Innovation Strategy of the Czech Republic 2019 — 2030

Czech Republic
The Country For The Future

COUNCIL FOR RESEARCH, DEVELOPMENT AND INNOVATION

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Andrej Babiš, Prime Minister of the Czech Republic

You hold in your hands a crucial document. The plan that will bring our country back to leading Europe. Where we once were and where we wish to return. A specific plan. The countries that have chosen to promote science, research and innovation as key national priorities are now the ones that prosper. Switzerland, Finland, Sweden and Denmark, which are geographically and economically close to us and which decided some time ago to set out on the road of massive support for innovation. Thanks to this, they are now among the global leaders. And the Czech Republic has all the prerequisites to do the same. Exceptional knowledge potential. We are a technologically oriented country and meet the strictest economic criteria. When is the time to venture into such bold changes if not now, when we are amongst the most stable economies in Europe, when our companies are achieving record results and when our scientists are gaining ever-growing respect in the world?

The government of the Czech Republic has therefore decided that support for science, research and innovation will become an absolute priority. We have the highest ambitions. Within twelve years to become one of Europe's innovation leaders and a country of the technological future. If we want to maintain our performance in an increasingly competitive environment, we must focus on final production, technology solutions and services − based on knowledge. The goal must be not only to generate volume but mainly to generate added value.

This is why we have put together a team of the most capable personalities in the field of innovation from the business environment, scientists, academics and public administration staff who have prepared the most daring innovation strategy of recent years with a huge overlap of jurisdictions, concentrating the activities of a number of ministries and organisations. We are ready to invest record resources in science, research and innovation to create from the Czech Republic a country that will not only become a symbol of knowledge and advanced technology but also host to the world's most important scientific authorities. By combining our industrial traditions, research background and entrepreneurial skills, we have an extraordinary chance to place the Czech Republic among the most advanced countries by 2030.

It will be a very challenging journey. This is not just about resources, it is about changing the perception of the future position of our country, about the belief that we are able to achieve our goals, about introducing a consistent strategic management system. That is why its implementation will be under the direct authority of the Prime Minister, through the Government Council for Research, Development and Innovation. Much extremely demanding work awaits us, but I am convinced that with our joint efforts we will shift our country back where it once belonged.

Karel Havlíček, Council for Research, Development and Innovation

Few countries have to hand so many strategic documents and visions as the Czech Republic. The problem is that it has never been very good at using them. Political inactivity, a ministerial mentality and the incredible complexity of the action plans. Which is why the visions remained just on paper. This time it is and will be different.

We have created a team of top businessmen and managers, representatives of the Czech Academy of Sciences, the best universities, research organisations and ministries; a team which has identified all activities in the science, research and innovation. We have completed critical and ongoing innovation-related plans and activities, and complemented them with those that are missing or are not developing. We have defined the nine strategic pillars that are crucial to becoming one of Europe's innovation leaders. We have confronted all of this with the international environment, the requirements for innovation performance and, in particular, with the specific examples of successful countries.

The strategy must be timeless, supra-ministerial and apolitical. A simple framework document, which will have legislative support and at the same time ambitious goals consistent with the international requirements of a number of innovative Scoreboards. We are working with three of the most important. These are the Summary Innovation Index (SII), the Global Innovation Index (GII) and the Innovation Output Indicator (IOI).

According to the SII, the Czech Republic is in the most numerous group of Moderate Innovators. The plan? We want to be among the Strong Innovators by 2025, and by 2030 in the leading European group, Innovation Leaders. Our fourteenth place in the EU in the GII and 13th place according to the IOI criteria now put us at the exact average of the European twenty-eight. By 2025, we want to be in the top ten and by 2030 in the top seven EU countries, within both the GII and the IOI.

The means of management and control is absolutely fundamental to the future success of this strategy. Most national strategic plans have failed on this in the past. Each of our pillars has a clear management responsibility for achieving its goals. Each year, their guarantors will prepare an action plan for all the changes; we will evaluate this on a monthly basis at the Council for Research, Development and Innovation, with the Prime Minister's involvement.

I thank all those who have worked tirelessly on this for several months. I appreciate the fact that we have managed to create a balanced strategy involving representatives of all areas of science and innovation. For the first time, an innovation concept has emerged which covers national key activities across ministries, setting out targets and strategic tools for their implementation. And it has all the best prerequisites to make it really work.

Czech
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The Country
For The Future

Czech
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The Country
For Excellence

Czech
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The Country
For Digitalization

Czech
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The Country
For Startups

Czech
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The Country
For R&D

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The Country
For Technology

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For Investment

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For Smart
People

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The Country
For Smart
Infrastructure

Czech
Republic
The Country
For Patents

Czech Republic
The Country For R&D

Financing and Evaluation of Research and Development

Institution responsible: Council for Research, Development and Innovation (RVVI)

Managerial responsibility: Member of the RVVI Board

Opening position

The share of total R&D and innovation expenditure in the Czech Republic is 1.79% of GDP, of which 60% are company resources, 40% are government and European resources. At this time, a change is under way to the evaluation system for research organisations, to transition from the existing quantitative system to assessing the quality and impact of research and development (Methodology 2017+). Apart from the aforementioned institutional support, the assessment system for targeted support is also being changed, where a system of professional guarantors is gradually being introduced, sectoral priorities are being unified and the overlapping of forms of support is being eliminated. In the case of both institutional and targeted support, the weak points are the linkage and proportionality of the innovation chain: basic research → applied research → innovation → product → profit → reinvestment into research.

Goals

- Strengthen R&D funding (measured as % of GDP): 2020 2.0%, 2025 2.5%, 2030 3.0%, i.e. growth by 0.1 percentage points each year; of which 1% from public resources and from company resources, 1.5% in 2025, and 2% in 2030.
- Increase the institutional component of R&D funding for those research organisations that achieve excellent results in defined research priorities.
- Strengthen the targeted support for institutions whose results are applied in practice.
- Through evaluation support the orientation towards participation in Horizon Europe and maintain research funding from European funds.
- Fully implement an assessment system in line with the Methodology 2017+, monitor and continually evaluate its impact with an emphasis on the impact on society.
- Support research topics that meet the criteria cross-sectionally: globally competitive basic research – sufficient capacity for followup applied research – successful applications (new quality of life solutions, patents, licences sold, products) – real interconnection to the corresponding company environment and fields with breakthrough technology potential.
- By 2030, achieve excellence in research and development by the standards of the European Research Council.
- Encourage obtaining funds from non-public sources through financial instruments.
- Simplify conditions and expedite the process of employing foreign skilled staff.

Tools

- Czech National Research, Development and Innovation Policy, 2021+.
- National Research and Innovation Strategy for Smart Specialisation of the Czech Republic (RIS3).
- Prepare of a major amendment or new Act on the promotion of research, experimental development and innovation.
- Strategy for the long-term financing of RD&I involving resources from the state budget.
- Create a higher state incentive to use tax deductions for RD&I.
- Investment Incentives Act in relation to RD&I incentives.
- Engaging companies in research projects with research organisations using private co-financing.
- Establishment of an inter-ministerial working group to prepare targeted grant schemes supporting research topics with innovation potential and the creation of innovation chains.
- Assessing innovation capacity as part of the evaluation of research centres of excellence.
- Create a scheme for pooling public and private resources and funding long-term research for business needs.
- Horizon Europe‘s National Support for Domestic Organisations Scheme and active international science policy towards the EU to increase the participation of the Czech Republic in consortium projects H2020, respectively, Horizon Europe.
- Operational programmes funded by EU 2020+ funds with a strong focus on RD&I.
- Development of the Methodology 2017+ for the individual segments of the R&D system in the Czech Republic, i.e. the full launch of all modules, the application of scaling and the strengthening of the interconnection of basic and applied research.
- Evaluation system for RVVI targeted support respecting National RD&I Policy.
- Motivation programme to support international teams, establishment of a Welcome Office.
- Targeted programs to support excellence (ERC-CZ, EXPRO), institutional support for excellence and „pipe-line“ programs to attract, develop and maintain top-level researchers at the level of providers of research organisations.
- Support Open Access to R&D results.

Czech Republic
The Country For Technology

Polytechnic Education

Institution responsible: Ministry of Education, Youth and Sports/Ministry of Industry and Trade/Ministry of Agriculture

Managerial responsibility: Ministry of Education, Youth and Sports representative

Opening position

Although the Czech Republic has a high-quality education system, the area of polytechnic education has been undervalued over the long term. A properly developed STEM (Science, Technology, Engineering and Mathematics) system is missing, which is one of the key competences in the new curriculum concept from nursery schools through elementary to secondary education. At elementary schools there is a clear absence of a compulsory subject focused on technology (development of technical thinking, practically applicable skills, fine motor skills and technical creativity) with a link to new technologies, while not only the training of teachers in these fields but also the involvement of practical specialists in teaching is standing still. The situation at secondary vocational schools is characterised by insufficient interconnection of teaching with both practice and with elementary schools. Furthermore, there is a lack of teaching with elements of the dual system of education, systemic and managed cooperation between schools and employers in relation to regional infrastructure, and familiarisation of pupils and teaching staff with the latest technologies. Polytechnic-oriented universities lack a system to incentivise spin-offs, start-ups, and the creation of natural cooperation between

students and companies in advanced technologies, including the establishment of their own companies (the so-called entrepreneurial university). In the case of further education, there are few possibilities for retraining in the use of new technologies, associated with changes in workload. Czech society is also not sufficiently ready for the use of disruptive models in education. This may in turn lead to a further shortage of skilled staff in new technologies, both in business practice and in the research sphere.

Goals

- Changing the polytechnic education system: emphasis on creativity, research approaches, technical imagination, logical and critical thinking, problem solving, information evaluation, project-based teaching based on a knowledge base of natural sciences and mathematics.
- Elementary education: at the level of the Framework Educational Programmes (FEPs) the integration of a „People and Technology“ education area with the aim of implementing a compulsory subject „Technology“ at the 2nd level of elementary school, in line with the existing background study on revisions to the FEP; at the 1st elementary school level, implementation of a technology curriculum into a relatively separate educational area and at the same time implementation of technical skills across the board in all relevant subjects.
- Secondary Vocational Education: innovation and consolidation of a coherent national system with dual education elements, managed by the government with the involvement of the regions and employers.
- University education: support for study programmes focusing on advanced technologies and incentives to involve top personalities in collaboration with domestic universities in all areas.
- Promoting lifelong learning and re-skilling − preparing for the use of breakthrough technologies.
- Analysis of the impact of Industry 4.0 on the labour market in order to appropriately transform the education system.
- Targeted support for strategic alliances of our domestic universities with Europe‘s top universities and the synchronisation of their curricula in relation to the mobility of students and academics.

Tools

- Updating the Digital Education Strategy with the introduction of breakthrough technologies.
- Revision of the FEP for elementary schools (application of the National Institute for Education working group concept − Technology), implementation of the area „People and Technology“ with the subject „Technology“ and implementation of new technologies in other relevant subjects within the FEP.
- Strengthening undergraduate teacher training with a focus on the use of new technologies as teaching tools.
- Introducing conceptual support for the innovation potential of pupils and students.
- Increasing the digital competence of teachers in line with the Teacher Digital Competence Standard.
- Changing legal standards in initial and continuing education using the elements of the dual education system with the involvement of employers, the regions, unions and critical departments.
- Creating a system at national and regional level to coordinate the cooperation of schools with employers based on dual education in order to provide firms with methodological support in professional training and preparation.
- Preparation of a support system for staff retraining at national and regional level to respond to current market demand.
- Establishment of university methodological support centres for current and future teaching staff, with the aim of sufficient preparation for the implementation of new technologies in elementary and secondary education.
- Creating a system of ongoing assessment of the impact of the industrial revolution on the innovation ecosystem, labour market, education and citizens’ lives.
- Creation of a Fast Track for the employment of advanced technology scientists and academics.
- Incentivisation of universities to introduce Masters and PhD programmes in English and targeted state activity in the winning foreign students for Czech universities and their interconnection with public research institutions.

Czech Republic
The Country For Startups

National Start-up and Spin-off Environment

Institution responsible: Ministry of Industry and Trade/CzechInvest/Czech-Moravian Guarantee and Development Bank/Technology Agency of the Czech Republic

Managerial responsibility: General Director of CzechInvest

Opening position

In the Czech Republic there is a weaker investment environment to incentivize the creation and financing of new projects, but there is partial support for start-up projects through the state CzechInvest agency, through incubation and acceleration programmes. However, there is a lack of a comprehensive national concept for their establishment, development and funding. Universities support the emergence of start-ups/spin-offs haphazardly because they are generally considered to be risky in the academic environment. From the point of view of business practice, there is insufficient motivation to use academic outputs, and in the Czech Republic the approach of corporations and small and medium-sized firms to cooperation with start-ups is inflexible. From the point of view of young Czech innovative companies themselves, their ability to expand abroad is lower due to low internationalisation.

Goals

- Create specific support elements for the establishment and support of start-ups and spin-offs at national level and link these elements with regional and international support.
- Create a comprehensive funding programme with national support for the start-up segment.
- Create a start-ups map to link them up with investors and support providers.
- Ensure an exchange of information and best practice between startups at national level.
- Create an environment of interest for foreign start-ups and technology teams for the long-term development of their activities in the Czech Republic.
- Prepare a Czech Technology Agency targeted programme for start-ups and spin-offs.
- Introduce training for entrepreneurship as part of teaching at all levels of education.
- Introduce monitoring and benchmarking of incubators, hubs and accelerators.

Tools

- Creation of a National Start-up Support Agency within CzechInvest.
- Create Czech-Moravian Guarantee and Development Bank programmes for financing start-ups, incl. involving small and mediumsized businesses in setting up their own start-ups.
- A system for commercialization institutions at universities and public research institutions.
- Collaboration with commercial corporations and possible private investors to develop start-ups.
- Create tools for targeted support of RD&I within the Czech Technology Agency for start-ups and spin-offs, incl. an evaluation system.
- Creating 2020+ operational programme calls for start-ups and spinoff.
- Targeted support from university teaching for entrepreneurship through setting up start-ups and spin-offs.
- Supporting a regional structure to promote innovative start-ups and spin-offs.
- Expanding the use of the instruments of the European Investment Fund (EIF).
- Creation of investment schemes in line with international models (Israel, Finland).

Czech Republic
The Country For Digitalization

Digital State, Manufacturing and Services

Institution responsible: Government Council for Information Society (RVIS)/Ministry of Industry and Trade/Ministry of the Interior/Office of the Government of the CR (UV CR)

Managerial responsibility: Government Representative for IT, Ministry of Industry and Trade Representative

Opening position

A number of important tools for digitisation have been introduced in the Czech Republic in recent years, with more than 700 online solutions implemented in the public sphere. On the other hand, the system for digitization implementation in the Czech Republic has been chaotic so far, public information systems and online tools are not interconnected, bringing neither comfort nor time or cost savings to businesses or citizens. As the Czech Republic is a highly industrially-oriented country, Industry 4.0 must be understood as a societal and economic phenomenon that determines our future position in the world community. In order to strengthen the coordination of the digital agenda process, the current government has approved a new Digital Czech Republic strategy, which contains: The Czech Republic in a Digital Europe, an Information Concept for the Czech Republic (Digital Public Administration) and Digital Economy and Society. Digital Czech Republic has managed to overcome the long-term sectoral and thematic fragmentation of the digital agenda. Coordination of the whole implementation is concentrated in the RVIS under the patronage and direction of the government representative for IT; it will be implemented in offices and departments in accordance with their authority.

Goals

- Ensure online services for citizens and businesses and transform the network of contact points for assisted state administration.
- Establish efficient and centrally managed IT to be coordinated by the RVIS with the involvement of all ministries.
- Create an interlinked data fund (data only once) to use all the information already provided to the state by the citizen or company in order to avoid the obligation to re-provide information already submitted earlier.
- Prepare society for trends such as IoT, AI, BigData, new types of human-machine interface, etc.
- Promote implementation of applied research on transformative technologies in practice.
- Permanently secure online and shared services, including industrial enterprises and the system security of complex facilities (cities, airports, businesses, power stations), using intelligent cybernetic systems and handling the most serious risks.
- Involve small and medium-sized businesses in the use of digital business tools.
- Ensure communication on topical issues and opportunities from the EU Digital Agenda.
- Formulate measurable levels of Industry 4.0 implementation and resulting generally respected standards.
- Apply Industry 4.0 principles to the energy sector, especially in the field of smart grids, as well as in smart cities and regions.
- Set up a system to support resource optimisation and environmental protection in connection with the implementation of Industry 4.0 in manufacturing plants and services.

Tools

- National Strategy for AI linked to the Coordinated Plan for AI.
- European Centre of Excellence for AI in the Czech Republic.
- National Research and Innovation Strategy for Smart Specialisation of the Czech Republic (RIS3).
- Building high-speed infrastructure as the basis for online services.
- Switch to shared services, shared platforms, and the Cloud.
- Creating targeted digital literacy training at small firms in the form of the Year of Digital Business.
- Support for Czech companies and research organisations within Digital Europe.
- Support for free access of research teams to computing capacities and their expansion.
- Introduction of the Digital by Default and Data Only Once principles for relevant state administration agendas.
- Implementation of a Digital Citizens' Rights Act.
- Pilot projects on the use of transformative technologies in state administration.
- Negotiations within existing platforms with the European Commission and other national CDOs on strategic digitisation issues.
- Promoting the position of the Czech Republic as an active player in the digital single market.
- Integration of Industry 4.0 with the Digital Czech Republic programme.
- Introduction of financial instruments to facilitate robotisation, automation and the promotion of innovation in firms, with an emphasis on SMEs in line with defined Industry 4.0 standards.
- Support for the transformation of small and medium-sized businesses - Digital Innovation Hubs.
- Support for technological solutions and innovations in automation, robotics, AI in the calls of national RD&I programmes.

Czech Republic
The Country For Excellence

Innovation and Research Centres

Institution responsible: Council for Research, Development and Innovation (RVVI)/Ministry of Education/ Czech Academy of Sciences/Ministry of Industry and Trade/Technology Agency of the CR

Managerial responsibility: Member of the RVVI Board

Opening position

In terms of the number and quality of its research centres and research infrastructures the Czech Republic is one of the EU‘s leaders. However, their development has not been managed having regard to research or economic priorities, resulting in a number of centres whose capacity will be difficult to utilise in the future, with overlapping disciplines in a number of cases. In spite of this, a number of top research centres have emerged in the area of new technologies (robotics, laser technology, nano-technology, etc.). There are several support systems for these centres, institutional support for the long-term conceptual development of a research organisation, support for large research infrastructures, as well as support for National Competence Centres. This support is however accompanied by bureaucracy, inconsistencies between control bodies and providers in issues of public aid permitted, selection procedures, support rules, while limitations multiply, inhibiting the options for public research and its co-operation with the applications sphere.

Goals

- Focus support on key trends at the intersection of research excellence, the potential of Czech companies and future technological trends = Smart Specialisation Strategies (AI, Space Technologies, Laser Technologies, Nanotechnology, Biotechnology, Energy-Saving Solutions, Chemistry and Chemical Technologies, Clinical Medicine and Biomedicine, etc.).
- Create a complementary scheme for financing RD&I capacities from institutional support for the long-term conceptual development of research organisations and the so-called large research infrastructures on the one hand and tools to support long-term strategic cooperation between the public research sector and the industrial sphere in the form of so-called National Competence Centres.
- Support for excellence centres resulting from the Smart Specialisation Strategy − the global visiting card of the Czech Republic for the most advanced technologies.
- Achieve the integration of Czech firms into industry clusters with the involvement of research institutions.
- As part of support from public funds, specifically support proposed solutions with the potential for commercialisation through IP protection.

Tools

- Long-term strategy for cooperation of the private sector with research facilities in areas defined as high-priority by the state.
- Innovative Strategy „Institutional Support for Long-Term Conceptual Development of Research Organisations“.
- Innovated „Large Research Infrastructures” strategy.
- Connection of „National Competence Centres“ and OP RDI Centres with industry clusters.
- Involvement of key European programmes for the development of research excellence centres.
- Involvement of European 2020+ Operational Programmes for building research clusters.
- National Initiative to reduce the bureaucratisation of science, effective modifications to the interpretation of state aid questions, the Registry of Contracts and procurement tenders.
- National Research and Innovation Strategy for Smart Specialisation of the Czech Republic (RIS3).

Czech Republic
The Country For Investment

Smart Investment

Institution responsible: Ministry of Industry and Trade representative

Managerial responsibility: Ministry of Industry and Trade representative

Opening position

The Czech Republic has long supported foreign investment in particular, where since 1993 state investment policy implemented by CzechInvest has attracted foreign direct investment worth CZK 1 trillion, which has in turn generated 250,000 jobs. However, in most cases, support for business investment was not directed to value-added investments. A partial change has occurred only in recent years, when foreign companies, with the support of CzechInvest, sought locations for higher added value operations after the global economic crisis. A change in the legislation related to support for investment in research and development projects is currently under way. At the same time, Team Czech Republic has been created, consisting of state agencies and banks, comprising support for businesses, from support for research and investment to promotion of exports, including financing.

Goals

- Achieve an increased volume of corporate investment with high value added.
- Achieve an increase in corporate investment in which the results of research conducted in research organisations will be utilised.
- Achieve increased use of tax deductions for RD&I investment.
- Support Czech companies investing abroad in research and development and innovative projects.
- To support investments implementing Industry 4.0.
- Achieve increased investment in prospective industries (e.g. AI, Space Technologies, Laser Technologies, Nanotechnology, Biotechnology, Energy-Saving Solutions, Chemistry and Chemical Technologies, etc.).
- Encourage public procurement to support investment in innovation.
- Link investment in defence and security with industrial research support.
- Support the modernisation of the Czech economy's industrial base.
- Within the framework of state investment policy (public investment), take into account solutions for adapting to climate change and addressing drought and food security.

Tools

- Change the incentive rules for corporate investment in order to support investments with high value added, incl. involving these companies in collaboration with research centres and research organisations.
- Incorporating in the promotion of investment greater support for small and medium-sized businesses with the potential for high value added production.
- Focus in particular on support for investment in key areas, in line with the Smart Specialisation Strategy, the National Space Plan, the AI Support Strategy, etc.
- Create a system of technological foresight (horizon scanning).
- Focus the public procurement system increasingly on the purchase of innovative technologies − within the framework of the Public Procurement Act, prepare a methodology sheet to take into account best value.
- Create a National Investment Plan.
- Create a motivation system for existing foreign investors who have had positive experiences of the Czech Republic to relocate their RD&I, distribution and marketing activities to the Czech Republic.
- Through Team Czech Republic create a motivation system for Czech companies investing abroad in innovation and technology projects.
- Update the legislation on deductions on RD&I and create an education system for businesses.
- Create a system to link investment in defence long term with the support of Czech industry so that Czech companies are part of the development of the latest systems and have the possibility under the given conditions to transfer these to the civilian sphere, but also from civilian industry to the defence industry.
- Apply the so-called adaptation strategy − combining innovation and, where relevant, the need to prepare for climate change.
- Regularly evaluate the impact of public support for innovative processes in the commercial/corporate area.
- Create as part of Team Czech Republic a product based on the support of enterprises involved in the whole cycle (from investment in R&D to export of the final product), on the basis of which, in particular, small and medium-sized enterprises would receive a comprehensive offer of financing, investment aid for innovation, patent support and export support.

Czech Republic
The Country For Patents

Intellectual Property Protection

Institution responsible: Ministry of Industry and Trade/Industrial Property Office

Managerial responsibility: Chairman of the Industrial Property Office

Opening position

In the Czech Republic, IP protection instruments are insufficiently used in comparison with the most advanced countries, which is reflected in the low number of national and foreign patents granted. Awareness of the need to protect intellectual property is still weak, and in management documents, not even in the strategic and conceptual documents for research, development and innovation, the issue has not yet been sufficiently addressed. Cooperation with all types of schools in the development of training programmes is not systematic, there is only support and ad hoc activities as part of lectures.

Goals

- Raise awareness of protection − setting up closer co-operation with all levels of education, both in lecturing and in creating training programmes.
- Raise awareness of IP protection in the manufacturing and application spheres, beginning with the research phase.
- Increase the use of intellectual property protection, especially patents with commercial potential.
- Make use of patent information before formulating scientific, research, and innovation plans.
- Reflect the goals and follow-up measures of the IP Protection Concept, in particular for patents, in other EU and CR management documents.

Tools

- Create a comprehensive IP Protection Concept, in particular for patents.
- Long-term support for the operation of centres for technology and knowledge transfer at research organisations and universities.
- Setting financial support in line with the established objectives of the IP Protection Concept.
- Provision of training services in the field of IP for all levels of education.
- Motivation to make use of licencing policy to achieve leading-edge results.
- Share in the formulation of EU and CR management documents to have them reflect the objectives of the IP Protection Concept.
- Setting up financial support tools for the effective use of IP protection.
- Setting up IP enforcement support tools.
- Recording and promoting financial support for the protection and enforcement of IP rights.

Czech Republic
The Country For Smart Infrastructure

Mobility and Construction Environment

Institution responsible: Ministry of Transport/Ministry for Regional Development, Government Council for Public Investment/Chamber of Commerce of the Czech Republic

Managerial responsibility: Ministry of Transport representative, Ministry for Regional Development representative

Opening position

The Czech Republic is building a backbone communications network, but in many places is blocked due to lengthy proceedings. Conventional transport telematics elements are being built up and connected to each other, and new ones are being pilot tested to create, process and then provide information of sufficient quality to control and manage traffic. On the other hand, a sufficiently large network of recharging stations has not yet been built to absorb the coming increase in the number of electric vehicles. Neither transport infrastructure nor legislation are yet ready for the deployment of data-linked and autonomous or automated vehicles. Nor has the issue of city logistics been adequately addressed. Although the Czech Republic has good research, business and training capacity in the construction field, incl. a readiness to build the structures associated with advanced technologies, at the same time, the Czech Republic is continuing to fall down the international rankings in the speed of handling construction permitting. In order to address this area, a Public Investment Council has been set up and the re-codification of public construction legislation is under way.

Goals

- Ensure widespread and affordable use of reliable smart mobility services for both people and objects.
- Complete the backbone transport infrastructure network.
- Build a sufficiently robust network of transport telematics systems in the Czech Republic (at state and regional level) and integrate data from them into the National Transport Information Centre (NDIC) for their further use for controlling and managing traffic and their provision for further use by the private sphere.
- Ensure a permitting process within construction proceedings with mandatory and enforceable deadlines of a maximum of 1 year.
- Simplify and accelerate the administrative processes for construction proceedings and procedures related to digitisation.
- Synchronise and coordinate state administration and local authority activities in transport network construction and transport provision, including provision for the needs of persons with reduced mobility and orientation.
- Ensure an integrated approach of carriers in public passenger transport.
- Ensure a high level of intermodality and support the establishment of logistics centres.
- Prepare for the widespread deployment of alternative fuel cars in real traffic and by enabling the operation of autonomous and automated vehicles, support the further development of the automotive industry in the Czech Republic.
- Create a targeted concept of support for smart cities, including the issue of city logistics.
- Promote the implementation of extensive demonstration and testing pilot projects for smart mobility solutions.

Tools

- Czech Republic Transport Policy.
- Concept for public passenger transport.
- Intelligent Transport Systems Development Action Plan.
- Action Plan for the Future of the Czech Automotive Industry.
- Action Plan for Clean Mobility (building of recharging stations for electric cars, etc.).
- Vision for the development of autonomous mobility and an Autonomous Driving Action Plan.
- Concept for Research, Development and Innovation in the Transport Sector to 2030.
- ESIF, CEF, SFDI, Transport Research Centre.
- Act on Accelerated Construction of Transport Infrastructure (the “Line Act”).
- Amendment of the Road Traffic Act, the Roads Act, etc.
- Concept for Smart Cities and Regions at national level.
- Creating a separate, professionally qualified construction office.
- Clear delimitation of competences on the basis of state and local government policies in construction proceedings.
- Integration and review of the public interests affected.
- Introducing the appellation principle in review and at the same time the principle of concentration.
- Defining the protection of the public construction interest (introduction of the European TIA − Territorial Impact Assessment).
- Introduce a binding “nationwide land-use plan” to coordinate and make adequate use of resources (water, finance, infrastructure, energy) and protect, for example, natural wealth, food security, military security, etc.

Czech Republic
The Country For Smart People

Smart Marketing

Institution responsible: Council for Research, Development and Innovation (RVVI)/Ministry of Industry and Trade/Ministry of Foreign Affairs/CzechInvest

Managerial responsibility: RVVI representative

Opening position

Developing the good name of the Czech Republic as a highly innovative country can be a haphazard process. The Czech Republic is promoted abroad primarily in the traditional way (beer, ice hockey, cut glass and tourism). Exceptions include some international exhibitions, such as EXPO, where there has been a long-term effort to present the Czech Republic as a technologically advanced country. However, there is a lack of a comprehensive communications strategy, including a unified graphical concept involving key public and private institutions. The result is marketing fragmentation, both on a product basis (presentation of the top fields in which the Czech Republic is world-class) and in communication (advertising, PR, direct marketing). As a result, in spite of a number of exceptional successes in the areas of the latest trends in science, research and commercial applications, the Czech Republic is not perceived as a country of innovative opportunities with exceptional human potential in a number of technological fields.

Goals

- To build the brand of the Czech Republic as a confident innovation leader − to communicate the Czech Republic as a country with scientific potential, advanced industry and doing research in numerous fields, with educated, ingenious people of great inventiveness.
- To present both past global successes and a contemporary innovation ecosystem, incl. a modern Innovation Strategy.
- To build a brand on the excellence of Czech research centres, the unique products of Czech companies, leading-edge science in the most advanced technologies and successful innovative individuals.

Tools

- Development of a marketing team that will systematically introduce new elements for communication of the Czech Republic across ministries, research organisations and businesses.
- Creation of a style guide for the „The Czech Republic: The Country for the Future“ strategy and introduction of its elements into key national and international documents and activities (conferences, exhibitions, EXPO, EU presidency, etc.) including integration into the online communication tools of the relevant professional public institutions, embassies, foreign representations of the Czech Republic and the Czech Centres.
- Creation of tools for the communication mix (advertising, PR, support, direct marketing) for the Czech Republic – Innovation Leader of Europe 2030 concept, especially on the basis of new communication technologies making use of social networks, etc.
- The launch of a long-term communications campaign using examples of scientific and commercial success, the success of scientific teams and their leaders in selected areas of technology: AI – energy – efficient systems – laser technologies – nanotechnology – space technologies – biotechnology – chemistry and chemical technologies, etc.
- Active representation for the Czech Republic as a technological leader at the international level (EU, OECD etc.), the key role of the Prime Minister, ministers, ambassadors and foreign representations of the Czech Republic.
- Including experts with an insight into the Czech Republic‘s innovation and research potential in delegations of institutional figures, with a specific mission objective.
- Organisation of incoming missions of foreign experts and scientists who are influential in the research policies of their countries in order to engage them in our national RD&I and present to them the best of Czech research and innovation.
- Systematic promotion of research opportunities in the Czech Republic in multiple language versions, communication of a so-called Welcome Office for foreign scientists.
- The organisation of thematic technology missions of Czech experts to countries with cooperation potential.

Conclusion

The Czech Republic has an extraordinary opportunity to become one of Europe’s innovation leaders by 2030. As demonstrated by the international comparison, it has for this the potential in the crucial instruments of positive change, notably in innovative infrastructure and the promotion of digitisation. To add to this actual innovation potential it also has a clear understanding of what needs to be done to bring about change, as demonstrated by the Ten Commandments of the Action Plan, nine areas that are important for change.

Last but not least, it also has the political will to make these changes. One of the first steps will be to increase spending on research and development. This spending will be tied to the evaluation of research, which will continually improve by international comparison and be increasingly useful for the quality of life of people in the Czech Republic.

As an industrial country that has always been at the forefront of development, we are not afraid of the changes known as Industry 4.0, but will support research and development that will strengthen the Czech Republic’s position in the world, especially in artificial intelligence and the digitisation of branches of the economy. The quality of citizens’ lives will also be improved by the digitisation of public administration services, the possibility to provide their data to public administration just once and to communicate with it at a single point. Of particular importance will be the enforcement of a citizen’s right to digital service.

In the wider world we have the reputation of an extremely inventive and creative nation. We always had exceptional technical potential, capable engineers and technicians. The new challenges call for an efficient system of polytechnic education, for new ways of teaching, for digital education, support for technical education and manual skills from our nurseries onwards. School education programmes will be adjusted as well as the training of teachers in practice, and pedagogical students will be managed to this effect.

Intellectual property protection will also be systematically improved. This requires, in particular, the promotion of systematic education in this field from elementary school onwards, the promotion of patent protection and the enforcement of patent rights.

Support will also be strengthened for endogenous Czech companies, spin-offs and start-ups arising as a result both of academic research and of the natural needs of businesses in all areas of social needs. In line with the Israeli model, we will be creating an environment where the state with its tools will support the most risky period of emergence of new companies.

Using EU funds and national resources, there will be support for the most promising centres and research infrastructures, both centres of international importance and innovation centres which will be of the greatest benefit for Czech society and the economy.

The production potential of the Czech economy, which in the past was supported by investment incentives, will be renewed and extended, subject to a commitment to high value added output and to cooperation with the Czech Republic's research infrastructure. In the past, investment in the Czech Republic has been geared towards supporting employment, while from now they will focus on promoting innovation.

Current and future infrastructure includes not only roads, motorways and railways but also telecommunications infrastructure and its associated logistics. We will be ready for self-driving transport, new transport fuels, having regard inter alia to the impacts of climate change. In a short time, there will reform to the construction law so that the approval process will be radically accelerated and all infrastructure can be built in a short period following the example of the most dynamic innovative countries.

Czechoslovakia was an acknowledged name in the world. The Czech Republic has the "right" to a similar brand. All the major means of communication will be used to provide systematic support for this brand to grow in the world, as the mark of a dynamic country that has the conditions for a good quality of life.

Annex

International Comparison of the Innovation Environment in the Czech Republic

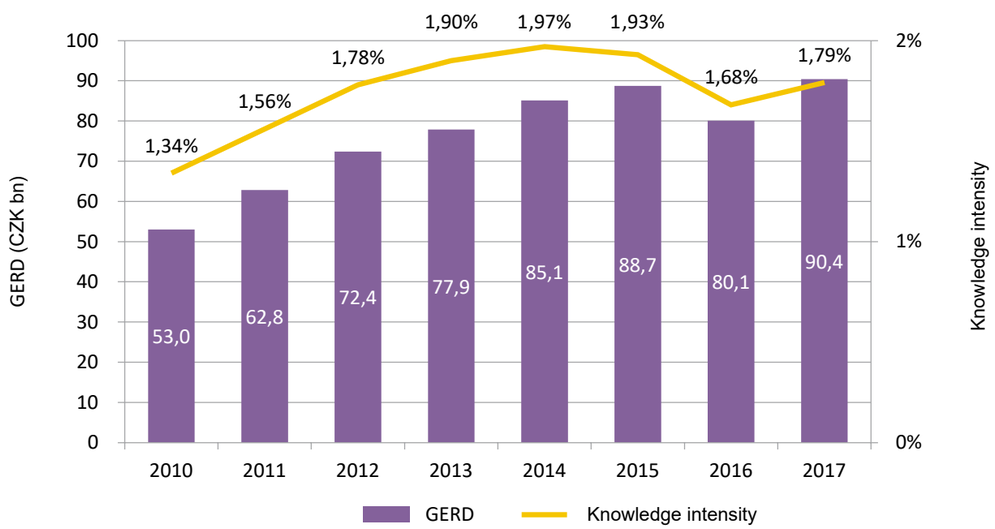
1 Innovation Performance of the Czech Republic

In order to measure innovation performance on an international basis, either simple or composite indicators are used. The advantages of simple indicators that rely primarily on financial data include their easy calculation and interpretation, the disadvantages include, in particular, the limited ability to find the true cause of innovation performance. Composite indicators have several dozen sub-indicators, and so better characterise the phenomenon described and are more useful for finding the true causes of innovation performance. Their disadvantage is a more complex interpretation of the influence of individual factors on overall innovation performance. It follows from this that it is necessary to use both types of indicator for a comprehensive and objective analysis of innovation performance.

1.1 Simple Innovation Indicators Knowledge Intensity

Knowledge intensity is one of the basic and most commonly used simple indicators to determine innovation performance, expressing the ratio of total R&D expenditure (GERD) to Gross Domestic Product (GDP).

Fig. 1.1: GERD and knowledge intensity in the Czech Republic



Source: CZSO, Research & Development

It is clear from Figure 1.1 that knowledge intensity in the Czech Republic is gradually increasing, for 2017 it is 1.79%. The temporary drop during the period under review was due to the transition between two periods of EU fund implementation.

Figure 1.2 shows the knowledge intensity of selected countries for 2010 and 2016 (ranked according to 2016). In 2014, the Czech Republic was just below the EU-28 average. In 2016, the Czech Republic moved significantly away from the EU-28 average, with the Netherlands, Norway, Slovenia, the United Kingdom coming between the Czech Republic and the EU-28 average (of these countries the United Kingdom and Norway were behind the Czech Republic in recent years, while Slovenia was ahead of the Czech Republic and the EU-28). Economies such as Italy, Hungary, Russia, Poland and Slovakia remain behind the Czech Republic. Over the long term, Switzerland, Sweden, Austria and Germany have had the highest levels of knowledge intensity in Europe.

Fig. 1.2: Knowledge intensity in the Czech economy in international comparison

Source: Eurostat; OECD – MSTI database | For CHE, data for 2008 and 2015 are listed; for KOR, JPN, USA and RUS data from 2015.

When comparing the 2010 and 2016 values, Greece (68.3%), Bulgaria (39.3%), Poland (34.7%), Slovakia (27.4%) and the Czech Republic (25.4%) show the greatest increases. On the other hand, the most intense decline between the reference years can be seen in Latvia (-27.9%), Finland (-26.3%) and Ireland (-25.8%), followed by Estonia, Luxembourg, Portugal, Spain, Slovenia and Denmark. It is clear, therefore, that knowledge intensity has the largest percentage increase for countries with a low baseline, and a year-on-year assessment is not sufficient. As mentioned above, simple indicators do not provide adequate information about the reasons for, for example, year-on-year changes.

In 2016 total GERD expenditure for the EU28 was EUR 302.9 billion, with the following countries having the largest share of GERD: Germany (EUR 92.4 billion, 30.5%), France (EUR 50.1 billion, 16.5%) and the United Kingdom (EUR 40.5 billion, 13.4%). The Czech Republic share of EU-28 GERD is EUR 3.0 billion, or 1.0%.

Fig. 1.3: Comparison of countries by GERD to GDP and by R&D expenditure per capita (2016)

Y–axis – GERD per capita in PPS (RUS data from 2014, USA, CHE, JPN, KOR data from 2015)
X–axis – GERD to GDP in % (KOR, JPN, CHE, USA and RUS from 2015)

Source: own calculations based on Eurostat and OECD – MSTI Database

Knowledge intensity provides only basic information about the intensity of state expenditure on R&D, it does not account for the differences in the level of production achieved or the structure of R&D expenditure by area of financing. An increase in the predictive capacity for knowledge intensity makes it possible to compare it with the amount of R&D expenditure per capita in PPS. A comparison of countries by GERD to GDP and by R&D expenditure per capita is shown in Figure 1.3. PPS is expressed per capita at 2005 prices.

It is clear that of the countries under review the highest levels of knowledge intensity and GERD per capita in PPS are in South Korea, followed by Switzerland, Sweden and Japan. The Czech Republic is slightly below

the EU-28 average in knowledge intensity on a per capita basis. Knowledge intensity in the Czech Republic and Great Britain are comparable, but the United Kingdom shows a higher GERD per capita in PPS.

The difference in the approach of individual EU countries to the importance of R&D can be seen from a comparison of the Czech, Austrian and Polish parameters. In 2015 compared to Austria, the Czech Republic achieved 2.6 times lower R&D expenditure per capita in PPS, but 2.5 times higher than Poland.

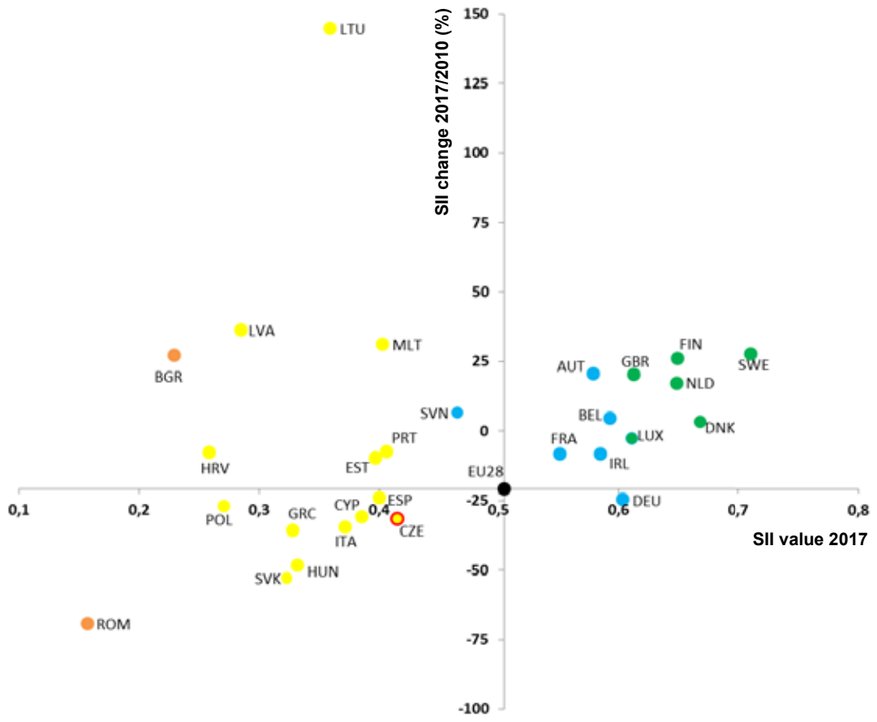
1.2 Composite Innovation Indicators (CII)

According to the most commonly used composite indicators, the Czech Republic is one of those countries that are not yet „at the top“ but obviously have the potential to become an innovation leader. Below, we compare the most commonly used indicators – the Summary Innovation Index (SII), the Global Innovation Index (GII) and the Innovation Output Indicator (IOI). The use of all three indicators gives relatively comprehensive information on the situation in the Czech Republic and in international comparison (see also section 1.2.4 below).

1.2.1 Summary Innovation Index (SII)

The European Innovation Scoreboard (EIS) allows for an annual comparison of the innovativeness of EU Member States and selected third countries. EIS 2018 is assembled based on data from 2017 and is already the seventeenth issue, which on one hand respects a consistent processing methodology, but it also testifies SII value in 2017 to the changing factors for the innovation potential of individual EU member states. The most significant changes in recent years include the inclusion of broadband penetration in the factors that positively influence an innovation-friendly environment. The Summary Innovation Index; SII) consists of four indicator areas – Framework Conditions, Investments, Innovation Activities, Impacts. These areas contain ten innovation sub-groups and consist of 27 indicators with different weightings. According to their achieved SII value, assessed countries are divided into four groups – Innovation Leaders, Strong Innovators, Moderate Innovators, Modest Innovators.

Fig. 1.4: EU Member State CII for 2017 and change between 2010 and 2017



The colour coding of countries corresponds to the SII breakdown.

Source: own calculations based on EIS 2018

Figure 1.4 shows the SII value for EU Member States for 2017 and the relative change between 2010 and 2017 The figure also shows the division of the countries into the four groups mentioned above. Two countries, Romania and Bulgaria, have long been Modest Innovators, and have the lowest levels of both SII values for 2017 and relative change between 2010 and 2017.

The Czech Republic belongs to the most numerous group, the Moderate Innovators, where we reach the highest level of SII (as was the case in previous years). The highest relative change between 2010 and 2017 in this group and overall in the SII was achieved by Lithuania (from 0.2 to 0.4).

The Strong Innovators include 6 EU Member States − Slovenia, France, Austria, Belgium, Ireland and Germany. The Innovation Leaders include Great Britain, Luxembourg, Finland, the Netherlands, Denmark and Sweden, which achieved the highest SII value. As can be seen from the conclusions of EIS 2018, the innovation performance of the EU continues to grow and progress in recent years is and will in the future be even faster. Within EU countries, however, progress is very unevenly distributed. From a global perspective, the EU approaches the performance of the US, Japan and Canada, while it lags behind South Korea.

Compared to 2010, innovation performance in 18 EU countries increased in 2017, while performance in 10 EU countries declined. At the same time, we are aware of China's growing importance in R&D, where R&D expenditure in recent years is close to US spending in absolute terms, so that these two countries currently account for 80% of all R&D spending worldwide.

Although the innovation performance of the Czech Republic is growing, the SII shows that it is not keeping pace with the EU's innovation performance. The share of the population with higher education is growing rapidly, we also exceed the European average in the number of joint publications of Czech and foreign scientists, mainly due to the residential study abroad of Czech co-authors of publications. We are also above the European average in corporate investment in innovation and ICT training, in employment growth in fast-growing firms and the export of medium high-tech products, mainly driven by the export performance of the automotive industry. However, our country is exceptionally weak in protecting intellectual property and investing venture capital in new companies, especially in start-ups.

Table 1.1: Innovation performance of the Czech Republic against the EU27 average by SII in 2010 and 2017 and the change there of

CZECH REPUBLIC	*Performance relative to EU 2010 in*		*Relative to EU 2017 in*
	2010	*2017*	*2017*
SUMMARY INNOVATION INDEX	**90,0**	**87,1**	**82,3**
Human resources	**76,2**	**93,5**	**78,4**
New doctorate graduates	92,3	114,4	82,1
Population tertiary education	45,5	74,6	65,8
Lifelong learning	92,7	90,6	88,8
Attractive research systems	**58,5**	**82,4**	**72,5**
International scientific co-publications	132,1	244,6	150,4
Most cited publications	51,8	57,3	55,2
Foreign doctorate students	42,8	62,3	56,3
Innovation-friendly environment	**78,7**	**106,0**	**79,2**
Broadband penetration	88,9	133,3	75,0
Opportunity-driven entrepreneurship	72,7	89,8	83,3
Finance and support	**116,1**	**50,9**	**47,3**
R&D expenditure in the public sector	73,4	85,8	89,0
Venture capital investments	170,9	6,1	5,0
Firm investments	**108,4**	**116,2**	**103,9**
R&D expenditure in the business sector	58,9	86,0	77,2
Non-R&D innovation expenditure	155,4	139,5	127,6
Enterprises providing ICT training	121,4	128,6	112,5
Innovators	**105,5**	**74,1**	**86,1**
SMEs with product or process innovations	98,8	81,5	99,6
SMEs with marketing or organisational innovations	120,1	51,7	62,5
SMEs innovating in-house	97,0	89,7	96,1
Linkages	**80,6**	**78,4**	**77,6**
Innovative SMEs collaborating with others	101,1	88,6	88,1
Public-private co-publications	81,0	72,3	71,6
Private co-funding of public R&D expenditures	59,2	74,7	73,7
Intellectual assets	**45,6**	**63,2**	**62,7**
PCT patent applications	25,2	25,2	26,3
Trademark applications	64,1	77,0	68,2
Design applications	50,8	88,6	91,8
Employment impacts	**115,3**	**115,7**	**115,1**
Employment in knowledge-intensive activities	85,7	93,5	84,7
Employment in fast-growing enterprises	136,4	131,6	140,7
Sales impacts	**104,2**	**98,7**	**94,8**
Medium & high tech product exports	124,8	131,6	124,3
Knowledge-intensive services exports	41,1	53,0	50,6
Sales of new-to-market and new-to-firm innovations	153,4	112,9	111,7

Source: EIS 2018 | Note: Dark green − normalized performance above 120% of EU; light green − normalized performance between 90% and 120% of EU; yellow − normalized performance between 50% and 90% of EU; orange − normalized performance below 50% of EU. Data in red show a decline in compared to 2010.

1.2.2 Global Innovation Index (GII)

The Global Innovation Index (GII) is used by the UN (through WIPO) to compare the situation in a number of Member States, to describe the overall context of their (innovation) development, where the indicator focuses on the impact of innovation-oriented policies on economic growth and development. The GII consists of innovation inputs and innovation outputs. Innovation inputs include institutions, human capital and research, infrastructure, market sophistication and business sophistication.

In the framework of the GII 2018 (with the subtitle Energising the World with Innovation, which characterises the current main global challenge), calculated on the basis of 2017 data, 126 countries were evaluated. The highest GII values were achieved, as in the previous year, by Switzerland, the Netherlands, Sweden, Great Britain, Singapore, the USA and Finland. In the GII 2017, the Czech Republic was ranked 24th, falling to 27th position in the GII 2018. The absolute value of the Czech Republic score was 51.0 in the previous rating. In the GII 2018 rating, the score is 48.8 when the leading Swiss score is 68.4 and the last for the Yemen is 15.0.

In the Innovation Input Sub-Index, Singapore ranks first, followed by Switzerland, Sweden, the United Kingdom, Finland and the USA. The Czech Republic was in 30th place. On the Innovation Output Sub-Index, Switzerland was again in first place, followed by the Netherlands, Sweden, Great Britain, Germany and the United States. The Czech Republic is in 20th place.

The following table shows GII 2018 values achieved by the Czech Republic in individual pillars and selected sub-pillars.

Table 1.2: The values of the Czech Republic within GII 2018 pillars and selected sub-pillars

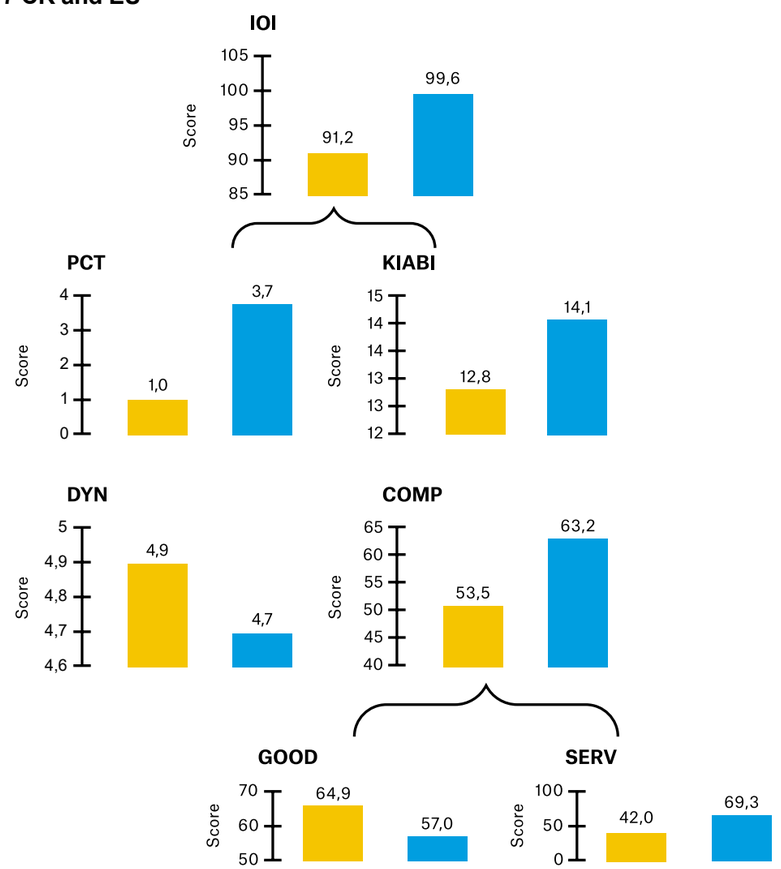
Pillars | Sub-Pillars | *Indicators*	Czech Republic		
	score (0−100)	position (out of 126)	strong | weak points
1. Institutions	78,5	27	
1.1 Political environment	76,8	25	
- political stability and absence of violence/terrorism	*87,6*	*16*	*silná*
1.2 Regulatory environment	76,5	34	
- cost of redundancy dismissal	*81,4*	*77*	*slabá*
2. Human capital & research	41,7	35	
2.1 Education	52,2	48	
- expenditure on education	*33,9*	*79*	*slabá*
3. Infrastructure	55,2	31	
3.1 Information and communication technologies (ICT)	60,3	63	
- government's online service	*47,8*	*88*	*slabá*
- online e-participation	*55,9*	*74*	*slabá*
3.3 Environmental sustainability	53,1	15	silná
- GDP per unit of energy use	*22,1*	*77*	*slabá*
- ISO 14001 environmental certificates	*85,9*	*7*	*silná*
4. Market sophistication	50,3	48	
4.2 Investment	33,9	98	slabá
- ease of protecting minority investors	*58,3*	*61*	*slabá*
- market capitalization	*11,9*	*52*	*slabá*
4.3 Trade & competition	71,6	27	
- intensity of local competition	*79,7*	*13*	*silná*
5. Business/entrepreneurial environment sophistication	45,7	25	
5.2 Innovation links	40,5	34	
- joint venture/strategic alliance deals	*5,7*	*81*	*slabá*
5.3 Knowledge absorption	43,5	20	
- high-tech imports	*61,4*	*8*	*silná*
6. Knowledge and technology outputs	42,3	17	
6.1 Knowledge generation	39,7	21	
- utility model applications by origin	*61,3*	*7*	*silná*
6.2 Knowledge impact	54,3	11	silná
- ISO 9001 quality certificates	*72,5*	*6*	*silná*
- high-tech and medium high-tech output	*74,6*	*7*	*silná*
6.3 Knowledge dissemination	33,0	26	
- high-tech exports	*67,9*	*6*	*silná*
7. Creative outputs	44,1	25	
7.1 Intangible assets	49,6	39	
7.2 Creative goods and services	42,7	11	silná
- printing and publishing output	*24,3*	*58*	*slabá*
- creative goods exports	*91,6*	*4*	*silná*
7.3 Online creativity	34,5	26	
- country-code top-level domains (ccTLDs)	*49,06*	*15*	*silná*

Source: own calculations based on GII 2018 report

1.2.3 Innovation Output Indicator (IOI)

The Innovation Output Indicator (IOI), the so-called innovation results indicator, reports on the ability to achieve use for the ideas of innovation industries in the market, thereby contributing to more skilled jobs and increasing the competitiveness of the economy being analysed. The IOI was introduced by the European Commission in 2013. It is a composite indicator consisting of four basic parts. The first sub-index

Fig. 1.5: IOI 2017 CR and EU



Source: own calculations based on Innovation Output Indicator 2017, Dániel Vértesy, JRC Technical Reports (http://publications.jrc.ec.europa.eu/repository/bitstream/JRC108942/jrc108942_ioi_2017_report_final.pdf)
PCT = patent applications per billion GDP (PPS); data for 2014
KIABI = share of employment in knowledge intensive business industries; data for 2016
DYN = employment share in fast-growing enterprises in innovate sectors; data for 2014,
COMP = component; aims to capture international competitiveness in knowledge-intensive sectors, and is defined as the arithmetic average (with equal weights) of two indicators: GOOD and SERV
GOOD = the share of medium- and high-tech products in total exports; data for 2016
SERV = knowledge-intensive service exports as percentage of total exports; data for 2015

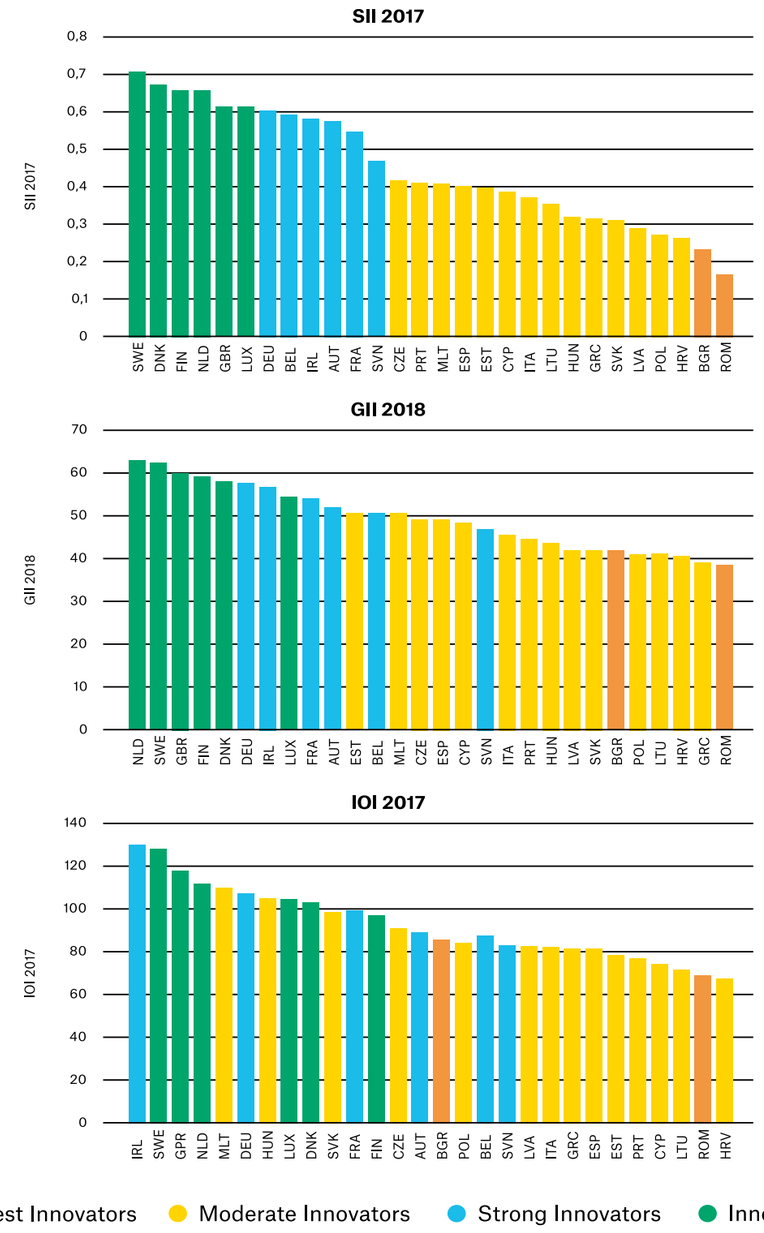
IOI (PCT) is the rate of technical innovation measured by patents. The second area (KIABI) is made up of employment in knowledge intensive fields (percentage of total employment). The third part of the IOI (COMP) is the competitiveness of goods (GOOD) and services (SERV) requiring a high level of knowledge, and DYN is the rate of employment in fast-growing businesses within the innovation sector.

Figure 1.5 shows a comparison of IOI 2017 (data mostly for 2016, in some cases 2015 and 2014) for the Czech Republic and the EU-28. In terms of the number of patents per billion GDP in PPS the Czech Republic lags significantly behind. While the Czech Republic has only one patent per billion GDP in PPS, the EU-28 average is 3.7. Also, for the second IOI sub-indicator, the Czech Republic shows lower values – the share of employment in knowledge-intensive sectors. The opposite applies to the share of employment in fast-growing sectors in innovation sectors. Here the Czech Republic achieves excellent results. Similarly, the Czech Republic has a good result in the share of medium- and high-tech products in total exports. The opposite is true, however, for the share of knowledge-intensive services in the total export of services.

1.2.4 Comparison of innovation performance positions of the Czech Republic according to SII, GII, IOI

Figure 1.6 shows the ranking of EU-28 countries within the composite indicators used – SII, GII, IOI. The colour coding of countries corresponds to the SII evaluation – Modest Innovators, Moderate Innovators, Strong Innovators and Innovation Leaders. Within SII 2017, the CR reaches 13th place. From the colour coding, the order of the countries in the case of GII 2018 is slighlty different from that of SII 2017. The Czech Republic is in similar positions (14th place). The countries on the IOI 2017 are even more different compared to SII 2017, but the Czech Republic is ranked similarly in IOI 2017, in 13th place. The international comparison, which is based on the individual indicators from different points of view, shows the relatively good starting position of the Czech Republic in its ambition to become one of the innovation leaders. According to the SII we are the strongest Modest Innovator, where we are on a decent average position in the world ranking. But in the future, not only will the immediate situation be important, but also the dynamic of the changes that we will support.

Fig. 1.6: Comparison of positions within SII 2017, GII 2018 and IOI 2017

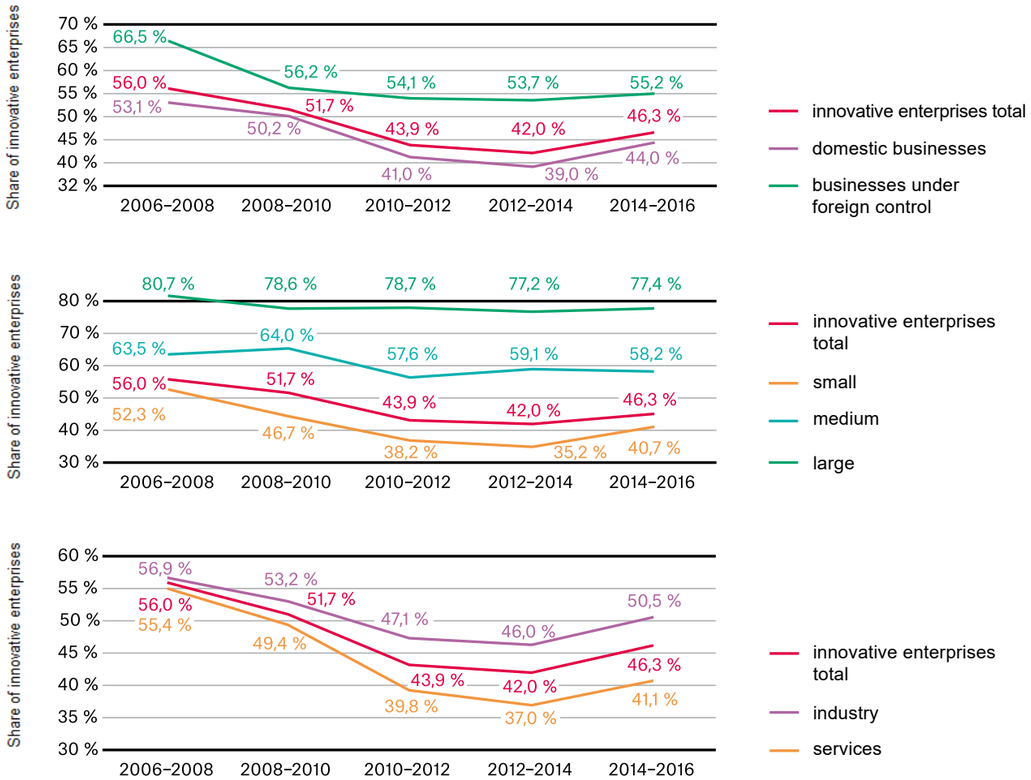


Source: own calculations based on EIS, 2018; GII report 2018; The Innovation Output Indicator 2017, Dániel Vértesy, JRC Technical Reports

2 Corporate innovation in the Czech Republic

Since 2002 the Czech Statistical Office has carried out statistical surveys on innovative business activities at regular two-yearly intervals. The most recent valid survey is TI 2016, which focuses on innovation activities for 2014–2016. The results can be compared to those in other European countries, as the methodology for them has a common basis in Eurostat methodology. Innovative enterprises are monitored for their technical and non-technical innovations. For companies with technical innovations, it may be the innovation of a product, a process or an ongoing or suspended innovation activity. In businesses with non-technical innovation, activities in the field of marketing or organisational innovation are reported.

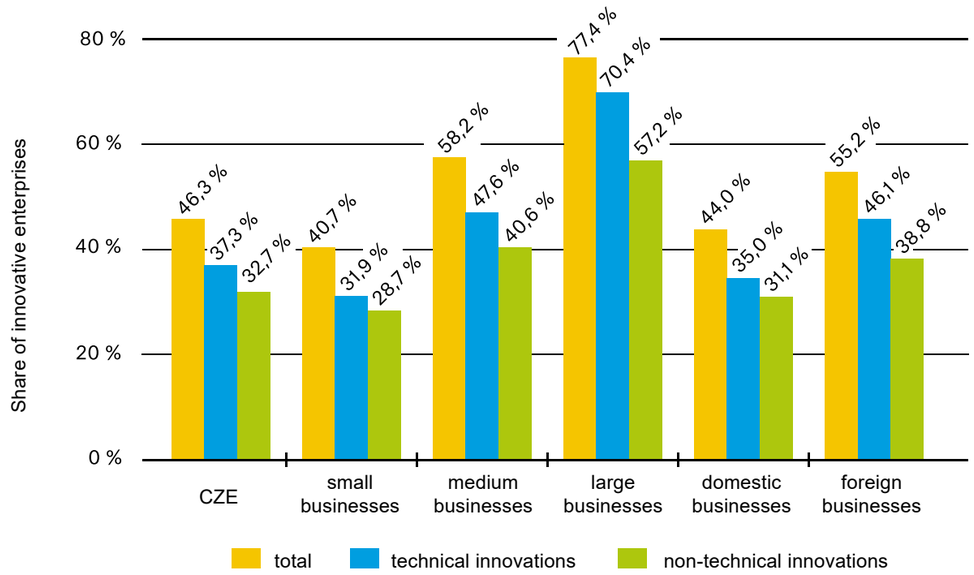
Fig. 1.7: Basic information on innovations in the Czech Republic by business category



Source: own calculations based on CZSO, Innovation activities of businesses in 2014–2016

The majority of innovating enterprises are foreign-controlled enterprises, which are mainly large industrial enterprises. At the same time, the share of foreign-controlled enterprises is high especially among medium and large firms, where foreign-controlled firms represent half to two-thirds. This implies their importance for the innovation performance of the Czech Republic and the necessity of cooperation of the public sector with this segment.

Fig. 1.8: Share of innovative enterprises by type of innovation (2014–2016)



Source: own calculations based on CZSO, Innovation activities of businesses in 2014–2016

Figure 1.8 shows the proportion of innovative enterprises broken down by type of innovation, ie technical and non-technical. Within technical innovations process innovations prevail in all categories. The differences between product and process innovation ratios for technical innovations are not very significant (most of them take place at the same time, the difference is due to the fact that only 1–2% are process innovations). Non-technical innovations (marketing, organizations) are also often associated with technical ones, but the difference is higher (only about 5% are technical innovations).

List of abbreviations

AI	Artificial Intelligence
CDO	Chief Data Officer
CEF	Connecting Europe Facility
CR	Czech Republic
IP	Intellectual Property
EIF	European Investment Fund
ESIF	European Stuctural and Investment Funds
EU	European Union
FEP	Framework Educational Programme
GDP	Gross Domestic Product
GERD	Gross Expenditure on R&D
GII	Global Innovation Index
ICT	Information and Communications Technologies
IOI	Innovation Output Indicator
IoT	Internet of Things
IT	Information Technology
Methodology 2017+	Methodology for Evaluating Research Organisations and Research, Development and Innovation Purpose-tied Aid Programmes, approved under Czech Government Resolution No. 107 of 8 February 2017
OECD	Organization for Economic Cooperation and Development
OP RDI	Research and Development for Innovations Operational Programme
PPS	Purchasing Power Standard
R&D	Research & Development
RD&I	Research, Development and Innovation
RIS3	National Research and Innovation Strategy for Smart Specialization of the Czech Republic
RVVI	Council for Research, Development and Innovation
SFDI	State Transport Infrastructure Fund
SII	Summary Innovation Index
SME	Small and Medium Enterprises
STEM	Science, Technology, Engineering and Mathematics
UV CR	Office of the Government of the Czech Republic

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