically, working to facilitate access to bank credit for companies and on more favourable terms (price and financing term), through protocols with most credit institutions operating in Portugal. Its products focus on the areas of Investment, Cash Management, Export and Import, Contractual Guarantees, Sector Offers and Entrepreneurship.

- **Venture Capital Management Companies**: The main purpose of venture capital fund management companies is to manage venture capital investment

65 <https://www.ama.gov.pt/>

66 <https://www.simplex.gov.pt/medidas>

67 <https://www.adcoesao.pt/>

68 <http://www.portugalglobal.pt/PT/Paginas/Index.aspx>

69 <http://www.turismodeportugal.pt/pt/Paginas/homepage.aspx>

70 <http://www.ifd.pt/pt/>

71 <https://www.pmeinvestimentos.pt/>

72 <https://www.200m.pt/>

73 https://dre.pt/web/guest/legislacao-consolidada/-/lc/123628779/201912011022/exportPdf/normal/1/cacheLevelPage?_LegislacaoConsolidada_WAR_drefrontofficeportlet_rp=diploma

74 https://dre.pt/web/guest/legislacao-consolidada/-/lc/67025093/201903171933/exportPdf/normal/1/cacheLevelPage?_LegislacaoConsolidada_WAR_drefrontofficeportlet_rp=diploma

undertakings and specialised alternative investment undertakings and, as their corporate purpose, to make venture capital investments⁸². Investment in venture capital is considered to be the acquisition, for a limited period of time, of equity and debt instruments in companies with high development potential, as a means of benefiting from their valuation. According to the Securities Market Commission (CMVM)⁸³, on 31 December 2019, there were 52 Active Companies and 135 Venture Capital Funds⁸⁴ with a total net value of 4.45 billion euros.

- Portugal Capital Ventures – PV⁸⁵: established in 2012, responsible for public investment in Venture Capital, operating under the same conditions and terms applicable to any private company and subject to general national and EU competition rules. Both the company and the Funds it manages are subject to the supervision of the Securities Market Commission (CMVM). It has 15 shareholders and a network of more than 70 partners that link the entity to the main players in the entrepreneurial ecosystem. PV invests in four areas (digital, engineering & manufacturing, life sciences and tourism), in pre-seed, seed and A series stages and in investment tickets from 300 thousand euros to 1.5 million euros.

Regulation, Accreditation and Standardisation: entities that are mainly involved in defining the regulatory framework to be applied to the different entities with which knowledge and innovation intersect. Encompasses independent entities and public bodies, many of which also assume functions similar to those involved in the definition and implementation of innovation policy or to investment and financing support entities.

- Banco de Portugal⁸⁶: the central bank of the Portuguese Republic, forming part of the Eurosystem and the European System of Central Banks, the Single Supervisory Mechanism and the Single Resolution Mechanism. Its tasks are related to monetary policy; Asset and reserve management; Prudential supervision; Resolution; Macro-prudential policy; Payment systems; Regulation and supervision of the foreign exchange market; Currency issuance; Compilation and production of statistics; Production of economic studies and analyses; International Activity and Relations with the State.

- ANACOM – Autoridade Nacional de Comunicações⁸⁷: has the task of regulating the communications sector, including electronic and

75 <https://dre.pt/application/file/a/115200767>

76 <https://www.fis.gov.pt/>

77 <https://www.spgm.pt/pt/institucional/sobre-nos/spgm-sociedade-de-investimento/>

78 <https://www.norgarante.pt/pt/>

79 <https://www.lisgarante.pt/pt/>

80 <https://www.garval.pt/pt/>

81 <https://www.agrogarante.pt/pt/>

82 <https://dre.pt/application/file/a/66651924>

83 <https://www.cmvm.pt/pt/Estatisticas/SeriesLongas/Pages/default.aspx>

84 The Funds are available at https://web3.cmvm.pt/sdi/capitalrisco/pesquisa_nome_fcr.cfm

75 <https://dre.pt/application/file/a/115200767>

postal communications and, without prejudice to its nature as an independent administrative entity, assisting the Government in these areas.

- AdC – Autoridade da Concorrência⁸⁸: aims to ensure the application of the rules of promotion and protection of competition in the private, public, cooperative and social sectors, respecting the principle of market economy and free competition, with a view to ensuring the efficient functioning of markets, the optimum allocation of resources and the interests of consumers. Free competition is fundamental to the innovation process.

- CMVM – Portuguese Securities Market Commission⁸⁹: aims to regulate financial instrument the markets, as well as the agents that operate therein, promoting the protection of investors.

- IMPIC – Institute of Public Markets, Real Estate and Construction⁹⁰: a public institute that carries out tasks in the areas of construction, real estate and public procurement. Aims to regulate and supervise the construction and real estate sector, to energise, supervise and regulate the activities developed in this sector, to produce statistical information and sector analyses, and to ensure the coordinated action of state agencies and the sector, as well as the regulation of public contracts.

- IPQ – Instituto Português da Qualidade⁹¹: public institute whose aim is to coordinate the Portuguese quality system, to promote and coordinate activities aimed at contributing to demonstrate the credibility of the action of economic agents, as well as to develop the activities necessary for its functions as the National Metrology Institute and the National Standardisation Body.

- IPAC – Instituto Português de Acreditação⁹²: the national accreditation body, in charge of the evaluation and recognition of the technical competence of entities that carry out specific conformity evaluation activities (example: tests, calibrations, certifications and inspections).

- APA – The Portuguese Environment Agency⁹³: entity whose aim is to propose, develop and monitor the integrated and participatory management of

76 <https://www.fis.gov.pt/>

77 <https://www.spgm.pt/pt/institucional/sobre-nos/spgm-sociedade-de-investimento/>

78 <https://www.norgarante.pt/pt/>

79 <https://www.lisgarante.pt/pt/>

80 <https://www.garval.pt/pt/>

81 <https://www.agrogarante.pt/pt/>

82 <https://dre.pt/application/file/a/66651924>

83 <https://www.cmvm.pt/pt/Estatisticas/SeriesLongas/Pages/default.aspx>

84 The Funds are available at https://web3.cmvm.pt/sdi/capitalrisco/pesquisa_nome_fcr.cfm

85 <https://www.portugalventures.pt/>

86 <https://www.bportugal.pt/>

87 https://www.anacom.pt/render.jsp?categoryId=CATEGORY_ROOT&languageId=0

88 <http://www.concorrencia.pt/vPT/Paginas/HomeAdC.aspx>

89 <https://www.cmvm.pt/pt/Pages/home.aspx>

90 <http://www.impic.pt/impic/pt-pt/>

environmental and sustainable development policies, in conjunction with other sectoral policies and in collaboration with public and private entities that contribute to the same end, with a view to a high level of protection and enhancement of the environment and providing high quality services to citizens.

- **ADENE – Agência para a Energia:** aims to develop activities of public interest in the area of energy, efficient use of water and energy efficiency in mobility. ADENE is responsible for managing the National Energy Certification System (SCE), the Intensive Energy Consumption Management System (SGCIE) and others assigned to it. ADENE also manages the Innovation Support Fund (FAI)⁹⁴ and the Energy Efficiency Fund (FEE)⁹⁵.

- **Directorate General of Maritime Policy (DGPM):** a central service with administrative autonomy, which is part of the direct administration of the State. Responsible for supporting the coordination and management of public policies in matters concerning the Sea, considering the transversality of this theme at both the national and international levels. Its mission is to develop and update the National Strategy for the Sea, to draw up and propose the national policy for the sea, to plan and organise the maritime space in its different uses and activities, to monitor and participate in the development of the European Union's Integrated Maritime Policy and to promote national and international cooperation in matters concerning the sea. In addition, it also supports the management of Fundo Azul⁹⁶.

- **INPI – Portuguese Institute of Industrial Property**⁹⁷: aims to ensure the protection of Industrial Property, granting and promoting Industrial Property Rights, with a view to contributing to innovation, competitiveness and economic growth. In Portugal, it is responsible for granting rights on trademarks, logos, patents, utility models, designs, appellations of origin and geographical indications and for ensuring that national and international legislation is respected during the awarding process. Abroad, it works with various organisations to ensure that rights granted in Portugal can be protected in other countries and to ensure that trademark, patent and design rights registered abroad can be protected in Portugal.

• **Qualifications, Education and Training:** includes basic and vocational education entities, responsible for the first phase of preparing people for the development of knowledge and innovation activities.

- **Compulsory education institutions:** In Portugal, compulsory education covers students aged 6–18, i.e. primary education (1st, 2nd and 3rd cycles) and secondary education. In secondary education, there are several modalities available, which are distinguished by characteristics that suit different interests and situations. In addition, there are suitable education/training modalities for those who have left school early or wish to extend their schooling⁹⁸. According to DGECC, and taking into account figures for the 2018/2019 school year, around 1.37 million pupils and almost 131,000 teachers were enrolled in primary and secondary education⁹⁹. Compared to the 2007/2008 school year, there was a 10.8% decrease in students enrolled¹⁰⁰ and a 17.4%¹⁰¹ decrease in teachers in office.

› **Professional Training:** according to the Education and Training Courses Portal, there are three stages of professional training in the Portuguese Educational and Training System: Professional Courses in Secondary Education; Technological Specialisation Courses in Post-Secondary Education and Professional Higher Technical Courses in Higher Education¹⁰². Of the students enrolled in secondary education in Portugal in the year 2018/2019, around 40% were enrolled in vocational courses¹⁰³.

91 <http://www1.ipq.pt/PT/Pages/Homepage.aspx>

92 <http://www.ipac.pt/>

93 <https://apambiente.pt/>

94 Created in 2013, it is mainly intended to finance the national scientific system in the field of innovation and technological development, primarily in the area of renewable energy, particularly wind energy. Its intervention results in repayable grants and non-repayable grants, it is managed by ADENE - Agência para a Energia. <https://dre.pt/application/file/a/1035193>

95 A fund created in 2010 with the aim of financing the measures set out in the National Action Plan for Energy Efficiency (PNAEE), it supports projects of a predominantly technological nature in the areas of transport, residential and services, industry and public sector; and supports wide ranging actions inducing energy efficiency in the areas of behaviour, taxation and incentives and financing. In addition, it can support projects not set out in the NEEAP but which have been shown to contribute to energy efficiency. <https://dre.pt/application/file/a/614762>

96 Created in 2016, it aims to develop the sea economy, scientific and technological research, protection and monitoring of the marine environment and maritime safety, through the creation or strengthening of funding mechanisms for entities, activities or projects. The objectives of the fund are pursued through equity instruments, share-capital instruments and, within the framework of scientific research and the monitoring and protection of the maritime environment, through total or partial non-reimbursable funding.

97 <https://inpi.justica.gov.pt/>

98 <http://www.anqep.gov.pt/default.aspx>

99 <https://www.dgeec.mec.pt/np4/96/> <https://www.dgeec.mec.pt/np4/96/>

100 <https://www.pordata.pt/Portugal/Alunos+matriculados+por+n%c3%advel+de+ensino+e+sexo-1005>

101 <https://www.pordata.pt/Portugal/c%c3%adcio+nos+ensinos+pr%c3%a9+escolar++b%c3%alsico+e+secund%c3%a1rio+total+e+por+n%c3%advel+de+ensino-240>

102 <https://www.ofertaformativa.gov.pt/#/sistema-educativo>

103 <https://www.dgeec.mec.pt/np4/96/> <https://www.dgeec.mec.pt/np4/96/>

The actors of the National Innovation System – entities of production, use and dissemination of knowledge, technology and innovation

• **Higher Education and Research:** includes public and private higher education entities, and their associated R&D development agencies.

- **Higher Education Institutions:** is organised through a binary system, which includes university teaching and polytechnic teaching, at public and private institutions. These entities benefit from scientific, pedagogical, cultural and disciplinary autonomy¹⁰⁴. In 2005, a process of reform of the Education System Framework Law was initiated in order to implement the Bologna Process, and the European Credit Transfer System (ECTS) was introduced into study cycles, mobility mechanisms, diploma supplement, among others. The System now has a new structure comprising 3 study cycles, a process that was completed in 2009/2010. In 2014, a non-academic degree course was created, called a technical higher professional course. To date, there are 14 public universities, 23 private universities, 20 public polytechnic institutes and 47 private polytechnic institutes¹⁰⁵. As well as training, one of the objectives of higher education is 'to encourage the scientific research and investigation work, aiming to develop science and technology, humanities and arts, and create and disseminate culture and, in this way, develop the understanding of Man and its environment'¹⁰⁶. The Foundation for Science and Technology is the public entity in charge of the certification, evaluation and financing of two types of entities, associated with the development of scientific and technological knowledge in Higher Education, despite including private bodies. These types of entities are the R&D Units and the Associated Laboratories, framed by the 'Law of Science', approved on 16 May 2019¹⁰⁷. Currently, 348 R&D Units¹⁰⁸ and 26 Associated Laboratories are assessed¹⁰⁹.

• **State Laboratories**¹¹⁰: These entities, created in 1999¹¹¹ and restructured in 2006¹¹², are public research institutions created and maintained with the specific purpose of pursuing the objectives of the scientific and technological policy adopted by the Government, through the pursuit of scientific research and technological development activities, as well as other planned scientific and technical activities, such as the provision of services, support to industry,

expertise, standardisation, certification, regulation and others. There are currently eight state laboratories: (i) Hydrographic Institute; (ii) Instituto Nacional de Saúde Ricardo Jorge; (iii) National Laboratory for Civil Engineering; (iv) Portuguese Institute for the Sea and the Atmosphere; (v) Instituto Nacional de Investigação Agrária e Veterinária; (vi) Laboratório Nacional de Energia e Geologia; (vii) Instituto de Medicina Legal; (viii) Laboratório Nacional do Medicamento¹¹³. Of the 8 existing organisations, seven are currently active and, according to the 2020 State Budget, will have a total budget for the economic year 2020 of around 224.12 million euros.

• **Collaborative networks and technology transfer:** entities or groups of entities that, as well as having the capacity to develop knowledge, provide support to the interface between knowledge and the market in its different forms, such as, for example, the development of collaborative projects, bringing together people who are potentially interested in certain objectives or promoting Portuguese products or innovative companies nationally and internationally.

• **Technology Centres (TC) and Technology Enhancement and Transfer Centres (CVTT):** these structures act as intermediary organisations between science and industry, bringing together a set of skills that enable them to support the development of R&D and innovative solutions, laboratory testing, standardisation and certification, as well as a number of other activities related to training and intelligence from national and external markets. In the mapping exercises for these infrastructures organised by ANI, eight TC and 52 CVTT¹¹⁵ with legal personality were identified in 2016, with the figures rising to seven TC and 48 CVTT in 2020¹¹⁶. Among these infrastructures, the following Interface Centres stand out:

› Interface Centres (CIT)¹¹⁷ are entities of the NIS that cumulatively carry out technical and technological business assistance and R&D activities, provided that they are non-profit making, have a corporate purpose and develop relevant activities in the supply of market failures, weaknesses and structural deficits at the level

¹⁰⁴ <https://www.dges.gov.pt/pt/pagina/autonomia>

¹⁰⁵ Military establishments are not included.

¹⁰⁶ <https://dre.pt/application/file/a/245260>

¹⁰⁷ <https://dre.pt/application/conteudo/122317422>

¹⁰⁸ <https://www.fct.pt/apoios/unidades/avaliacoes/2017/resultados.phtml.pt>

¹⁰⁹ <https://www.fct.pt/apoios/unidades/las>

¹¹⁰ <https://dre.pt/web/guest/lexionario/-/dj/115425075/view>

¹¹¹ <https://dre.pt/application/conteudo/534998>

¹¹² <https://dre.pt/application/conteudo/541802>

¹¹³ <https://dre.pt/application/file/a/69920241>

¹¹⁴ <https://dre.pt/application/file/a/130891365>

¹¹⁵ https://www.ani.pt/media/4382/caracteriza%C3%A7%C3%A3o-infraestruturas-tecnol%C3%B3gicas_v4_2018.pdf

¹¹⁶ In addition to these types, and excluding Science and Technology Parks and Technology Based Incubators, 50 infrastructures in higher education institutions, 8 technology and knowledge transfer units and 1 R&D and education institution were mapped in 2020.

¹¹⁷ <https://dre.pt/application/file/a/108029684>

of technical and technological services, and have an autonomous organisational structure with their own staff with technical and scientific skills, as well as the material means required for their activity. In 2017¹¹⁸ 28 entities were recognised as Interface Centres. Subsequently, in 2019¹¹⁹, three more entities were recognised. ANI is the body responsible for monitoring, mentoring and promoting the CIT¹²⁰.

- **Collaborative Laboratories (CoLAB)**¹²¹: applied R&D institutions, whose main objective is the collaboration of their members in the pursuit of short- and medium-term common research and innovation agendas aimed at creating qualified employment and economic and social value. Recognition is granted by the FCT for a period of five years to non-profit associations or commercial enterprises, according to the evaluation of a set of defined parameters, which may be revoked if certain conditions are met during intermediate evaluations. ANI is the entity responsible for monitoring, mentoring and promoting the CoLABs¹²².

- **TTO – Technology Transfer Offices**: the network of TTOs¹²³ (OTIC and GAPI) comprises about 40 entities, mostly in higher education entities, but also some in Technological Centres or sector associations. Technology and Knowledge Transfer Workshops (OTIC) comprise mediating entities in order to identify and promote the transfer of new and innovative ideas and concepts to the business fabric, contributing to our country's growing economic, social and business development.

- **Fablabs and Living Labs**: typically, a FabLab consists of a set of rapid prototyping tools and computers and their respective computer programming tools. In Portugal, the FabLabs Portugal Association¹²⁴ is the entity whose main objective is to promote the FabLab concept in Portugal, establishing the network of spaces where any citizen has access to a network of knowledge and technology of worldwide scale, following an open source logic. This association includes for 21 entities active in the country¹²⁵. Living Labs are defined as open, user-centred innovation ecosystems, based on a systematic approach of co-creation, integrating research and innovation processes into real-life communities and contexts. Living Labs are organisations that aim to foster open and collaborative innovation. They operate as intermediaries between citizens, research organisations, businesses, cities and regions with a view to co-creating value, rapid prototyping or validation to extend innovation and business. The implementation of Living

Labs in Portugal started in the 90's and 16 Living Labs have already been registered in several different areas¹²⁶. **Competitiveness clusters**¹²⁷: knowledge and skill aggregating platforms, consisting of partnerships and networks that include companies, business associations, public entities and relevant support institutions, namely non-business entities of the Research and Innovation System, that share a common strategic vision to achieve, through cooperation and the achievement of economies of agglomeration, higher levels of competitive capacity. In 2017, 20¹²⁸ entities were recognised, in accordance with conditions defined by the Government in 2015¹²⁹ and operationalised by IAPMEI. Currently, only 18 entities are active, with recognition valid until 2023¹³⁰. In 2019, the Government wanted to encourage a closer proximity to these entities in order to define joint strategic agendas for the different value chains. 16 Sectoral Pacts for Competitiveness and Internationalisation were signed¹³¹, reinforcing the objectives of each of the Collective Efficiency Strategies and mobilising a set of instruments and commitments for future activities.

- **Supplier Clubs**: an initiative created in 2017, as part of the National Reform Programme and the INTERFACE Programme, it aims to increase the participation of Portuguese entities (SMEs and entities of the research and innovation system) in the supply of centres of specialisation, namely those set up in Portugal, around Nuclear Companies and by stimulating clustering dynamics with a structural impact on the territory. This is intended to recognise and support Portuguese entities that are already able to contribute to the distinction of large companies/brands in the world, present in Portugal, boosting their chances of entering other international value chains. This initiative involves the selection of nuclear companies and the submission of network proposals for consolidation¹³². Initially, the Bosch network was recognised, followed by the Volkswagen Autoeuropa and Peugeot Citroen Portugal networks¹³³.

• **Entities and structures supporting entrepreneurship and business R&D**: structures focused on the development of innovative ideas and businesses, bringing together a range of infrastructure and support services that are complementary and necessary to the success of their beneficiaries.

- **Technology-based incubators**: Incubators are organisations designed to accelerate the growth and success of companies and business ideas, providing not only space for business installation and development but also providing a set of resources and services

118 <https://dre.pt/application/file/a/114248249>

119 <https://dre.pt/application/file/a/125008783>

120 https://www.ani.pt/media/5304/af_brochura_digital_pt_062020.pdf

121 <https://www.fct.pt/apoios/CoLAB/>

122 <https://www.ani.pt/media/4376/brochura-colab.pdf>

123 https://www.ani.pt/media/5200/knowledge_transfer_network_portugal.pdf

124 <http://www.fablabportugal.pt/>

125 <http://www.fablabportugal.pt/fablab-ativos/>

126 https://www.ani.pt/media/4880/relatorio_012_ani.pdf

127 <https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Empreendedorismo-Inovacao/Eficiencia-Coletiva-e-Clusters.aspx>

128 <https://www.iapmei.pt/Paginas/Clusters-de-competitividade-reconhecidos-pelo-IAPM.aspx>

129 <https://dre.pt/application/file/a/66817438>

130 The Creative Industries Cluster and the Forestry Industries Cluster were extinguished.

131 <https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Empreendedorismo-Inovacao/Eficiencia-Coletiva-e-Clusters/Pactos-Setoriais.aspx>

132 https://www.compete2020.gov.pt/admin/images/20170220_AAC_CLUBE_DE_FORNECEDORES.pdf

133 <https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Incentivos-Financiamento/Sistemas-de-Incentivos/Incentivos-Portugal-2020/Clube-de-Fornecedores.aspx>

that can influence their efficiency and development. According to the National Network of Incubators¹³⁴, by 2019 there were 158 incubators owned by 135 institutions, most of which mainly aim for regional impact.

- **Science and Technology Parks:** spaces that promote a culture of innovation and competitiveness among the entities based there, stimulating and managing the flow of knowledge and technologies; facilitating the creation and growth of innovative companies; and providing other value-added services. TecParques - Portuguese Association of Science and Technology Parks represents 23 institutions geographically distributed throughout the country¹³⁵. In addition, in the same mapping of technological infrastructures referred to in the previous point, the National Innovation Agency mapped 15 existing structures in Portugal in 2016 and 17 in 2020.

- **EEN - European Enterprise Network¹³⁶:** platform that helps companies to innovate and grow on an international scale. It is the largest support network for SMEs with international ambitions, worldwide - this network is spread over more than 60 countries and brings together more than 3000 experts from over 600 organisations. In Portugal, this network is coordinated by IAPMEI.

- **PERIN Network¹³⁷:** established in 2019, the promotion of R&D, innovation and digital transformation activities has been a national priority within the framework of public policies and their effective insertion into the European context. It has the following objectives: monitoring the preparation, promotion and implementation of the European Union R&D Framework Programmes and other instruments such as the European Innovation Council and the Eureka/Eurostars Programme; coordinating activities in the area of higher education and post-secondary training, in close collaboration with the Directorate-General for Higher Education and other agencies; and coordinating the preparation of the Portuguese Presidency of the Council of the European Union in 2021 in the area of science, technology and higher education. ANI, FCT and AICIB¹³⁸ are the main entities coordinating the PERIN Network.

- **Business associations (sectoral, regional and municipal):** These organisations have an important role in the NIS, justified by the coordination of efforts of business entities, not only in developing capacity in a specific technological field or sector, but also in promoting the results and consequent internationalisation. It is important to note the role of the CIP - Confederação Empresarial de Portugal (Business Confederation of Portugal), which, through its members (multisectoral, regional, sectoral associations, chambers of commerce and industry and companies) represents 150,000 companies, 1.8 million workers

and 71% of GDP. The second association to note is COTEC Portugal - Business Association for Innovation, which is the main Portuguese business association for the promotion of innovation and technological business cooperation. It encompasses multinational companies, large national groups and SMEs from various sectors of activity, representing over 16% of GDP.

- **Consulting Entities:** this type of entity has an undeniable importance in what can be the evolution process of SMEs. Most of them work in business development processes and legal and financial support, but also work to foster partnerships and help to build bridges for value creation within companies. At least 44% of all Portugal 2020 applications submitted for business support instruments include the intervention of consultants (this figure amounts to 55% when considering only the 'Business Innovation and Entrepreneurship' instrument). This highlights how important these entities are for value creation within companies.

- **Private capital foundations:** several entities that support Research and Innovation in Portugal. The ePortugal.gov.pt website lists all the Foundations and legal persons of public utility in Portugal. Some of the Foundations in Portugal that play a very important role in promoting research and innovation in various thematic areas are the Calouste Gulbenkian Foundation, the Champalimaud Foundation and the Francisco Manuel dos Santos Foundation. We must also mention economic foundations, such as the Bial Foundation, the EDP Foundation or the la Caixa Foundation. It is also worth mentioning the initiative carried out by the Portuguese Foundation Centre, which brings together several of the main organisations in Portugal. At a time of great difficulty caused by SARS-CoV-2, it published a set of initiatives by the Foundations that contribute to the fight against the virus¹³⁹.

• **Companies:** they are central entities in the innovation system, as they are defined by the performance of economic activities, when producing and marketing goods and services. Companies can introduce innovations in different ways, as described in the Oslo Manual. A valid instrument for measuring innovation in Portuguese companies is the Community Innovation Survey, which, in its most recent edition, states that in 2018, 32.4% of companies in Portugal introduced some kind of innovation or have some kind of innovation in their structure¹⁴⁰. However, R&D companies are only a small part of the universe of innovative companies and it is estimated that there are less than 5,000 companies engaging in R&D. According to the National Scientific and Technological Potential Survey (IPCTN), for the year 2018, the economic activities that have developed the most R&D were Manufacture of basic pharmaceutical

¹³⁴ <https://drive.google.com/file/d/16vr6E5t45USXs1fJHKdt130XGzpMbmMp/view>

¹³⁵ <https://web.tecparques.pt/associados/>

¹³⁶ <https://een.ec.europa.eu/>

¹³⁷ Portugal in Europe Research and Innovation Network: <https://perin.pt/>

¹³⁸ AICIB - Agency for Clinical Research and Biomedical Innovation

¹³⁹ <https://cpf.org.pt/resposta-das-fundacoes-a-covid-19/boas-praticas-das-fundacoes/>

¹⁴⁰ <https://www.dgeec.mec.pt/np4/207/>

products and pharmaceutical preparations; Consulting and computer programming and related activities, and Scientific research and development activities¹⁴¹. Among companies, the universe of start-ups should be highlighted because of their importance in terms of growth and creation of qualified employment: According to Startup Hub (promoted by Startup Portugal and the National Network of Incubators), there are about 1820 start-up/scale-up and 155 incubators/accelerators in Portugal¹⁴². In addition, according to a recent study produced by the National Network of Incubators, there are about 2855 start-ups based in incubators that have signed a protocol with the same entity¹⁴³.



The NIS' response to the negative impact of COVID-19

The emergence and development of the pandemic caused by the novel coronavirus has brought new challenges to the entities and response capacity of the National Innovation System (NIS). Since March 2020, we have witnessed the combined efforts of various actors in society, public and private entities – including the design and implementation of government initiatives, as well as a set of initiatives led by private entities, at various levels.

Initiatives by different political actors regarding the impact of COVID-19 were implemented early on¹⁴⁴. Decisions were taken on the organisation of work, valuing online activities and, if this was not possible, financial support was made available for the extraordinary and temporary suspension of work activities (layoff).

In terms of the European Structural and Investment Funds, the action was taken in two directions: the anticipation of payment requests by companies was encouraged¹⁴⁵ and, finally, different Incentive Schemes were set up in the context of COVID-19, also adapting these instruments to the new extraordinary situation in which the country found itself:

- Incentive System for Productive Innovation¹⁴⁶
- System of Incentives for Research and Development Activities and for Investment in Testing and Optimisation Infrastructures¹⁴⁷
- Security Incentive Scheme for Micro, Small and Medium Enterprises¹⁴⁸

More specifically, linking the country's situation to science and innovation, on 14 April the adoption of extraordinary measures in response to the COVID-19 pandemic was approved¹⁴⁹. Thus, by Government decision, the reorientation of the current research and development teams was facilitated and stimulated, towards the promotion of projects and initiatives that meet the immediate and medium-term needs of the National Health Service. The reinforcement of the current FCT funding lines was mobilised to support the R&D activities of the respective teams, prioritising three specific areas (new therapies and vaccines, tests and diagnostics and data processing) and the current lines supporting doctoral training and scientific employment in areas that meet the needs of the National Health Service. ANI was also mandated to take the necessary measures to facilitate and stimulate R&D and Innovation projects

¹⁴¹ <https://www.dgeec.mec.pt/np4/206/>

¹⁴² <https://startuphub.pt/pt-pt/>

¹⁴³ <https://www.rni.pt/conteudos/item/30-monitorizacao-das-incubadoras-portuguesas-2019>

¹⁴⁴ <https://dre.pt/legislacao-covid-19-upo>

¹⁴⁵ <https://dre.pt/application/>

¹⁴⁶ <https://dre.pt/application/file/a/131915556>

¹⁴⁷ <https://dre.pt/application/file/a/131915557>

¹⁴⁸ <https://dre.pt/application/file/a/133723618>

and initiatives in Technology Interface Centres (CIT) and Collaborative Laboratories (CoLAB) that respond to identified needs, mobilising the necessary financial support. Finally, SMEs were mobilised in close collaboration with the scientific and technical health community to ensure the effective implementation of responses to various needs, including the pursuit by IAPMEI of the necessary measures to facilitate and stimulate innovative and higher value-added projects and initiatives meeting the same needs.

In addition, procedures were changed regarding payments to beneficiaries of the Public Administration Digital Transformation Support System (SAMA 2020) and Collective Actions (SIAC) in the field of Competitiveness and Internationalisation¹⁵⁰, the StartUP Voucher Regulation was amended for projects approved in the first cut-off of the instrument¹⁵¹ and, finally, the Regulation that created the Entrepreneurship and Employment Incentive System was amended¹⁵².

**Textbox 1:
STAYAWAY
COVID -
Project
developed
by an entity
of the NIS in
the context of
the COVID-19
pandemic**

Developed by the INESC-TEC Interface Centre, STAYAWAY COVID is an application for iOS or Android mobile phones that aims to assist the country in tracking COVID-19. The application allows, in a simple and safe way, each person to be informed about risk of exposure to the disease, by monitoring recent contacts. The application is voluntary and free of charge, and has no access to identity or personal data.

The STAYAWAY COVID system resulted from an initiative, carried out under the INCoDe.2030 programme, to develop a digital contact tracing solution to prevent and mitigate the spread of COVID-19. This system, based on the strictly voluntary use of an application for personal mobile devices, is intended to be a further tool in the service of a global response strategy to the SARS-CoV-2 pandemic.

The main functionality of the application is to alert its user of exposures, considered high risk (World Health Organization), to other users of the application who have, in the meantime, been diagnosed with COVID-19 (detailed information at <https://stayawaycovid.pt/>).

Having concluded the framework of legislative action in the fight against COVID-19 and linked to the area of innovation, some examples of support instruments launched by the Government are listed, as well as initiatives developed by Civil Society and projects developed and/or approved to date.

¹⁴⁹ <https://dre.pt/application/file/a/131390207>

¹⁵⁰ <https://dre.pt/application/file/a/132138801>

¹⁵¹ <https://dre.pt/application/file/a/132800073>

¹⁵² <https://dre.pt/application/file/a/134309879>

Table 1. Examples of initiatives launched to support the development of solutions and responses to the COVID-19 pandemic

Instrument name	Description
"Estamos ON" Portal (XXII Government) ¹⁵³	Practical guide to support citizens, families and businesses in combating the effects of the novel coronavirus and COVID-19. It provides access to good practices and recommendations from health authorities, exceptional measures adopted by the government in each government area and developments on the epidemiological state of the country. Finally, all emergency contacts created by the various public services are also compiled.
Tech4COVID-19 (APCT – Associação de apoio à comunidade TECH4COVID19) ¹⁵⁴	Platform created by several technological start-ups, it currently has 5,360 volunteers and has 34 active projects. Within the services provided or to be provided, this platform focuses on areas such as support to health professionals and hospital material, health services and education and business and leisure.
SCIENCE4COVID19 (FCT and AICIB) ¹⁵⁵	Portal promoted in partnership with health authorities and scientific research institutions, both public and private, to mobilise the scientific communities for joint Research and Development (R&D) projects and activities aimed at combating COVID-19, in line with the National Plan for Disease Preparedness and Response of the Directorate General for Health (DGS).
COVID-19: Solutions and Technologies (ANI and COVINDEX) ¹⁵⁶	Platform made available by ANI in partnership with COVINDEX, which aims to be a space for the dissemination of technologies and solutions in response to the negative impacts of COVID-19. The aim is to give greater visibility to the efforts of start-ups, companies and entities in the scientific and technological system to support the resolution of this problem.
Research4COVID19 (FCT) ¹⁵⁷	With a budget of 3.8 million euros, to be divided between two editions, this instrument aims to support the development of R&D projects, to be developed or already underway, that contribute to improve the response to the impact of COVID-19, in line with the provisions of the National Plan for Disease Preparedness and Response for the new coronavirus. The beneficiaries are higher education institutions and their institutes, State Laboratories and other research institutions, which may compete individually or in partnership, namely with business entities.
INNOV4COVID19 (ANI) ¹⁵⁸	With a budget of 4 million euros, this reimbursable support aims to support the immediate development of R&D and technological innovation projects and initiatives that respond to the immediate and medium-term needs of the National Health Service, namely in relation to the design, testing and industrial production of invasive ventilators, non-invasive ventilators, pandemic ventilators, screening systems, diagnostic and test kits, personal protection equipment and other equipment or systems necessary for the quality of public health, industry and the population in general. This tool is intended for Technology Interface Centres and Collaborative Laboratories.

¹⁵³ <https://covid19estamoson.gov.pt/>

¹⁵⁴ <https://tech4covid19.org/>

¹⁵⁵ <https://www.science4covid19.pt/>

¹⁵⁶ <https://www.ani.pt/pt/portugal-inovador/portugal-inovador/covid-19-solu%C3%A7%C3%B5es-e-tecnologias/>

¹⁵⁷ <https://www.fct.pt/apoios/research4covid19/>

¹⁵⁸ <https://www.ani.pt/pt/financiamento/incentivos-financeiros-pt-2020/convite-inov-4-covid-19/>

3 Support instruments

In Portugal, there are different sources of financial resources for investment projects in innovation and development, involving research, the creation of qualified employment and support for innovation in the productive fabric, as well as the promotion of approximation and partnerships between the different actors of this process, aligned with

European guidelines for the promotion of R&D. In addition to the state's own budget, the main funds that contribute to the country's development and its capacity to generate knowledge and turn it into value for the economy and society can also be listed.



European Structural and Investment Funds

The partnership agreement between Portugal and the European Commission, which adopts the programming principles of the Europe 2020 strategy and commits to the economic, social, environmental and territorial development policy that will stimulate growth and job creation during its cycle, defines the interventions, investments and funding priorities necessary to promote smart, sustainable and inclusive growth and the achievement of the Europe 2020 targets in the country. This agreement allows access to and management of resources from five European Structural and Investment Funds (ESIF).

Through the main programme oriented towards competitiveness and business innovation - Operational Programme for Competitiveness and Internationalisation

- as well as the instruments created in the context of the ongoing pandemic, the National Innovation System has different incentive systems, where each one focuses on different instruments and objectives, thus providing different financial support for the development of research and innovation. In accordance with the Specific Regulation for Competitiveness and Internationalisation, created in 2015¹⁵⁹ and amended over the years¹⁶⁰, there are different incentive and support systems:

- Business Incentive Scheme
- Support system for the digital transformation of public administration
- System to support scientific and technological research
- Collective Action Support System

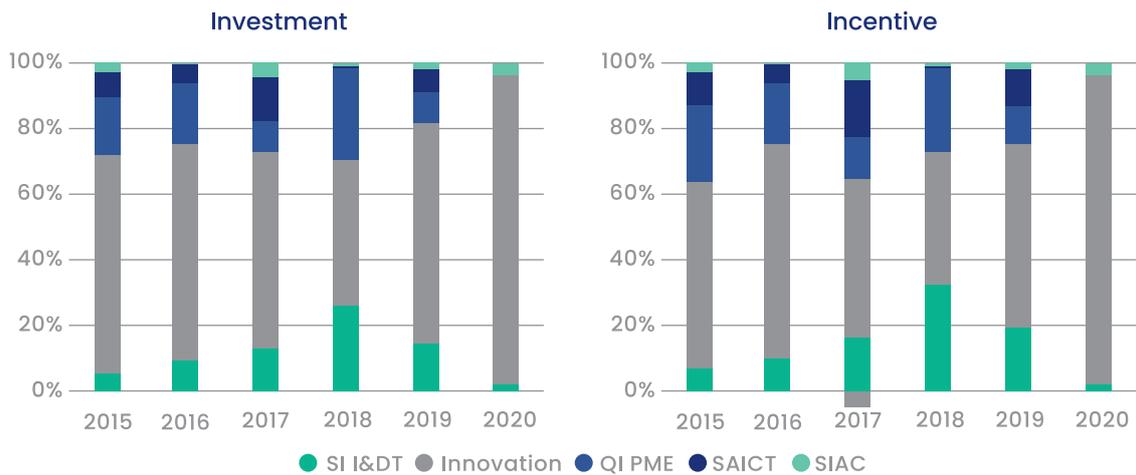
¹⁵⁹ https://www.compete2020.gov.pt/admin/images/P_57A_2015.pdf

¹⁶⁰ <https://www.compete2020.gov.pt/legislacao>

According to information from 31 June 2020, the instruments dedicated to competitiveness and internationalisation of Portugal 2020 registered a total of 15,262 approved projects, with an approved investment of 12,415.86 million euros and an approved incentive of 6,413.77 million euros. These figures include instruments related to: training, business research and technological development; business innovation and entrepreneurship, qualification and internationalisation of SMEs; support for scientific and technological research; and collective actions. A large part of the investment to be made

and the public incentive approved has been earmarked for supporting business innovation and entrepreneurship (EUR 7,613.77 million and EUR 3,652.15 million respectively), the qualification and internationalisation of SMEs (EUR 2,145.02 million and EUR 1,001.70 million respectively) and business R&D (EUR 1,572.83 million and EUR 935.80 million respectively).

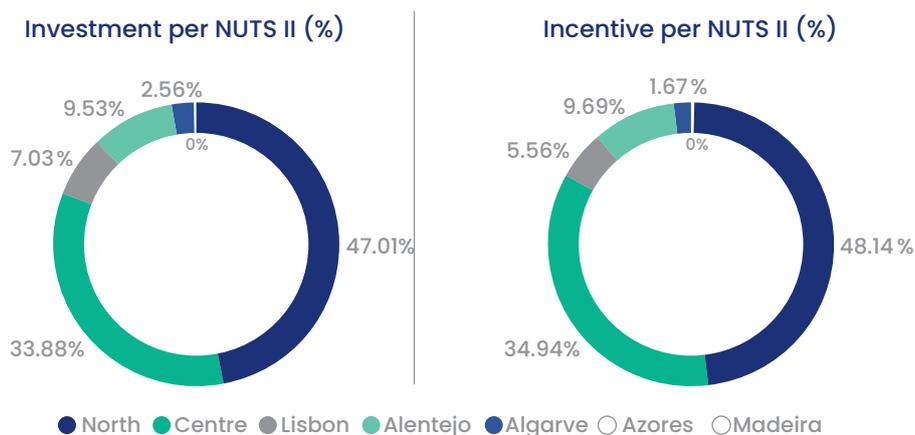
Figure 4. Investment and Public Incentive by the Portugal 2020 Incentives and Support System



Source: ANI

Regarding the relevance of public support from NUTS II regions, both in terms of approved investment and contracted incentives, the Norte region attracts almost half of these amounts.¹⁶¹

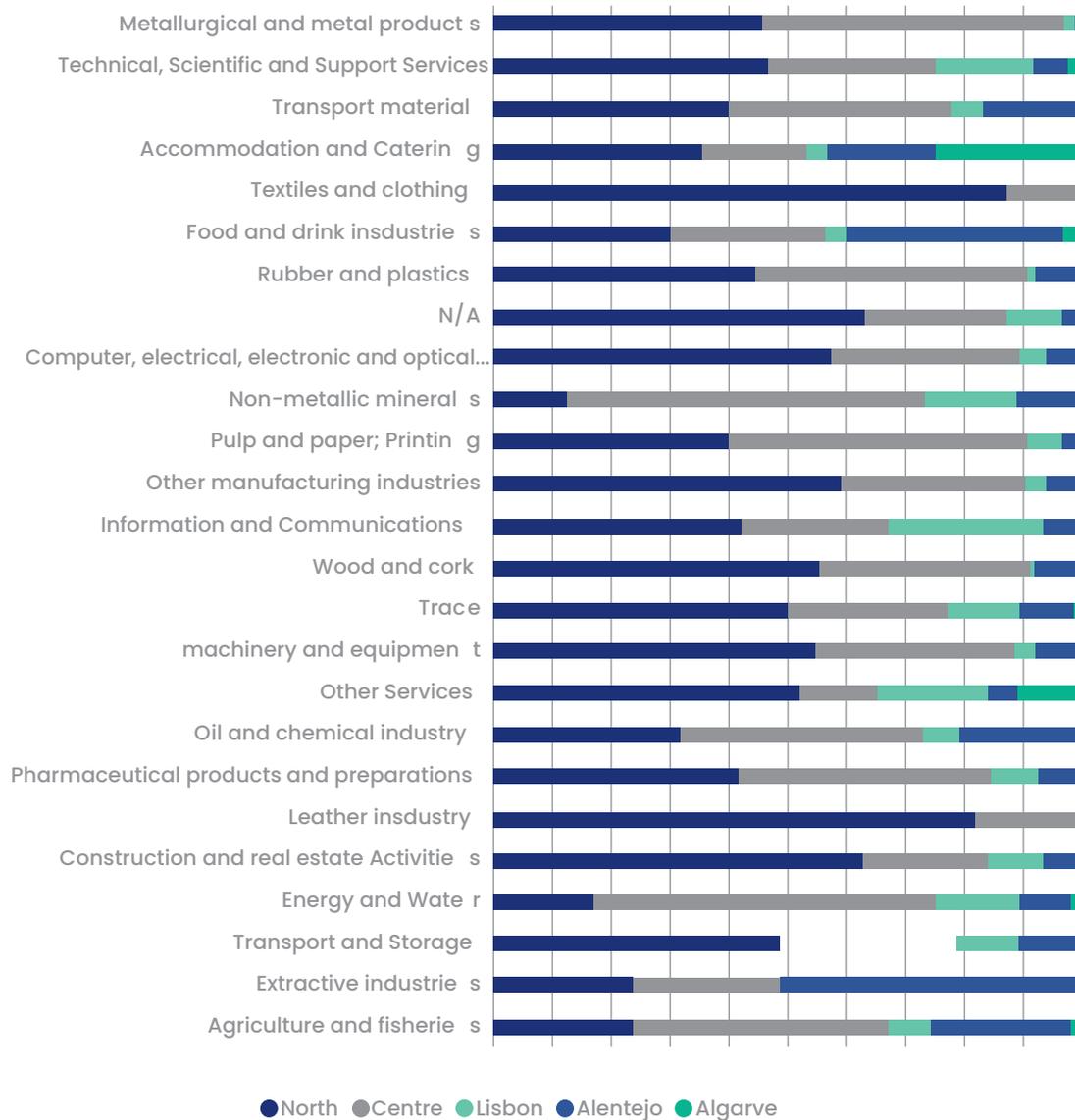
Figure 5. Investment and Public Incentive under Portugal 2020, by NUTS II region



Source: ANI

¹⁶¹ Due to limitations in the available data, the Autonomous Regions of Azores and Madeira are at 0%.

Figure 6. In the Norte region, the CAEs with the most approved incentives are the following



Source: ANI

**Textbox 2:
Testimony
from a Higher
Education
Institution
on their
participation
in Portugal
2020 projects**

Looking at what has happened in recent years, it is clear that the knowledge produced, the inclusion in international networks of scientific institutions and the transfer of knowledge are advancing.

In 2020, Portugal is a highly innovative country in which the scientific and higher education system is one of the sectors of society that has become more internationalised, portraying the image of a modern country, of knowledge and innovation. It attracts and develops talent, promotes the creation of qualified employment, keeps people in the territories, and knowledge is the determining factor for the future of an open, cohesive and competitive country.

Portugal has highlighted the impossibility of promoting development by concentrating human and material resources in large urban centres, by projecting a new understanding of the role of knowledge as an unavoidable factor of progress and growth. Thanks to Portugal 2020, the country has reinforced the need to promote spatially distributed scientific development, by decentralising specialised resources, as the retention and attraction of talent in peripheral regions is vital.

Fontainhas Fernandes, UTAD



SIFIDE

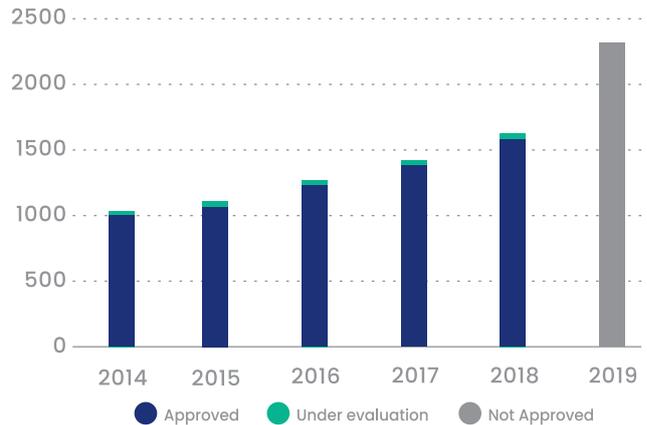
SIFIDE – Sistema de Incentivos Fiscais à I&D Empresarial (Business R&D Tax Incentives System), created in 1997, aims to increase the competitiveness of companies by supporting their efforts in Research and Development by deducting corporate income tax (IRC) from R&D investments.

This incentive system has undergone some revisions, with SIFIDE II taking effect from 2011¹⁶² with some changes to the legislation that make it even more attractive for companies. SIFIDE II was set to run until 2015, but the period was extended twice in 2014¹⁶³ and 2020¹⁶⁴, and will now run until 2025. The tax benefit system applies to a wide range of R&D costs, for example: Acquisitions of tangible fixed assets; Staff costs; Operating costs; Participation in the capital of R&D institutions; Contributions to investment funds intended to finance companies dedicated to R&D; or Costs for the registration, maintenance or acquisition of patents.

The instrument has had a growing and significant take-up by businesses, with applications doubling within five years. Applications for the tax year 2019 (and submitted by July 2020) are being assessed, with a view to furthering the developments recorded thus far (Figure 7).

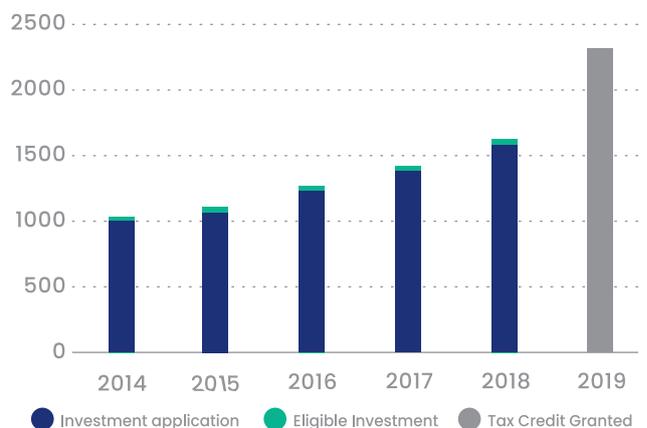
For tax years 2014 to 2019 there was an increase not only in the number of applications, but also in the total sum of the R&D investment declared in the applications. The volume of declared investment increased by around 113% in the period, resulting in a change from almost 548 million euros in 2014 to over 1.168 billion euros in 2019 (Figure 8).

Figure 7. SIFIDE applications per year



Source: ANI

Figure 8. R&D Investment declared and approved and tax credit granted



Source: ANI

¹⁶² <https://dre.pt/application/file/a/345017>

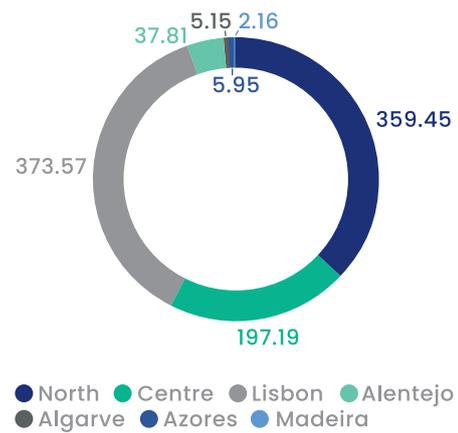
¹⁶³ <https://dre.pt/application/file/a/58660557>

¹⁶⁴ <https://dre.pt/application/file/a/130891365>

According to the information available for 2014–2018, there was a 74% increase in eligible R&D investment and a 94% increase in the tax credit granted compared to 2014. For 2014–2018, the variation in the approved investment is higher than the variation in the declared one, which may indicate that the applications submitted are increasingly competitive (with higher quality in R&D activities) and qualified (with more assertiveness in meeting the requirements defined for the instrument). Finally, the tax credit to be granted is calculated on the approved investment, which, in the period under review, grew by about 87%.

The distribution of SIFIDE's results over the 2014–2018 period and across NUTS II regions shows that the Norte region and Lisbon Metropolitan Area represent 75% of the requested tax credit, with the Norte region leading investments with 764 million euros (Figure 9).

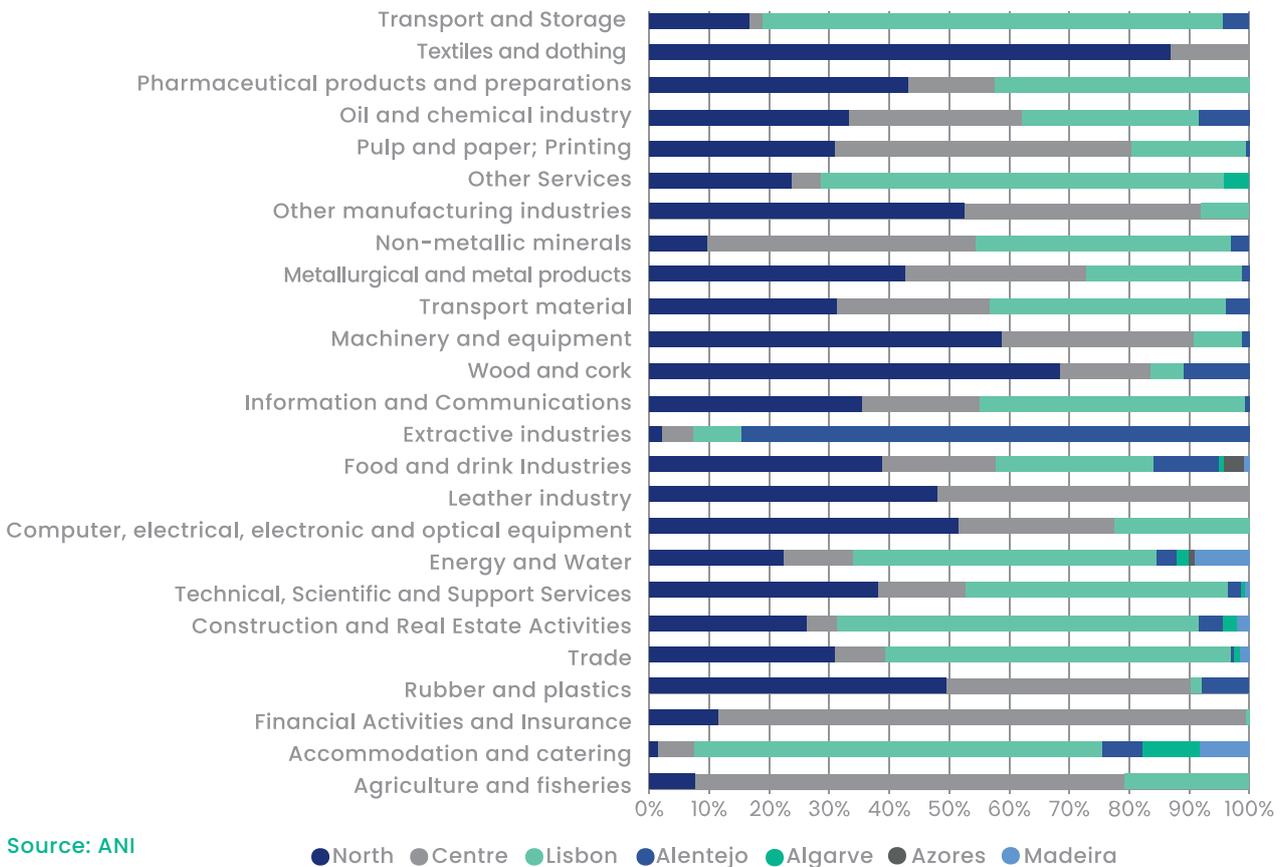
Figure 9. Tax credit granted per NUTS II region



Source: ANI

For the same period, it is also possible to identify the total incentive per classification of economic activity, distributed among NUTS II regions (Figure 10).

Figure 10. Tax Credit approved by Economic Activity in each NUTS II region



Source: ANI

For the North region, the most encouraging economic ratings approved were: Information and Communication (15% of the region's total); Pharmaceutical products and preparations (11% of the region's total) and technical, scientific and support services (9.8% of the region's total). As for the Centro region, the CAEs with the most approved incentives were: Information and Communication (15.5% of the region's total), non-metallic minerals (8.47%) and computer, electrical, electronic and optical equipment (7.97%). In Lisbon, the predominant CAEs are: Information and communication (18.39% of the region's total), Trade (12.81%) and Technical, scientific and support services

(11.31%). In Alentejo, the CAEs with the most approved incentives are: Extractive industries (22.86% of the region's total), food and drink industries (17.91%) and agriculture and fisheries (9.86%). As for the Algarve, the CAEs with the most approved incentives are: Information and Communication (16.79% of the region's total), Other Services (15.46%) and Trade (15.23%). In the Autonomous Region of the Azores, the food and drink industries represent 87.51% of the total incentive, while in the Autonomous Region of Madeira the CAEs with the most approved incentives are Energy and Water (30.03% of the region's total), Trade (26.51%) and Construction and Real Estate Activities (11.81%).

**Textbox 3.
Testimony
from a
company
on their
participation
in SIFIDE**

The Sistema de Incentivos Fiscais em Investigação e Desenvolvimento Empresarias (SIFIDE) has been a very important instrument in supporting Vision-Box's research and development activities since 2006, with the greatest impact in the last five years in which we have invested heavily in participating in Research & Innovation projects, in the context of Horizon 2020 and Portugal 2020. However, this instrument could be even more relevant to the Portuguese business fabric if the measures for the acquisition of patents or bonuses attributed to SMEs were also extended to Small and Mid Cap companies, which usually have more capacity to bet on new products and services. It would also be interesting to explore a possible surcharge or exception measures for companies that, in the context of a pandemic caused by COVID-19, have kept in place the assets allocated to R&D activities without the use of simplified lay-offs.

Vision-Box



Horizon 2020

Horizon 2020 (H2020) is the largest research and innovation programme in the EU, with around 80 billion euros of EU funds available for the seven-year period (2014-2020), focusing on supporting the development of innovative and disruptive projects within the EU by

companies and entities in the science and technology system. H2020 consists of three programme Pillars with different scopes:

Pillar I - Excellent Science (around 32% of the total budget);

Pillar II - Industrial Leadership (around 22% of the budget);

Pillar III - Societal Challenges (around 39% of the total budget).

Around 2% of the total budget of H2020 is a financial contribution to the Joint Research Centre of the European Commission. In addition to these three pillars, there are other instruments, which account in total for about 6% of the H2020 budget. In addition, the EURATOM programme

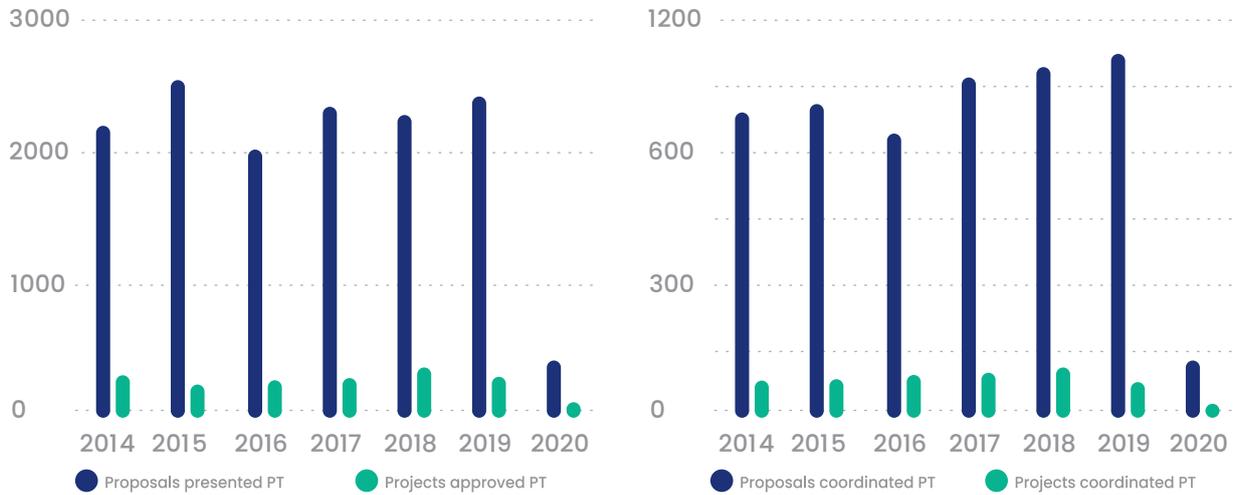
for nuclear energy activities has a budget under H2020 of 2.37 million euros for 2014-2020.

By November 2020, national entities were participating in 2,252 Horizon 2020 projects, resulting from 15,617 proposals

submitted, corresponding to a success rate of 14.4% (compared to 13% of the EU average) and representing 1,073.5 million euros of European funding attracted by Portugal (1.68% of total EU funding in Horizon 2020).

Over the years, there has been a growing involvement of the country in terms of project applications, with an increasing role in the coordination of European projects – both in proposed and approved applications (Figure 11).

Figure 11. Proposals presented and approved by Portugal



Source: ANI

Apart from 2020 (considering the figures on 31 June), Portugal has been performing at or above the same rate, for example in 2018, with a difference of three percentage points between Portugal and Europe. The success rate of applications with the participation

of Portuguese entities is, considering the accumulated figures since 2014, two percentage points higher than the success rate of total applications from eligible countries (Figure 12).

Figure 12. Application approval success rates and comparison to European average

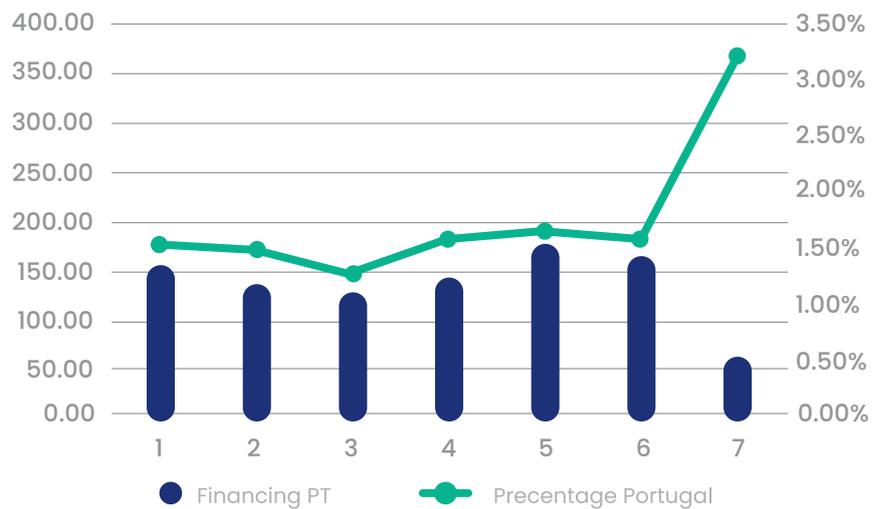


Source: ANI

In terms of total funding attracted by Portuguese entities, there has been a positive evolution in the total funding attracted under Horizon 2020 (Figure 13). As for the different types of entities, the R&D Centres are the ones that attract the most European investment,

with around 37% of the total in Portugal, followed by the Higher Education Institutions, which attracted the equivalent of 27% of the country's total.

Figure 13. Financing granted to Portugal and Weight of Financing for Portugal in the European Total



Source: ANI

The country has been able to attract more and more investment within what is financed each year. This is particularly relevant in the sense that Portugal competes with a wide range of European countries in terms of R&D and Innovation projects. This increase in funding for the

country is not due to the greater budgetary availability of Horizon 2020, but because the Portuguese entities are managing, in a competitive manner, to make a greater contribution to the proposals submitted and to their role in the consortia of entities.



Business Angels and Venture Capital Funds

According to the latest available data, there are 20 Business Angels networks in Portugal, including 344 members, responsible for 16.5 million euros in investment¹⁶⁵. These figures are still low on a European scale (where there are 482 networks of Business Angels), where Portugal ranks 16th (out of 39 European countries) in terms of the overall volume of investment by business angels. However, Portugal ranks 7th if we take into account the size of the country (investment as a % of GDP).

Regarding Venture Capital, in Portugal, the activities and funds of venture capital are framed by the 'Legal regime of venture capital, social entrepreneurship and specialised investment' - RJCR (Law 18/2015, of 4 March, amended by Decree-Law 56/2018, of 9 July). According to Article 3 of the RJCR, venture capital investment is

defined as 'the purchase of equity and debt instruments in companies with high development potential as a means of benefiting from their valuation'.

According to the CMVM, there are 52 Venture Capital Companies¹⁶⁶ and 3 Venture Capital Fund Management Companies¹⁶⁷, responsible for around 150 active Venture Capital Funds¹⁶⁸. The most recent figures¹⁶⁹ indicate that Venture Capital Funds totalled 4.9 billion euros in 2019, up 279.6 million euros (6.1%) compared to 2018, while the assets¹⁷⁰ under management by Venture Capital Companies (SCR) totalled 273 million euros (15.1% change between 2019/2018). However, total assets under management by the domestic venture capital sector amount to 5.1 billion euros (6.6% change between 2019/2018).

¹⁶⁵ Statistics Compendium 2018 (eban.org) Report

¹⁶⁶ See list at https://web3.cmvm.pt/sdi/capitalrisco/pesquisa_scr.cfm

¹⁶⁷ See list at https://web3.cmvm.pt/sdi/capitalrisco/pesquisa_sgfc.cfm

¹⁶⁸ See list at https://web3.cmvm.pt/sdi/capitalrisco/pesquisa_nome_fcr.cfm

¹⁶⁹ Report on Venture Capital Activity 2019 (CMVM, November/2020): <https://tinyurl.com/y49noxo4>

¹⁷⁰ Assets under management: are calculated by adding together equity, other financing, liquidity, positions in derivatives (options) and other assets.

In terms of venture capital application sectors, about one third of the investment is concentrated in information and communication activities (453.5 million euros), real estate (434.9 million euros) and accommodation and restaurants (313.6 million euros).

It is worth mentioning the importance of Public Funds to support Venture Capital, due to their size and performance in the market. For example, the FINOVA funds and the 200M Fund.

FINOVA – Fund to Support Financing for Innovation¹⁷¹

FINOVA is an autonomous fund, created in 2008 and managed by PME Investimentos, which promotes the competitiveness of companies through the creation or reinforcement of financial instruments related to, among others, risk capital, mutual guarantee system, entrepreneurship or the implementation of 'Collective Efficiency Strategies'.

Under FINOVA, 18 venture capital funds and three 'Revitalizar' venture capital funds were supported, investing in 218 Portuguese SMEs for a total investment value of 317 million euros. FINOVA also supported Business Angels' Lines of Finance, which made it possible to invest 45.6 million euros in 158 SMEs.

200M Co-investment Fund¹⁷²

Created in 2017, it aims to attract international entrepreneurs and start-ups to Portugal, attract funds and specialised companies to invest in the Portuguese market, promote co-investment between Portuguese and international investors, promote increased venture capital activity and encourage the incorporation or capitalisation of companies primarily in the start-up phase¹⁷³. The fund carries out equity and quasi-equity

investment in SMEs with product or process innovation projects.

Under the 200M Fund, 39 applications were received, with a total investment value of around 200 million euros. 26 million have already been invested in 10 start-ups, corresponding to a total public and private investment of about 70 million euros.



Other Funds Supporting Innovation

In addition to the Venture Capital funds, there are other funds aimed at supporting the development of innovative but thematic or sectoral projects.

For example, Fundo Azul, FITEC, the Social Innovation Fund, the Environmental Fund or the Energy Efficiency Fund.

¹⁷¹ https://dre.pt/web/guest/legislacao-consolidada/-/lc/67025093/201903171933/exportPdf/normal/1/cacheLevelPage?_LegislacaoConsolidada_WAR_drefrontofficeportlet_rp=diploma

¹⁷² https://dre.pt/web/guest/legislacao-consolidada/-/lc/123628779/201912011022/exportPdf/normal/1/cacheLevelPage?_LegislacaoConsolidada_WAR_drefrontofficeportlet_rp=diploma

¹⁷³ <https://www.200m.pt/pt-pt/>

Fundo Azul

Since 2014, the Fundo Azul managed by the Directorate General for Maritime Policy (DGPM) has issued nine notices resulting in the approval of 50 projects with a total investment of 12.6 million euros, of which 9.3 million came from public support.

In parallel with the activities of the Fundo Azul, DGPM participated in a project at the beginning of 2017, together with eight other European entities, to use the

information produced by the Copernicus Programme. The development of innovative solutions to address the critical challenges currently facing Europe in the maritime and marine domain is worth noting. These include monitoring the marine environment and climate change, as well as illegal migration and border security, and maritime safety¹⁷⁴.

FITEC – Innovation, Technology and Circular Economy Fund

FITEC has supported the training of Technological Interface Centres, by signing 24 basic investment contracts, indexed to technological training activities, development of new skills and internationalisation, as long as non-economic

activities are involved. The approved incentive amount for this instrument is around 33 million euros for the period 2018–2021.

Social Innovation Fund (SIF)

The Social Innovation Fund is a public policy instrument that aims to boost investment with an impact in Portugal, acting in areas with strong innovation potential, in response to unmet societal needs, in line with the United Nations' Sustainable Development Goals. Secured by funds from the European and national Social Fund and operating in the Credit and Capital areas, the SIF is one of the four instruments under the Portugal Social Innovation initiative and is intended to support Innovation and Social

Entrepreneurship (IIES) initiatives that present innovative, impacting and sustainable solutions.

As part of the co-investment operations by the Social Innovation Fund (SIF), 17 applications were submitted with a total associated investment value of 17 million euros. Five projects have been invested, whose total investment and SIF co-investment amounts to 3.26 million euros and 1.89 million euros respectively.

Environmental Fund

The purpose of the Environmental Fund is to support environmental policies towards sustainable development objectives by contributing to the fulfilment of national and international objectives and commitments, in particular those relating to climate change, water resources, waste and nature conservation and biodiversity. The Fund may

establish mechanisms for liaison with other public and private bodies, in particular with other public or private national, European or international funds, related to the development of environmental policies to achieve the objectives of sustainable development.

¹⁷⁴ <https://www.dgpm.mm.gov.pt/marine-ee-ambito>

Energy Efficiency Fund (EEF)

The Energy Efficiency Fund (EEF) is a financial instrument capable of financing the programmes and measures set out in the National Action Plan for Energy Efficiency (PNAEE) in all its lines of action.

Activities by the FEE are also aligned with the economic, social and territorial development policy promoted between 2014 and 2020 called 'Portugal 2020', with the

support of the European Structural and Investment Funds and in accordance with the national targets set, to improve the country's energy efficiency through a 25% reduction in energy consumption by 2020, with the State appearing as an example with a specific target to reduce energy consumption by 30%.

Innovation Credit Lines

In addition to the funds mentioned, there are also some credit lines leading to business innovation. As part of the instruments provided by Capitalizar 2018, a credit line was presented to support the Digitalisation of the Economy. Subsequently, as part of the presentation of the 2nd phase of the government programme 'Digital Economy - Industry 4.0', new conditions were made available for the same line. With a budget of 100 million euros, it intended to support companies that acquire, develop or produce technological solutions within the framework of Industry 4.0.

In 2019, the Fund for Innovation, Technology and Circular Economy (FITEC) supported the Portuguese Mutual Guarantee Society in the development of a credit line to support investments in the areas of Decarbonisation and Circular Economy. This instrument is intended for companies and, with the support of state guarantee systems, supports innovation in reducing energy consumption, the adoption of measures for the transition from a fossil energy source to a renewable one, and the acceleration of the adoption of circular organisation models¹⁷⁵.



Training Programmes for Technology Transfer

Support for training and technology transfer is embedded in several initiatives developed by the NIS' actors, although support mechanisms

and instruments have been developed over time, notably by public policy. The following instruments stand out:

• **Support for the creation, strategic restructuring or reinforcement of Technological Infrastructure**, launched in 2018 by the Regional Operational Programmes;

• **Support for technology transfer activities by the Interface Centres and Collaborative Laboratories**, through the basic funding mechanisms and support for hiring qualified human resources, respectively, launched between 2018-2020;

¹⁷⁵ <https://www.spgm.pt/pt/catalogo/linha-de-credito-para-a-descarbonizacao-e-economia-circular/>

- **Support for hiring Highly Qualified Human Resources** for technology transfer activities by the technological infrastructures, launched by the different Regional Operational Programmes in 2019;

- **The Born from Knowledge (BfK) Programme** aims to give visibility to the relevance of investment in Science and R&D and its economic impact by promoting, disseminating and rewarding good practices and success stories, as well as contributing to promote scientific and technological employment, namely in companies. Within BfK, the BfK IDEAS initiative (which rewards the business ideas of students and researchers from Higher Education Institutions (HEIs), the BfK AWARDS (which recognise projects and companies 'born from knowledge' and which stand out in R&D activities, particularly collaborative) and BfK RISE (Science and Technology Acceleration Programme for the valorisation of R&D results and technologies with commercialisation potential) should be highlighted;

- **StartUP Voucher in 2019-2022**, with ongoing applications, aims to host projects of innovative

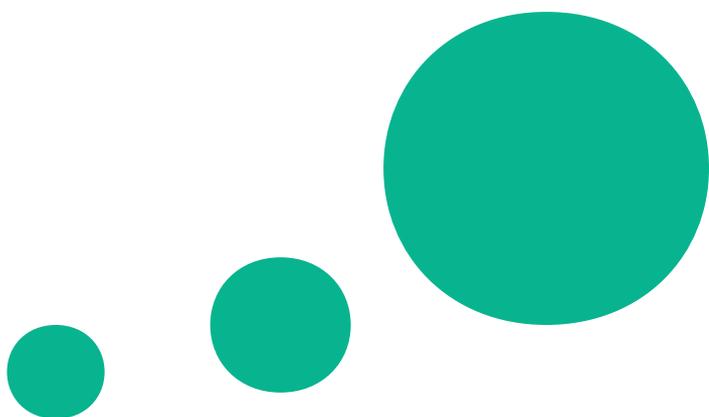
and qualified or creative entrepreneurship providing innovative responses to social and societal challenges and contributing to changing the productive profile of the economy with the creation of companies with qualified human resources. The number of applications submitted to the StartUP voucher throughout the various editions amounts to 1700. By mid-2020, StartUp Voucher has supported some 800 innovative projects and awarded more than 1200 grants, with over 100 start-ups created.

- **Go Portugal Program** - Global Science and Technology Partnerships, which involve the development of joint projects between Portuguese and international companies and R&D entities. Under these Partnerships, 25 collaborative R&D projects will be developed over the next three years, with a total funding of 55.2 million euros, including 16.7 million euros from US universities and 7.7 million euros from business funding. The remaining funding is provided by the Structural Funds and the FCT. The projects are developed in partnership with the University of Texas at Austin (UTA), Carnegie Mellon University (CMU) and the Massachusetts Institute of Technology (MIT).

**Textbox 4.
Testimony
from a spin-
off supported
by Born from
Knowledge**

Especially at an early stage of start-ups, the BfK Award style awards gain credibility and reputation that they sometimes lack and are indispensable to put them on the map of the Portuguese entrepreneurial ecosystem. In addition, the associated prize money can leverage proofs of concept, or first prototypes that are sometimes the bottleneck when the first round of financing begins. Even in more advanced stages, the prestige and wide dissemination of the project are extremely useful to attract clients, partners and even investors.

Fadhil Musa, Co-founder, Delox



4 Dissemination and Promotion of Innovation

Innovation Dissemination Actions

One of the key components of the innovation process is the mechanisms for its dissemination and promotion to society and actors of the NIS. In the last decade,

several initiatives have been launched in this regard. The initiatives currently underway are identified below.

'More Innovation' Roadmap: Technological Demonstrator and Dynamics for Innovation

In order to promote the activities developed by technological infrastructures for businesses and society, and within the priorities set out in RCM 25/2018, ANI launched the 'More Innovation' Roadmap, through which initiatives such as the 'Technological Demonstrator' and 'Dynamics for Innovation' were developed¹⁷⁶.

• 'Technological Demonstrator' intends to involve the national business fabric with the results of innovation and science and technology-based entrepreneurship. This activity takes place in several Interface Centres (CIT), which are liaison entities between higher education institutions and companies and which are dedicated to knowledge enhancement and technology transfer. This is an inclusive initiative, open to all companies with R&D and innovation projects in the convergence regions, with monthly events to disseminate and demonstrate the results of CIT R&D and Innovation projects.

• 'Dynamics for Innovation' consists of a set of initiatives on Knowledge Valorisation, subordinated to strategic areas and sectors of the national economy considered as priorities towards intelligent specialisation. These events, which have been taking place since October 2019 all over the country, are divided into two parts over the course of each day: 'Technology Transfer Workshops' in the morning; Thematic Focus Group Meetings in the afternoon, with the aim of testing and validating ideas for R&D projects in a pre-commercial phase, with potential for market value, through Open Innovation methodologies. The 15 ENEI¹⁷⁷ thematic areas were addressed, aimed at Higher Education Institutions, Interface Centres, Collaborative Laboratories, Technology Transfer Offices, Clusters and companies in the regions where they take place.

¹⁷⁶ These two initiatives are promoted by ANI within the framework of SIAC - Knowledge Transfer Initiative, co-financed by COMPETE 2020, through Portugal 2020 and the European Regional Development Fund.

¹⁷⁷ The 15 areas of ENEI (National Strategy for Intelligent Specialisation) are as follows: Energy, ICT, Raw Materials and Materials, Production Technologies and Product Industries, Production Technologies and Process Industries, Forestry, Automotive, Aeronautics and Space, Transport, Logistics and Mobility, Agri-food, Forestry, Sea Economy, Water and Environment, Health, Tourism, Cultural and Creative Industries, Habitat.

Meetings for Competitiveness and Innovation

'Meetings for Competitiveness and Innovation', an initiative of the Ministry of Economy and Digital Transition, promoted by IAPMEI, aim to make the Portuguese business fabric known and stand out and to foster synergies between the various public and private agents, paying special attention to the challenges faced by companies and the regions. Particular emphasis is placed on companies as

a strategic and decisive asset for creating more value and accelerating the development of new products and services. The Meetings for Competitiveness and Innovation started in 2018 and have already been held in almost every district in the country.

Industry 4.0 Events

'Industry 4.0' events are promoted by COTEC (Business Association for Innovation) and aim at promoting and disseminating success stories and good business practices related to the theme of Industry 4.0. Since 2018, COTEC

has organised several dozen events throughout the country, involving hundreds of actors of the NIS (public and private)¹⁷⁸.

Innovation Promotion Actions

Media dissemination

Tech 3 - This RTP3 show partnered up with the ANI to disseminate collaborations on science and technology-based innovation. The partnership between the ANI and Tech 3 included 13 programmes disseminating themes such as financial and tax incentives for R&D, public procurement for innovation, national participation in European programmes to support innovation, the national strategy for smart specialisation, Technological Interface Centres (TIC) and Collaborative Laboratories CoLAB). This set of programmes, broadcast on RTP3, were shown on a weekly basis and aimed to show the best of collaborative innovation in Portugal.

Inovação.PT - The *inovação.pt* segment of the Brand Images programme, in coordination with the ANI, aims to provide good examples of technology transfer developed

by national Interface Centres (TIC) in areas such as: 'Industry 4.0', 'Sea, Space, Aeronautics', 'Health and Well-being', 'Agri-food', 'Nanotechnology', 'Mobility and Smart Cities', 'TIC', 'Biotechnology' and 'Circular Economy and Renewable Energy'. This series of programmes, broadcast on SIC Notícias until the end of September 2020, was aired on a monthly basis, with an estimated total audience of over 1 million people¹⁷⁹.

More Competitive Portugal - an initiative developed by COMPETE 2020, with online and television dissemination, with the aim of disseminating the results of innovation projects developed by companies and entities of the NIS, and supported by the Portugal 2020 Structural Funds¹⁸⁰.

Science and Technology Exhibitions

Tech@Portugal - The TECH@PORTUGAL event is promoted by ANI and aims to be an annual technological exhibition of what has been achieved in Portugal in terms of R&D and innovation¹⁸¹. The last event was organised by the National Innovation Agency and took place on 4 July 2019, at Alfândega do Porto Congress Centre, with over

100 technology and innovation institutions exhibiting over 150 national technologies developed in collaboration within the NIS. In 2020, the event did not take place due to the pandemic situation and the negative impact of COVID-19 on planning major face-to-face events.

¹⁷⁸ For more information, visit the COTEC area for Industry 4.0 events: <https://cotecportugal.pt/pt/category/industria-4-0/>

¹⁷⁹ *Inovação.pt* was promoted within the scope of the SIAC - Knowledge Transfer Initiative, a project launched by the ANI and co-financed by Compete2020, through Portugal 2020 and the ERDF.

¹⁸⁰ More information at: <https://www.imagensdemarca.pt/categoria/me0--portugal-mais-competitivo/>

¹⁸¹ Initiative developed within SIAC - Knowledge Transfer Initiative, co-financed by Compete2020, through Portugal 2020 and ERDF

'Meeting with Science and Technology' - The Meeting with Science and Technology in Portugal ('Science') aims to promote a broad debate on the main topics and challenges of the scientific agenda beyond the world of scientific research. The main objective of the meeting is to stimulate not only participation, but also interaction between researchers, the business sector and the general public. The Science Meeting is promoted by the Science and Technology Foundation in collaboration with the National Agency for Scientific and Technological Culture - Ciência Viva and the Parliamentary Commission for Education and Science, and has the institutional support of the Government through the Minister of Science, Technology and Higher

Education. This edition of Science 2020 took place on 2, 3 and 4 November 2020, both face-to-face and online.

COTEC Innovation Summit - International event held by COTEC in Portugal on the latest trends in innovation and business cooperation. The event brought together several hundreds of participants, including industry leaders, academics, technology companies and public decision-makers, national and foreign experts and potential partners for innovation opportunities. The event has an Exhibition Space about innovation and technology developed in Portugal¹⁸².

Innovation Portal

The Innovation Portal (www.portaldainovacao.pt) is an initiative developed and coordinated by ANI, which aims to showcase innovation and R&D results produced by NIS actors, to enable the visualisation of actors of the NIS competencies and activities, as well as to promote matching between technology supply and demand. The Innovation Portal, which aims to address a 'market failure' in the NIS, includes three main research and visualisation modules:

1. Mapping of innovation system entities

- Identifies and maps the entities of the National Innovation System (NIS), through a search engine.
- Provides search filters to search for NIS entities according to their competencies, areas of activity, etc.
- Provides a 'showcase of projects' presented by NIS entities.

2. Researchers

- Mapping of skills of researchers working in Portugal

- Search engine for researchers through name, Ciência ID record, fields of action, training entities and professional experience.

3. Technology Supply and Demand

- *One-Stop-Shop of Portuguese technological supply and demand and partners for R&D projects.*
- *Simplified access to opportunities and technological demand of the Enterprise Europe Network.*
- *Details each opportunity, including a description of the partner sought and activities to be undertaken.*
- *Allows the direct expression of interest between entities associated with the Portal.*

The Innovation Portal has more than 1200 registered NIS entities, more than 38 thousand CVs of researchers working in Portugal and around 4600 technological offers and searches in Europe.

Financing Portal

Launched in 2019 by IAPMEI, the Financing Portal (<https://financiamento.iapmei.pt>), allows companies to find several financing solutions all in one place, with public support, directed in particular to SMEs, in the various phases of their activity and investment.

The information is organised according to the needs of the companies, their investment strategies (growth, expansion, export, capitalisation, etc.), their dimension or their sector of activity. The goal is to present the

solutions, taking into account the investor profile and the characteristics of the business, as well as identifying the agents responsible for implementation.

The Financing Portal, hosted on IAPMEI's website, provides information on a wide range of solutions, such as Mutual Guarantee, Credit Insurance, Risk Capital, Business Angels, CoInvestment Funds, Real Estate Investment Funds, as well as tax incentives for company investment and capitalisation.

¹⁸² More information at: <https://cotecportugal.pt/pt/events/cotec-summit/>

Study & Research in Portugal Portal

Launched in 2018, this Portal aims to enhance and internationalise higher education, science and technology, dedicated to students and researchers, companies and foreign science and technology institutions. Study & Research in Portugal is promoted by the government area of

science, technology and higher education, in coordination with the Directorate General of Higher Education, the Foundation for Science and Technology, the Portuguese Secretary of State for Tourism and Tourism¹⁸³.

Web Summit

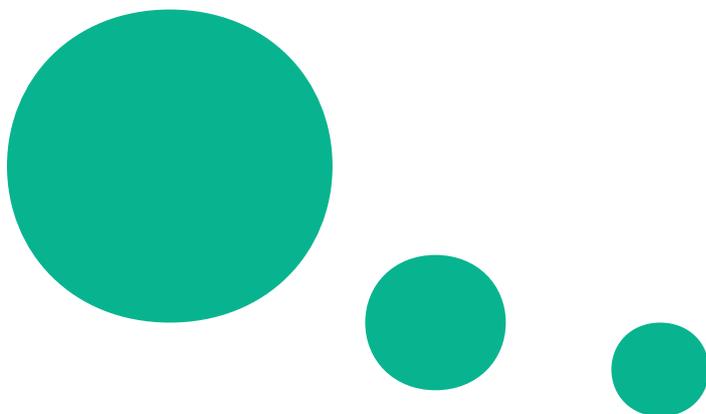
The Web Summit is Europe's largest digital economy and technology event, and one of the largest in the world, held annually in Lisbon. Every year, about 80,000 people attend the event, from start-ups and technological spinoffs, entrepreneurs and SMEs to Fortune 500 companies. The

Web Summit is the hub for CEOs and founders of technology start-ups, investors and people from the global technology industry. Web Summit is scheduled to take place in Lisbon until 2028, after 3 editions with increasing participation from participants from all over the world.

Other initiatives for the promotion of innovation and knowledge

Innovation Awards on the Portuguese Economy - Launched in 2017 by ANI and the Office of Strategy and Studies of the Ministry of Economy and Digital Transition (GEE), this award aims to give visibility to academic-based research carried out in Portugal, on innovation and innovation policy, as well as to support the work that contributes to disseminate innovations originating in companies and national R&D entities. With this, we intend to reward scientific articles that contribute to the identification of problems and to the implementation of economic policy solutions in Portugal in the areas of Knowledge-Based Innovation, namely Technology Enhancement and Transfer, Collaborative Innovation and Technology-Based Entrepreneurship.

National Award for Innovation Journalism (PNJI) - Launched in 2018, it aims to value and disseminate journalistic work focused on innovation that is 'Made in Portugal'. Three editions of award have already been organised, recognising journalistic pieces focused on innovation promoted by companies or other actors of the national innovation system, in areas of innovation policies and R&D activities, innovation activities, new products, processes and services, organisational change, technology transfer and valorisation of scientific and technological knowledge.



¹⁸³ More information at: <https://www.study-research.pt/>

5 Innovation Indicators

Table 2. Innovation Indicators in Portugal and the European Union 2010–2019

Areas	Indicator	Territory	Years									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Human Resources	Early dropout rate in education and training (aged 18–24)	PT	28,3%	23,0%	20,5%	18,9%	17,4%	13,7%	14,0%	12,6%	11,8%	10,6%
		EU28	13,9%	13,4%	12,7%	11,9%	11,2%	11,0%	10,7%	10,5%	10,5%	10,3%
	Population with secondary education (as a % of population aged 20–24)	PT	59,1%	64,6%	67,8%	70,1%	72,1%	77,0%	77,5%	78,5%	80,8%	82,9%
		EU28	79,3%	79,7%	80,3%	81,1%	82,2%	82,7%	83,2%	83,3%	83,6%	83,9%
	Percentage of population (aged 30–34) having completed tertiary education or its equivalent	PT	24,0%	26,7%	27,8%	30,0%	31,3%	31,9%	34,6%	33,5%	33,5%	36,2%
		EU28	33,8%	34,8%	36,0%	37,1%	38,0%	38,7%	39,2%	39,9%	40,7%	41,6%
	New PhDs per 1000 inhabitants (aged 25–34)	PT	1,9	1,9	1,9	1,9	2,0	1,9	2,0	1,8	2,0	
EU28		1,9	1,9	1,9	1,9	1,9	2,0	2,1	2,1	2,1		
Lifelong learning (per 100 inhabitants aged 25–64)	PT	5,7%	11,5%	10,5%	9,7%	9,6%	9,7%	9,6%	9,8%	10,3%	10,5%	
	EU28	9,3%	9,1%	9,2%	10,7%	10,8%	10,8%	10,8%	10,9%	11,1%	11,3%	
Companies with CIT training (% of all companies)	PT			23,0%		26,0%	22,0%	23,0%	21,0%	19,0%	28,0%	
	EU28			19,0%		21,0%	22,0%	22,0%	21,0%	23,0%	24,0%	
PISA – performance in Science	PT			489				501			492	
	OECD			501				493			489	
Excellence and Attractiveness of the R&D System	No. of international PhD students, as a % of total PhD students	PT	13,2%	14,8%	16,8%	15,1%	15,8%	21,2%	25,6%	27,3%		
		EU28	19,2%	19,5%	19,9%	19,2%	19,5%	20,5%	21,1%	21,4%		
	International scientific co-publications per million inhabitants	PT	469,1	553,1	841,2	931,1	994,2	1.061,2	1.139,5	1.187,7	1.284,9	1.408,1
EU28		335,9	363,0	810,3	863,3	918,6	959,1	1.012,5	1.051,5	1.105,5	1.171,8	
Researchers (FTE) per thousand employees	PT	9,1	9,9	10,0	9,1	9,0	9,0	9,5	10,0	10,3		
	EU28	7,6	7,7	8,0	8,2	8,3	8,6	8,7	9,0	9,3		
R&D and Innovation Financing	Public expenditure on R&D (State, Higher education, as a % of GDP)	PT	0,68%	0,64%	0,57%	0,68%	0,67%	0,65%	0,64%	0,64%	0,65%	
		EU28	0,72%	0,71%	0,72%	0,72%	0,71%	0,71%	0,69%	0,69%	0,69%	
	Business expenditure on R&D (as a % of GDP)	PT	0,70%	0,69%	0,68%	0,63%	0,60%	0,58%	0,62%	0,67%	0,69%	
		EU28	1,19%	1,24%	1,27%	1,28%	1,30%	1,31%	1,33%	1,37%	1,41%	
	R&D Expenditure – Private Non-Profit Institutions (as a % of GDP)	PT	0,15%	0,13%	0,12%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	
		EU28	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	
	Total expenditure on R&D (as a % of GDP)	PT	1,53%	1,46%	1,38%	1,33%	1,29%	1,24%	1,28%	1,33%	1,37%	
EU28		1,92%	1,97%	2,00%	2,02%	2,03%	2,04%	2,04%	2,07%	2,11%		
Expenditure on non-technological innovation (as a % of turnover)	PT	0,53%		0,60%		0,64%		1,02%				
	EU28	0,57%		0,69%		0,76%		0,86%				
Venture Capital (incl. early stage and expansion and replacement capital) (as a % of GDP)	PT	0,06%	0,08%	0,06%	0,08%	0,08%	0,09%	0,07%	0,05%	0,09%	0,10%	
	EU28	0,10%	0,08%	0,10%	0,09%	0,09%	0,09%	0,10%	0,11%	0,12%	0,13%	
Collaborative networks	SMEs that innovate in-house, as a % of all SMEs	PT	34,1%		33,8%		25,6%		56,8%			
		EU28	31,6%		28,7%		28,8%					
	Innovative SMEs collaborating with other companies, as a % of all SMEs	PT	8,1%		6,8%		7,8%		9,7%			
		EU28	8,9%		10,3%		11,2%		11,8%			
	Public-private co-publications per million inhabitants	PT		34,3	36,0	38,9	40,5	42,1	42,1	43,4	44,1	
		EU28		84,1	85,1	87,6	89,4	92,8	93,6	96,4	95,0	
	Collaboration between Universities and Companies in R&D activities (Index)	PT	4,5	4,6	4,6	4,6	4,7	4,7	4,0	4,2		
Spain		4,0	4,1	4,1	4,0	3,8	3,8	3,5	3,5			

Areas	Indicator	Territory	Years									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Intellectual Property	PCT patents per billion of GDP (in PPS)	PT	0,61	0,70	0,69	0,76	0,71	0,96	0,91	0,84		
		EU28	3,85	3,86	3,74	3,79	3,70	3,54	3,52	3,31		
	Community trademarks per billion of GDP (in PPS)	PT	5,01	5,23	5,65	5,97	6,58	6,83	7,12	8,11	8,72	8,51
		EU28	6,79	6,97	7,48	7,64	7,72	7,71	7,90	8,05	8,06	7,99
	EU designs per billion GDP (in PPS)	PT	4,64	4,13	5,02	5,00	4,53	4,47	4,43	4,05	3,79	3,57
		EU28	4,60	4,52	4,56	4,59	4,55	4,36	4,33	4,41	4,15	3,85
Innovative Companies	Companies with innovation activities (%)	PT	60,3%		54,6%		54,0%		66,9%			
		EU28	52,9%		48,9%		49,1%		50,6%			
	SMEs introducing process or product innovations, as a % of all SMEs	PT	44,2%		38,3%		42,1%		57,9%			
		EU28	33,5%		30,6%		30,9%		38,4%			
	SMEs introducing marketing or organisational innovations, as a % of all SMEs	PT	47,4%		42,8%		37,8%		47,4%			
		EU28	39,8%		36,2%		34,9%		35,7%			
	Employment in companies with high growth potential, of innovative sectors (as a % of total employment)	PT	3,1%	3,1%	3,1%	3,3%	3,7%	5,0%	4,9%	5,5%		
		EU28	5,1%	5,1%	5,1%	5,2%	4,8%	4,8%	5,2%	5,4%		
Economic Impacts	Employment in knowledge-intensive activities (as a % of total employment)	PT	8,6%	9,1%	9,0%	9,4%	10,3%	10,7%	10,9%	10,6%	10,9%	11,1%
		EU28	13,5%	13,7%	13,8%	13,9%	13,9%	14,1%	14,2%	14,2%	14,4%	14,6%
	Employment in technology-intensive sectors (industry and services), as a % of total employment	PT	2,3%	2,1%	2,2%	2,5%	2,8%	2,7%	2,8%	2,9%	3,0%	3,2%
		EU28	3,8%	3,9%	3,9%	3,9%	3,9%	4,0%	4,0%	4,0%	4,1%	4,2%
	Exports of medium and high-tech products (as a % of total exports)	PT	36,5%	36,8%	36,5%	35,2%	35,9%	36,8%	37,9%	38,5%	40,1%	42,3%
		EU28	54,6%	53,5%	53,5%	53,1%	54,3%	56,2%	57,1%	56,7%	56,4%	56,9%
	Exports in KIS sectors (knowledge intensive services) (as a % of total service exports)	PT	41,0%	43,4%	42,4%	43,7%	43,4%	41,9%	39,6%	37,6%	37,4%	
		EU28	66,8%	67,0%	67,6%	67,4%	68,3%	68,9%	68,9%	68,7%	68,4%	
	Sales of new innovations for the company and the market (as a % of the sales volume)	PT	14,4%		12,4%		6,3%		9,8%			
		EU28	13,4%		12,3%		13,4%		13,0%			
Technology Balance of Payments (TBP)	BPT credits (as a % of GDP - Constant Prices - Base 2016)	PT	1.022.914	1.179.179	1.311.185	1.420.774	1.541.408	1.682.068	1.732.820	2.001.421	2.134.103	2.227.971
	BPT debits (as a % of GDP - Constant Prices - Base 2016)	PT	0,51%	0,59%	0,68%	0,76%	0,83%	0,90%	0,93%	1,05%	1,11%	1,15%
	Technology Balance of Payments (in thousands of euros, Constant Prices, GDP - Base 2016)	PT	1.169.812	1.269.960	1.075.223	1.146.194	1.499.547	1.561.209	1.693.500	1.826.160	2.071.110	2.120.065
	Technology Balance of Payments (as a % of GDP - Constant Prices - Base 2016)	PT	0,58%	0,64%	0,56%	0,62%	0,80%	0,84%	0,91%	0,96%	1,08%	1,10%
	Use of mobile broadband in businesses with 10 or more employees (as a % of all businesses)	PT	-146.898	-90.802	235.962	274.580	41.892	120.829	39.310	175.270	62.993	107.877
	Use of mobile broadband in businesses with 10 or more employees (as a % of all businesses)	PT	-0,07%	-0,05%	0,12%	0,15%	0,02%	0,06%	0,02%	0,09%	0,03%	0,06%
	Companies with 10 or more employees with an internet presence (site) (as a % of all businesses)	PT										

Areas	Indicator	Territory	Years									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Information Society	Use of mobile broadband in businesses with 10 or more employees (as a % of all businesses)	PT	52.1%	53.7%	51.8%	59.5%	54.3%	61.5%	64.2%	64.8%	62.7%	58.6%
		EU28	67.0%	69.0%	71.0%	73.0%	74.0%	75.0%	77.0%	77.0%	77.0%	78.0%
	Companies with 10 or more employees with an internet presence (site) (as a % of all businesses)	PT										
		EU28										
	Companies with 10 or more employees with an internet presence (site) (as a % of all businesses)	PT										
		EU28										
	E-commerce - companies with 10 or more employees selling online (as a % of all businesses)	PT	19.0%	16.0%	14.0%	14.0%	14.0%	19.0%	18.0%	19.0%	19.0%	17.0%
		EU28	13.0%	13.0%	14.0%	14.0%	15.0%	17.0%	18.0%	18.0%	17.0%	18.0%
	Private households with broadband internet connection (%)	PT	14.6%	18.1%	22.3%	24.5%	26.3%	31.0%	31.0%	34.1%	36.7%	38.7%
EU28		40.0%	42.0%	44.0%	47.0%	50.0%	53.0%	55.0%	57.0%	60.0%	63.0%	
Private households with broadband internet connection (%)	PT											
	EU28											
Population (aged 16-74) using the Internet to purchase goods and services in the last 12 months (%)	PT											
	EU28											
Population (aged 16-74) using the Internet to interact with public services in the last 12 months among those who used the Internet in the last year (%)	PT											
	EU28											



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