Level of innovation of the economies of Central and Eastern Europe

Poland is an undisputed leader among the CEE countries in respect of number of introduced instruments of innovation policy. / The most common form of support for innovation in Central and Eastern Europe are research grants. / Development of information and communication technology (ICT) during and after the coronavirus pandemic may be a driving force of many economies.

In recent years innovation has become one of the key economic issues, determining international competitiveness. An analysis carried out for this study showed that since 1990s countries of Central and Eastern Europe had a low level of both innovation capacity (defined by indicators such as R&D spending) and poor innovation position. At the same time, individual CEE countries are diversified in respect of high-tech industries, for instance Czechia is a leader of production of computers, electronic and optical products, Poland is the leading producer of aircraft, spacecraft and related machinery; Hungary is the best at manufacturing basic pharmaceutical substances, medicines and other pharmaceutical products. Research on the efficiency of the innovation system, consisting in measuring relations between output measures (defining the innovation position) and input measures (reflecting innovation capacity) showed that the efficiency of the innovation system in Poland is poor.

The most common form of support for innovation in Central and Eastern Europe are research grants. This refers mostly to grants for projects carried out by public research institutes. They are followed by grants for businesses for R&D and introduction of innovation. It can be therefore stated that this instrument weighs the most, although it will probably change as money from structural funds for the region will be gradually reduced.

It is worth noting that an important and broadly applied instrument of innovation policy are information campaigns promoting innovations and their role. The number of national strategies, plans and agendas that are in line with the innovation policy is overwhelming. Although data in the STIP Compass base have been collected since 1992, and plans and strategies have to be amended and adjusted to social and economic changes, the number for this relatively long period is still enormous (over 14 on average per country). Hungary, Lithuania, Poland are leaders in this respect, but in most countries innovation

INNOVATIONS AND COVID-19

The situation of the global economy connected with COVID-19 increased the need for innovative solutions, especially in two areas:

1. development of information and communication technologies that make it possible to popularise remote work, remote education and remote health services, in order to raise health security and at least partially mitigate the consequences of the pandemic-related disruption;
2. works on innovative medicines, specifically the vaccine for COVID-19 virus.

Development of information and communication technology during and after the coronavirus pandemic may be a driving force of many economies. It is estimated that 10-percent growth of access to broadband Internet accounts for almost 2% of gross global product. The use of the Internet provides new opportunities for employers and employees, especially in respect of remote work and remote labour resources management. On-line work entails most of all time efficiency for both the employee and employer and avoidance of unnecessary costs. What is more, remote work means also flexible working time, or adjusting work to private life. That is why it has been observed that the number of employees working through digital platforms in the EU countries had been regularly growing even before the pandemic. Additionally, innovative solutions based on ICT, such as ProteGo Safe application, may be helpful in controlling the COVID-19 virus.

The use of information and communication technologies also stimulates development of tele-health services, which are a significant element of healthcare. Modern solutions are used for tele-monitoring, tele-supervision, tele-physiatry, tele-care, tele-diagnostics, tele-description, tele-psychiatry. Rendering these services requires both physicians at hospitals and health centres and patients to have special equipment. Development of tele-health improves communication of the patient with the doctor, and in some cases can replace traditional diagnosis and treatment methods. Considering the pandemic, another advantage of tele-health is limitation of patients' movement and reduction of disease spreading.

Use of technology gives the opportunity for a new form of education, i.e. on-line learning. Instruments for remote education have been developed and applied for a long time, but their significance rose in the face of the coronavirus pandemic.

TABLE 1. Number of innovation policy initiatives and instruments in selected countries of Central and Eastern Europe

Instruments of innovation policy	Bulgaria	Croatia	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Serbia	Slovakia	Slovenia	Total
Cooperation infrastructure	**13**	**13**	**15**	**6**	**16**	**9**	**18**	**16**	**4**	**2**	**9**	**21**	**142**
Dedicated support for research infrastructure	3	3	4	2	5	3	2	3	2	1	1	2	31
Information services and access to data bases	4	9	5	3	5	4	7	2	–	1	3	11	54
Cooperation networks and platforms	6	1	6	1	6	2	9	11	2		5	8	57
Direct financial support	**22**	**11**	**24**	**33**	**56**	**32**	**61**	**124**	**19**	**6**	**12**	**53**	**453**
Centres of excellence – grants	2	2	1	1	4	–	3	2	–	–	1	2	18
Equity financing	–	–	2	2	4	3	14	8	–	–	1	2	36
Scholarships, student and graduate loans	–	1	1	5	6	5	10	15	1	1	–	7	52
Subsidies for business innovations, research and development	4	3	5	10	17	4	10	23	7	1	3	13	100
Innovation vouchers	–	–	1	3	1	1	1	3	1	1	–	–	12
Institutional financing of public research	4	1	4	4	5	5	3	3	1	1	–	7	38
Loans for business innovations	–	1	3	–	3	2	–	5	–	–	2	3	19
Procurement schemes for innovations, research and development	–	1	1	2	–	1	2	4	–	1	1	–	13
Project grants (public research)	12	2	6	6	16	11	18	61	9	1	4	19	165
Innovation policy management	**20**	**30**	**25**	**31**	**56**	**30**	**56**	**60**	**21**	**8**	**12**	**48**	**397**
Establishment or reform of management structures of institutions	3	8	1	2	4	2	1	6	–	1	–	2	30
Formal consultations with instrument beneficiaries or experts	1	2	2	–	1	2	2	4	1	1	–	4	20
Horizontal bodies coordinating STI	3	1	2	1	1	2	5	1	3	1	1	8	29
National strategies, schemes and plans	9	15	14	12	32	13	22	22	8	1	7	19	174
Analyses (e.g. evaluations, comparative analyses and forecasts)	3	–	3	8	6	6	8	10	6	1	–	4	55
Information campaigns and other information actions	–	4	3	8	10	5	7	13	–	1	4	9	64
Bodies of aesthetic supervision and consultancy	1	–	–	–	1	–	11	4	1	1	–	2	21
Norms and certificates for technology development and implementation	–	–	–	–	1	–	–	–	2	1	–	–	4
Guidelines, regulations and incentives	**1**	**6**	**13**	**11**	**4**	**4**	**17**	**15**	**2**	**5**	**4**	**11**	**93**
Regulations on new technologies	–	–	1	–	–	–	1	–	–	1	2	–	5
Regulations and incentives relating to intellectual property	1	3	1	–	2	–	4	2	–	1	–	1	15
Regulations and incentives relating to employee mobility	–	1	2	2	1	–	–	7	1	1	1	7	23
Awards and distinctions in the field of science and innovation	–	–	6	4	1	1	1	1	–	1	1	1	17
Business consultancy and consultancy on the use of technology	–	2	3	5		3	11	5	1	1	–	2	33
Indirect financial support	**4**	**1**	**4**	**1**	**5**	**2**	**1**	**4**	**3**	**2**	**1**	**1**	**29**
Tax relief for businesses for innovations, research and development	3	1	3	–	3	–	1	3	2	1	–	1	18
Guarantee instruments of risk management	–	–	1	1	1	1	–	–	–	1	–	–	5
Tax relief for people supporting innovations, research and development	1	–	–	–	1	1		1	1		1	–	6
Total	**60**	**61**	**81**	**82**	**137**	**77**	**153**	**219**	**49**	**23**	**38**	**134**	**1114**

Source: [EC-OECD 2020].

policy instruments are dispersed among various strategic documents and numerous government institutions.

The countries referred to above (Hungary, Lithuania and Poland) also have the biggest numbers of introduced innovation policy instruments, whereas Poland is the undisputed leader.

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