

## SPECIFICS OF MODERN NATIONAL INNOVATION SYSTEMS IN COVID-19 CONDITIONS

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*Abstract. The article considers the consequences of the impact of the global pandemic on the development of national innovation systems. The most affected areas of innovation activity are highlighted. The negative and positive effects of the pandemic on the innovation system are studied.*

*Keywords: pandemic, COVID-19, innovation activity*

The COVID-19 pandemic and its aftermath are having an extremely dire impact on the global economy as a whole. In the pessimistic scenario presented by the OECD in 2020, global economic growth will contract by 2-3% in 2021, global unemployment will increase further, and corporate investment will remain very weak.

This crisis represents the worst recession since World War II. Growth has slowed and continues to decline in most developing countries and markets, the first time negative growth has occurred in at least 50 years.

The business sector has been hit hard by the crisis, with government lockdowns, supply chain disruptions and falling demand that have led to a sharp rise in bankruptcies. Small and medium-sized enterprises (SMEs) have been hit by the global pandemic even more than large businesses, as SMEs are mainly represented in sectors such as wholesale and retail trade, accommodation and catering services, real estate, professional services, etc.

The COVID-19 crisis also affected business research and innovation. Many innovative companies have curtailed innovation in the midst of isolation. According to a survey of innovative companies conducted in April 2020 by the German Federal Ministry for Economic Affairs and Energy, 54% of companies have suspended ongoing research and innovation projects.

An international survey and follow-up interviews with more than 200 industry leaders conducted by McKinsey in April 2020 showed that the focus on innovation as a top business priority has declined in many industries, with the exception of the pharmaceutical and medical sectors (McKinsey, 2020).

The sharp decline in demand during the first wave of isolation and limited access to research infrastructure influenced innovation. As elsewhere, isolation measures have led to the closure of most innovation and testing centers, laboratories and science parks. This has had a direct impact on the ability of many firms to make progress in their planned research, product development and commercialization as outlined in business plans and investor agreements.

Comparing the trends in the filing of patent applications under the Patent Cooperation Treaty (PCT) before the pandemic and after, the average slowdown in filing of patent applications can be noted after the outbreak of COVID-19.

COVID-19 has also impacted venture capital firms as the main source of funding for innovative startups. According to Ipsos MORI's analysis, the number of venture capital deals globally declined between January and August 2020, reaching its lowest level since February 2013 (Ipsos MORI, 2020).

A survey of 1,000 institutional and corporate venture capitalists, mostly based in the US, also showed that they slowed their investment rate (71% of normal) in the first half of 2020.

Universities are facing financial problems caused by the pandemic. Some students have abandoned their plans to enroll in higher education programs in 2020/21, including international students. All this led to a reduction in the income of universities from educational activities. It

can also affect research spending, as teaching income often cross-subsidizes research activities. About 60% of OECD countries have increased their education budget in response to the pandemic. How these additional funds are spent varies greatly from country to country: for example, additional teacher salaries to cover small classes and additional, corrective training; providing students with digital tools for online learning; additional scholarships or loan waiver for university students.

Severe travel restrictions imposed by isolation measures have interrupted the mobility of human resources in innovation and research (e.g. visiting researchers, exchanging employees with industry). In the early months of the pandemic, many scientific events and conferences were postponed or canceled. Instead, some of these conferences and events (including large flagship conferences) are increasingly being organized digitally, sometimes with very high attendance. The move highlighted the benefits of digital conferencing, especially in terms of improved accessibility, reach a more diverse audience, and lower costs. However, virtual exchanges are not an ideal substitute for face-to-face conferences, which often lead to collaborations and long-term relationships of trust, as well as an opportunity for aspiring researchers to find work and increase the visibility of their work.

An important change brought about by the pandemic is the faster publication rate of scientific research results, highlighting the role of open science. Many journals have accelerated the peer review process to ensure rapid distribution. Based on data from 669 articles published in 14 medical journals during and before the current pandemic, the study found that publication times decreased by an average of 49%, from 117 days to 60 days (Horbach, 2020).

Preprints became more common in the medical research field over a period of several weeks. Their rapid adoption is also supported by the high proportion of published documents with open access: an analysis of medical publications by the OECD shows that the share of open access studies on COVID-19 was 76% (compared, for example, with 43% for diabetes).

Another phenomenon observed in the early months of the pandemic was the rapid development of frugal innovations to fill shortages in medical equipment and other emergency supplies (Harris, 2020). For example, in mid-March 2020, an Italian start-up remodeled a 3D-printed version of a respirator valve and delivered 100 such valves to Chiari Hospital in a few days.

Some companies in the automotive, aviation, or consumer goods industries have repurposed (partially) their production lines to produce urgently needed medical equipment such as ventilators and respirators, face masks and hand sanitizers.

Thus, COVID-19 has accelerated the development of already incipient trends by opening up access to scientific publications, increasing the use of digital tools, improving international cooperation in research and innovation, stimulating various partnerships between the public and private sectors.

Overall, the pandemic continues to pose serious challenges to national innovation systems, jeopardizing key manufacturing and innovation capabilities. Policy responses to the crisis have focused on securing funding for research and innovation related to COVID-19, with governments, foundations and industry raising several billion dollars to fund new vaccines and therapies.

In the short term, governments should continue to support research and innovation to develop solutions to combat and mitigate the pandemic, while paying attention to the uneven distribution of the impact of COVID-19.

## References

1. Technology and Innovation Report 2021 // UNCTAD Review 2021 - Access Mode: [https://unctad.org/system/files/official-document/tir2020overview\\_ru.pdf](https://unctad.org/system/files/official-document/tir2020overview_ru.pdf)
2. On the effects of the pandemic on science, technology and innovation in the OECD review - Access mode: <https://issek.hse.ru/news/435594846.html>

3. OECD forecast for science, technology and innovation for 2021. Times of Crisis and Opportunity - Access Mode: <https://www.oecd.org/sti/oecd-science-technology-and-innovation-outlook-25186167.htm>
4. OECD Education Innovation Report: Schools and Education Systems Not Ready to Realize the Potential of New Technologies - Access Mode: <https://www.csee-etuice.org/ru/news/archive/1748-oecd-report-on-innovation-in-education-schools-and-education-systems-are-not-yet-ready-to-realise-technology-s-potential-2>