A 1 Impact of COVID-19 Crisis on R&I

The COVID-19 crisis has hit the global economy abruptly and hard. The lockdowns imposed in Germany to contain SARS-CoV-2 entail massive economic imbalances. Disruptions in international supply chains, the collapse of international trade and limited domestic economic activity have resulted in a decline in the supply of and demand for products and services. For a large part of the companies, this is associated with sometimes significant losses in turnover. This affects larger companies with 100 or more employees to the same extent as companies with five to 19 and 20 to 99 employees.[1] As a result of such loss of turnover, companies have fewer financial resources available for R&I projects. For stakeholders in the science system, too, the lockdowns impose restrictions, the effects of which will be reflected in research performance. As the duration of the pandemic increases, these developments in the corporate and scientific sectors may lead to a longer-term weakening of the German R&I system.

Majority of Companies Affected by COVID-19 Crisis

An evaluation of data from the ZEW Business Survey in the Information Economy shows that for most German companies the COVID-19 crisis has negative effects on current or planned innovation projects (cf. figure A 1-1). This most often results in delays of existing innovation projects. Around 32 percent of companies in the information sector and 45 percent of companies in the manufacturing sector are affected. The second and third most frequent reports are that companies have not started previously planned projects or have not planned any new innovation projects. Companies are much less likely to say that they have completely abandoned innovation projects that are already under way.

Yet apart from the primarily negative effects of the COVID-19 crisis, positive impulses on innovation activity, too, can be observed. For instance, about 26 percent of companies in the information sector and 28 percent of companies in manufacturing report that the impact of the COVID-19 crisis has led to new innovation projects. For 18 percent of companies in the information sector and 10 percent in manufacturing, the crisis has even led to an acceleration of innovation projects (cf. figure A 1-1).

Both positive and negative effects on innovation projects are perceived by 14 percent of companies in the information sector and 22 percent of companies in manufacturing. About 20 percent of companies in the information sector and 13 percent of companies in the manufacturing sector describe themselves as not affected by the COVID-19 crisis (cf. figure A 1-1).

Lack of Financial Resources for Innovation Activities

For companies, whose innovation activity is affected by the COVID-19 crisis, the reduced availability of financial resources is the most common reason for impairment of innovation activity. About 79 percent of the negatively affected companies in the manufacturing sector point to this. In the information sector, this percentage is significantly lower at around 64 percent (cf. figure A 1-2).

In addition to a lack of funds for the financing of innovation activities, many companies are confronted with the problem of declining demand for innovative products and services; this, too, affects the manufacturing sector more, with 50 percent of companies compared to 35 percent in the information sector. A slightly smaller number of companies

Fig. A 1-1

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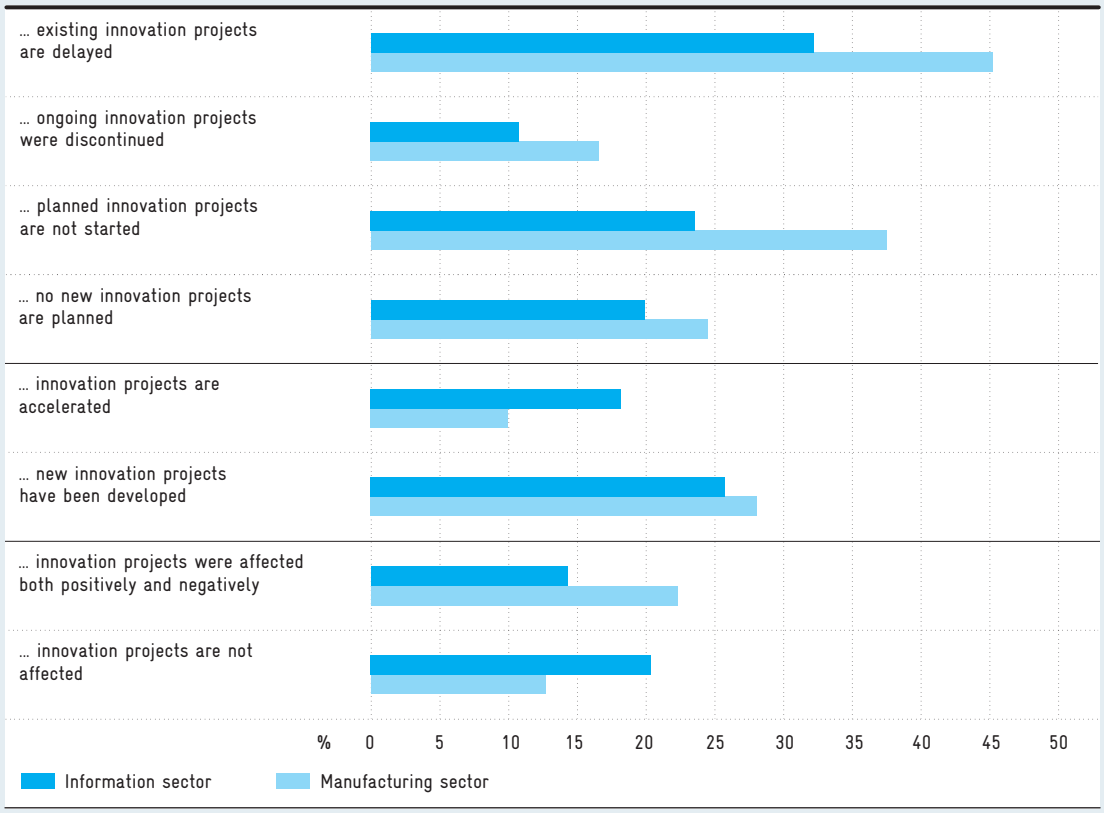
Impact of COVID-19 crisis on innovation activity



Sector-specific extrapolation of the results to the question:
'What impact does the COVID-19 pandemic have on your company's innovation activities? Due to the COVID-19 pandemic …'
Legend: At 24 percent of companies in the information sector, planned innovation projects are not started.
Source: ZEW Business Survey in the Information Economy 2020.

state that supply difficulties regarding materials and intermediate inputs important for innovation negatively affect their innovation activities. Some companies see their innovation projects hampered by the fact that R&D personnel and R&D cooperation partners are only available to a limited extent because of the crisis, or that premises cannot be used for R&D. Here, there are only minor differences between the information sector and manufacturing. Another problem is the lack of access to data relevant to innovation. In many companies, this access is only possible on site and not from the home office. About 15 percent of companies in the information sector and 19 percent of companies in manufacturing explain the negative influence of the COVID-19 crisis on innovation activity by the fact that their own digital infrastructure and equipment do not meet the new requirements (cf. figure A 1-2).

Future Package (Zukunftspaket) Sets Important Impulses for R&I System

In June 2020, the Federal Government adopted a comprehensive economic stimulus package totalling €130 billion. In addition to short-term stabilization measures, this economic stimulus package also includes a Future Package (Zukunftspaket) with a volume of more than €60 billion to overcome the medium- and long-term consequences of the COVID-19 crisis.[2]

A

Fig. A 1-2

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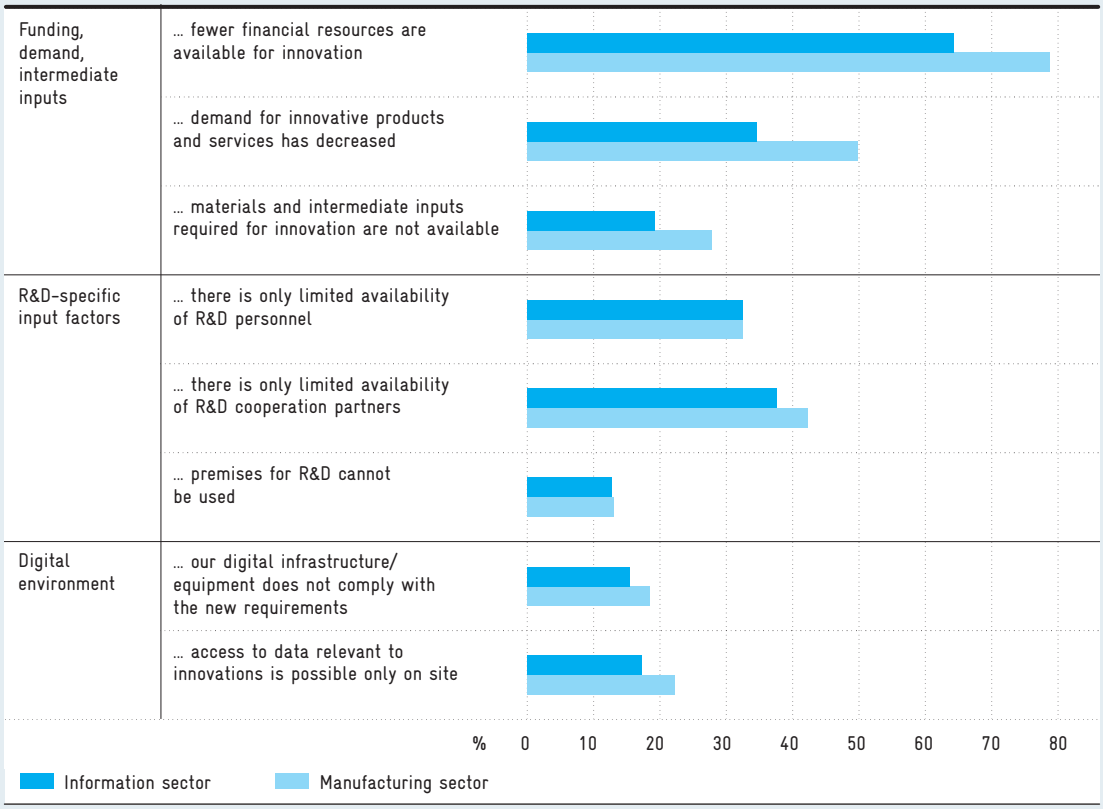
Reasons for impairments due to the COVID-19 crisis



Sector-specific extrapolation of the results from companies that reported at least one negative impact when asked about the impact of the COVID-19 pandemic on their innovation activity, to the question: 'Does the COVID-19 pandemic impact on your company's innovation activity because …?'
Legend: For 64 percent of companies in the information sector whose innovation activity has been negatively affected by the COVID-19 pandemic, innovation activity is impaired because fewer financial resources are available for innovation.
Source: ZEW Business Survey in the Information Economy 2020.

The Federal Government has provided important political impulses such as immediate short-term measures for supporting solvency and the prevention of wide-ranging bankruptcy as well as economic stimulus packages for combating the recession and weathering out the COVID-19 crisis. These impulses also benefit the R&I system.

Liquidity support enables companies to retain R&D employees and their skills within the company. The aid bundled in the Federal Government's 'Package of measures to combat the impact of coronavirus on companies' represents an important support.[3] The Commission of Experts welcomes the fact that this aid has increasingly been adapted to the specific needs of small and medium-sized enterprises (SMEs). For example, liquidity support measures[4] were expanded. The Federal Government, together with the Länder, has also expanded its participation offers for start-ups and SMEs. They are intended to help companies, through a reinforced equity base, to temporarily remain able to act and to invest in innovation and modernization despite the crisis.[5] However, the Commission of Experts calls for the rapid disbursal of the announced funds based on reliable eligibility criteria.

The Future Package contains extensive investments in education, research and innovation as well as future technologies, which are intended to ensure

that 'Germany emerges stronger from the crisis and is successful in the long term'.[6] In this context, the Research Allowance Act (Forschungszulagengesetz (FZulG), cf. chapter A 3) was also amended.[7] By increasing the subsidy cap for a limited period until 2026, companies are to be given an incentive to invest in R&D despite the crisis. The Commission of Experts criticizes the fact that SMEs hardly benefit from this increase in the funding cap and therefore sees a need for further adjustment.[8] This is particularly relevant in light of the fact that SMEs expect significant declines in innovation expenditure in 2020 and 2021 given the conditions of the pandemic. The survey of the Mannheim Innovation Panel (MIP) from spring 2020 shows that SMEs expect their innovation expenditure to fall by almost 9 percent in 2020 and by another 5 percent in 2021. By contrast, large companies expect innovation budgets to remain largely stable in 2020 and to expand slightly by 2 percent in 2021.[9]

The ZEW Business Survey mentioned above also asked companies which measures from the Future Package would benefit their innovation activities (cf. figure A 1-3). The 'increase in eligible expenditures for internal R&D personnel and contract research' is regarded as conducive to their own innovation activities by 42 percent of companies in manufacturing and by 27 percent in the information sector. Measures to 'financially support research cooperation with non-university research organizations' meet with approval particularly in the manufacturing sector, at 35 percent. The approval of companies in the information sector is significantly lower here at 20 percent. The increase in the Federal Government's planned investment in artificial intelligence, as provided for in the Future Package, is perceived as a positive impulse for their own innovation activities by about 20 percent of companies in the manufacturing sector and 25 percent in the information sector. Finally, about 62 percent of companies in the information sector and 51 percent of companies in the manufacturing sector are of the opinion that innovation activities would benefit from the expansion of the digital infrastructure, especially the planned expansion of 5G and fibre-optic networks (cf. figure A 1-3).

Fig. A 1-3

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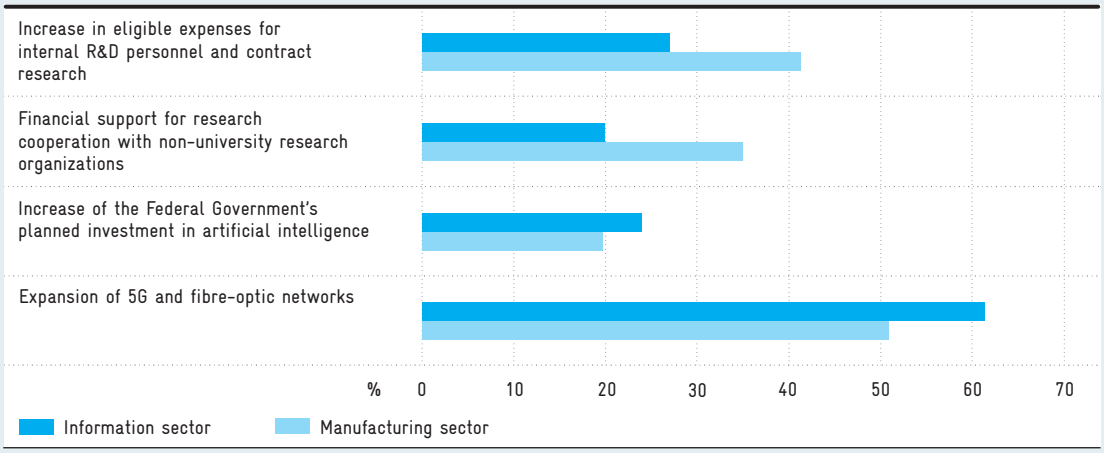
Positive assessment of the measures from the Federal Government's Future Package for innovation activity



Sector-specific extrapolation of the results for the question: 'Which of the following measures from the Federal Government's Future Package would benefit your company's innovation activities?'
Legend: For 62 percent of companies in the information sector, innovation activity would benefit from the expansion of 5G and fibre-optic networks.
Source: ZEW Business Survey in the Information Economy 2020.

Use Crisis as Catalyst for Transition to New Technologies

The measures to bridge the COVID-19 crisis are primarily financed through debt. The Commission of Experts sees a risk that in the future limited budgetary leeway will have a negative impact on R&I policy. The Commission of Experts cautions that the short-term stabilization of the economy must not be at the expense of the medium- and long-term competitiveness of the German R&I system. It also points out that the short-term preservation of certain companies that will not be able to prove themselves on the market in the long term can hinder or at least delay the market introduction of new technologies and business models.

In the Commission of Experts' opinion, the crisis can also act as a catalyst for the transition to new technologies and thus improve Germany's long-term competitiveness.[10] To this end, further economic stimulus programmes and growth policy measures should be designed with as much focus on R&I as possible.[11] This allows for the setting of growth impulses that exceed the costs of the support measures in the medium term. A development such as the reduction of the announced budget of the Horizon Europe research and innovation framework programme by about 8 percent must be urgently avoided.

With that said, the Commission of Experts expressly welcomes the Federal Government's intention of using €60 billion from the economic stimulus package to target investments and innovation. For instance, the provision of more financial resources for the expansion of the digital infrastructure can help to sustainably consolidate the innovation activities of companies. The Commission of Experts also appreciates the increased promotion of future technologies such as artificial intelligence, hydrogen technology and quantum technology as an important step in advancing the innovation-driven transformation of the economy.

Crises such as the COVID-19 pandemic are not predictable. However, the current experiences should be used to be better prepared for future crises. The Commission of Experts recommends documenting and evaluating the experiences in dealing with the COVID-19 crisis, as well as taking resilience research approaches into account in the further development of the R&I system and promoting corresponding research projects in this regard.

Substantial Funding Provided for Coronavirus Research

To overcome impairments in the science sector caused by the lockdowns, the Federal Government has initiated a series of measures ranging from relaxations in the Law on Fixed-Term Employment Contracts in Science (Wissenschaftszeitvertragsgesetz (WissZeitVG)) to simplifications in project applications and processing. The Commission of Experts welcomes the fact that some of its proposals in this regard have been adopted and implemented.[12]

An important item in the Federal Government's bundle of measures is the promotion of coronavirus research itself. Research activities in this field can be seen worldwide, not only in medical and pharmacological research, but also in the social and engineering sciences (cf. box A 1-4).

The Federal Government has given substantial funding for coronavirus-related research, especially for drugs and vaccines, with direct and indirect boosts to the economy. For example, the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung, BMBF) is supporting the CEPI (Coalition for Epidemic Preparedness Innovations) vaccine initiative with additional funding of €230 million and is supplying up to €750 million for the special programme to accelerate research into and development of urgently needed vaccines against SARS-CoV-2. With the development of a vaccine by BioNTech, a company directly funded by the BMBF, these measures have substantially contributed to a success that has received worldwide attention.[13] In addition, €150 million have been provided for the establishment of a national university medicine network to bundle and consolidate coronavirus-related research activities, and €45 million for the development of drugs.[14] To support the clinical testing of therapeutic agents, the BMBF has set up a programme with a volume of €50 million.[15] In addition to research in medicine and medicine-related disciplines, the BMBF has increased funding for social science research in the short term and has advanced the networking of empirical social science research into the COVID-19 crisis.[16] The Commission of Experts positively emphasizes that the funding of

Box A 1-4

Research on SARS-CoV-2 and COVID-19

An assessment of the activity of scientific research on the topic of SARS-CoV-2 and COVID-19 yields the following picture, which is based on publication data of scientific articles from the scientific database Scopus.[17] The largest share of all recorded publications is accounted for by researchers with affiliation in the USA (27 percent). They are followed by researchers in the EU (26 percent), China (12 percent), and the UK (10 percent).[18] Researchers with an affiliation in Germany achieve a share of about 4 percent. The thematic focus of research on SARS-CoV-2 and COVID-19 in Germany is concentrated on the disciplines of medicine, health, biochemistry, microbiology, and pharmaceutics. These disciplines make up 74 percent of all publications on the topic of SARS-CoV-2 and COVID-19. Social sciences account for 12 percent and engineering for 14 percent. A similar picture as in Germany emerges in the other six countries under investigation as well as for the EU.

Fig. A 1-5

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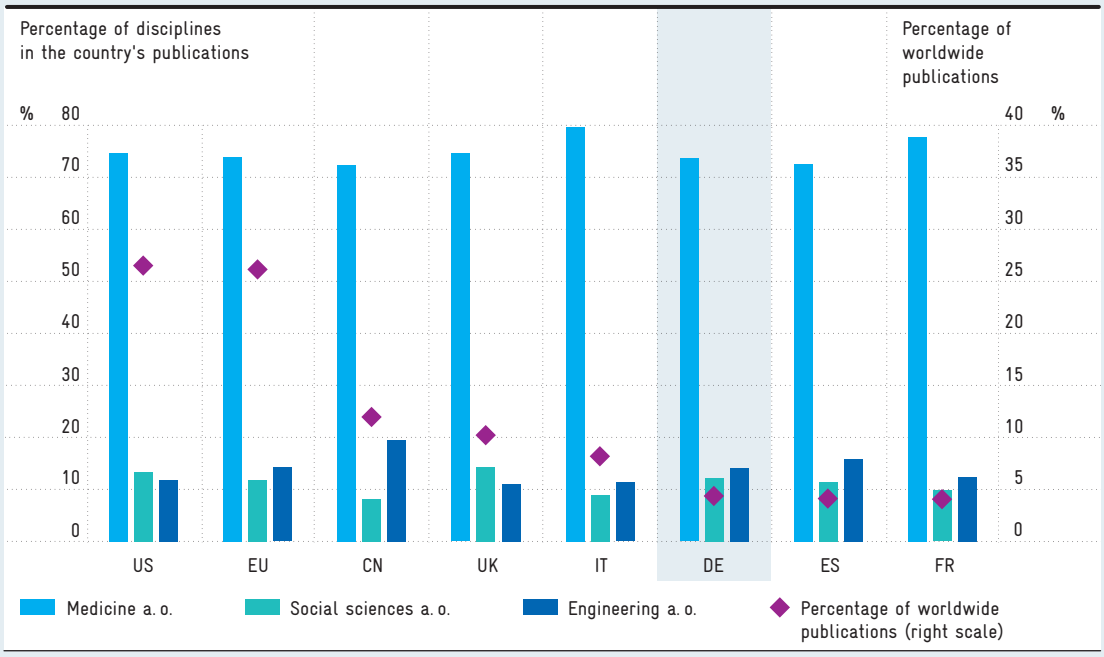
Publications related to SARS-CoV-2 and COVID-19 by country and discipline in percent



Diamonds indicate the percentage of SARS-CoV-2 and COVID-19-related publications of the respective country in the total number of worldwide publications on this (right scale). Columns represent the percentages of SARS-CoV-2 and COVID-19-related publications from medicine, social sciences, and engineering of all related publications within the respective country (left scale).

Legend: The share of publications related to SARS-CoV-2 and COVID-19 that are attributed to researchers with affiliation in the USA is 27 percent of all publications on this topic worldwide. The share of publications related to SARS-CoV-2 and COVID-19 from the social sciences by researchers with affiliation in Germany out of all publications on this topic from Germany is 12 percent.

In the allocation of publications to the respective countries, multiple counts occur in the case of international co-authorships. The publication media considered include journal articles, conference papers, reviews, book chapters, books, and data reports.
Source: Scopus (accessed on 30 November 2020; comprises publications published in 2020 and forthcoming publications).

coronavirus-related research by the BMBF and the project executing organizations was initiated very quickly.[19]

Despite the impressive successes achieved in Germany in the fight against SARS-CoV-2, the Commission of Experts sees potential for improving structures that enable faster and more efficient intervention in the event of pandemics and ensure a rapid ramp-up of drug research and development in the event of a crisis. In the USA, the Biomedical Advanced Research and Development Authority (BARDA), among others, takes on this task. Its job is to coordinate and promote the procurement and development of medicines and vaccines against known and unknown diseases.[20] The Commission of Experts suggests examining whether it would make sense to set up a similar institution in Germany or at EU level.