STUDY

Requested by the ITRE committee

European Parliament

Impacts of the COVID-19 pandemic on EU industries

Policy Department for Economic, Scientific and Quality of Life Policies
Directorate-General for Internal Policies
Authors: Jan Maarten DE VET, Daniel NIGOHOSYAN, Jorge NÚÑEZ FERRER, Ann-Kristin GROSS, Silvia KUEHL, and Michael FLICKENSCHILD
PE 662.903 - March 2021

EN

Impacts of the COVID-19 pandemic on EU industries

Abstract

The COVID-19 crisis has had a substantial impact on the EU27 economy and triggered unprecedented policy responses across Europe and the globe. With evidence on the effects on the EU industry manifested until the beginning of 2021, this report aims to address the following key issues: (1) impact of COVID-19 on the EU economy as a whole and across sectors; (2) impact on strategic value chains; and (3) necessary recovery measures to meet the needs of the EU industry.

This document was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Industry, Research and Energy (ITRE).

This document was requested by the European Parliament's committee on Industry, Research and Energy (ITRE).

AUTHORS
Jan Maarten de Vet, Ecorys
Daniel Nigohosyan, Ecorys
Jorge Núñez Ferrer, CEPS
Ann-Kristin Gross, Ecorys
Silvia Kuehl, Ecorys
Michael Flickenschild, Ecorys

ADMINISTRATORS RESPONSIBLE
Matteo CIUCCI
Frédéric GOUARDÈRES

EDITORIAL ASSISTANT
Catherine NAAS

LINGUISTIC VERSIONS
Original: EN

ABOUT THE EDITOR
Policy departments provide in-house and external expertise to support European Parliament committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU internal policies.

To contact the Policy Department or to subscribe for email alert updates, please write to:
Policy Department for Economic, Scientific and Quality of Life Policies
European Parliament
L-2929 - Luxembourg
Email: Poldep-Economy-Science@ep.europa.eu

Manuscript completed: March 2021
Date of publication: March 2021

This document is available on the internet at:
http://www.europarl.europa.eu/supporting-analyses

For citation purposes, the publication should be referenced as: de Vet, J.M, et al. *Impacts of the COVID-19 pandemic on EU industries*, Publication for the committee on Industry, Research and Energy, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg, 2021.

CONTENTS

LIST OF ABBREVIATIONS

ACEA	European Automobile Manufacturers' Association
ADAS	Advanced Driver-Assistance Systems
AI	Artificial Intelligence
API	Active Pharmaceutical Ingredient
AV	Autonomous Vehicles
B2C	Business-to-Consumer
CAV	Connected and Autonomous Vehicle
CCI	Cultural and Creative Industries
CCSA	Committee for the Coordination of Statistical Activities
COVID-19	Coronavirus Disease 2019
CRII	Coronavirus Response Investment Initiative
CSR	Country-Specific Recommendation
EAMA	European Automotive Manufacturers Association
EC	European Commission
ECB	European central bank
EIB	European Investment Bank
ESM	European Stability Mechanism
EU	European Union
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
HORECA	Hotellerie-Restaurant-Café
JTF	Just Transition Fund
KET	Key Enabling Technologies

ICT	Information and Communications Technology
IMF	International Monetary Fund
IPCEI	Important Projects of Common European Interest
ITRE	Committee on Industry, Research and Energy (of the European Parliament)
IT	Information Technology
LIDAR	Light detection
Li-ion	Lithium-ion
MMF	Multiannual Financial Framework
NGEU	Next Generation EU
OECD	Organisation for Economic Cooperation and Development
OEM	Original Equipment Manufacturer
PC	Personal Computer
PMI	Purchasing Managers' Index
PPE	Personal Protective Equipment
Q	Quarter (of the year)
R&D	Research and Development
REACT-EU	Recovery Assistance for Cohesion and the Territories of Europe
RRF	Recovery and Resilience Facility
SME	Small and Medium-sized Enterprises
STEM	Science, Technology, Engineering and Mathematics
SURE	Unemployment Risks in an Emergency
T&A	Textiles and Apparel
UK	United Kingdom
US	United States

LIST OF BOXES

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

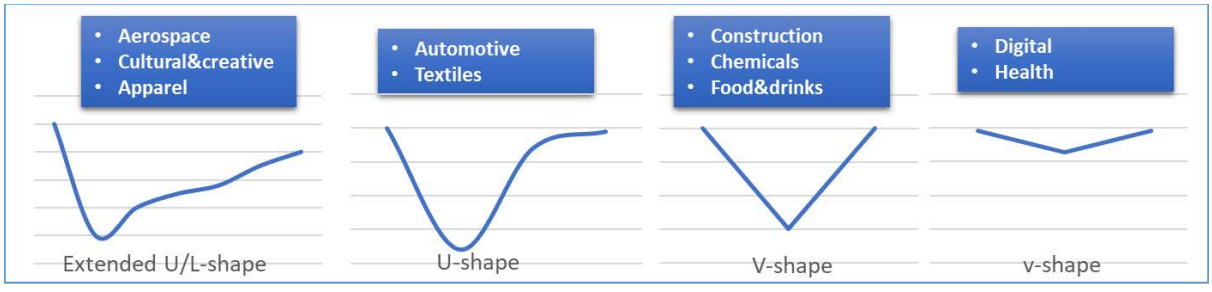
The COVID-19 crisis has had an abrupt impact on the EU27 economy and triggered unprecedented policy responses across Europe and the globe. As the pandemic is still unfolding globally, and at the time that a second (and potentially even a third) wave still keeps Europe and the world in its grips, it is too early to assess the full impacts of this crisis. Nevertheless, to support policymakers with evidence on the effects on the EU industry manifested so far, this report aims to address the following key questions:

1) What is the **impact** of COVID-19 on the EU economy, and how is the impact distributed among different sectors?
2) What structural changes has the crisis caused to our economy and the organisation of our **value chains,** and which value chains should be considered as strategic?
3) How comprehensive are the **recovery measures,** and to what extent they are meeting the needs of the EU industry?

1) The impact of the COVID-19 pandemic on the EU economy

Compared to the global economy, **the euro area has experienced a larger hit in 2020 and will experience a slower recovery in 2021**. The real GDP is expected to reach pre-crisis levels by mid-2022 in both the EU and the euro area. This is a positive adjustment of the outlook as compared to the initial forecasts that followed the start of the pandemic. However, it is important to note that a return of the economic activity to pre-crisis levels entails slow growth for the EU economy.

There are **remarkable differences in performance across, but also within sectors**. A large part of the digital industry has performed well, and so has the healthcare industry. Enabling industries like chemicals, construction, and the food and drinks sector are likely to experience a V-shaped recovery from the crisis. Despite the initial shocks, automotive and textile industries appear to be on a recovery path since the first lockdowns. **Sectors that are dependent on human contact and interaction, such as the cultural and creative industries and the aerospace industry** (due to the decrease in mobility and tourism activities), have experienced substantial hits by the crisis, and they are likely to suffer for extended periods from these unprecedented shocks.



The pandemic acted as an accelerator of digitalisation. The differences in the severity of COVID-19 effects are partially explained by the ability of businesses to go digital. Furthermore, the crisis lead consumers to re-assess their needs and **allows for a potential acceleration of the green agenda**. For example, in the automotive sector, despite the decline in the demand for new vehicles, the impact of the pandemic on the demand for electric vehicles seems to be much less severe. This also affects the forecasts positively for the rebound of the batteries supply chain. Overall, the pandemic has increased the awareness of the benefits of the digital and green transition, which needs to be coupled with adequate investments and political drives.

2) Changes that the pandemic is causing to (strategic) value chains

In order to remain internationally competitive, the EU will need to continue to rely on global value chains. In 2020, the resilience of European value chains had been tested: the COVID-19 pandemic unveiled weaknesses, as many businesses were initially unable to cope with shortages in supplies caused by closed borders and closed manufacturing sites. Nevertheless, most supply chains quickly recovered and have been affected less severely during subsequent waves of infections. The overall view from industry and experts alike is that value chains can be strengthened through increased **diversification rather than reshoring/onshoring**. The crisis accentuated the strategic importance of value chains such as microelectronics, autonomous driving, batteries, and AI in light of the accelerating digital transformation and growing demand for electric vehicles. These value chains need to receive continued attention and support to ensure access to materials, investment, and skills. However, this should not lead to a sustained policy drive for relocation, as this trend could be at odds with the need to keep the EU industry internationally competitive. Furthermore, industry leaders and experts alike point to the limited stability of the investment climate in the EU's Neighbourhood countries and the reluctance to place (strategic) investments (including in R&D) in these countries.

3) Comprehensiveness and relevance of the recovery measures

The heterogeneity of impacts on EU industries illustrated by this study needs to be fully taken into account when preparing and evaluating recovery measures. The EU recovery package provides a unique opportunity to strengthen the competitiveness of the EU industry by making it more green, digital, and resilient. **However, the measures in the national recovery and resilience plans will only be justifiable, effective, and efficient if these plans take full account of the underlying economic and sector-specific characteristics. If not, they may turn out to be the wrong vaccine.**

The key recommendations of the study on the design and focus of the recovery measures and policies are:

1) Ensure that the national recovery and resilience plans are **considering the specificities of the industrial tissue:** there is no 'one size fits all' solution;
2) The national recovery and resilience plans should **go beyond recovery** to pre-crisis levels and should aim to **boost the competitiveness of the EU industry via investments in R&D and digital re/upskilling;**
3) Support strategic **value chains where Europe can have a competitive edge**, rather than addressing potential short-term disruptions;
4) To ensure resilience, national and EU measures should **support the diversification of access to critical raw materials;**
5) Include **circular economy investments** in the national recovery plans and ensure the **necessary regulatory changes** to reduce pressures on value chains;
6) Address the multiplicity of targets in the national recovery and resilience plans through **prioritisation;**
7) **Speed up the adoption of national recovery and resilience plans** to avoid further widening of the gap with other leading economies;
8) Make sure that the national recovery and resilience plans have **a truly European character and oversight.**

INTRODUCTION

The COVID-19 pandemic, due to lockdowns in Europe and in the rest of the world, severely affected the European Union (EU) industries. Disruptions in multiple supply chains across a variety of sectors occurred, especially at the beginning of the crisis (March-April 2020) and particularly in the case of internationalised and complex value chains. Unprecedented policy responses have been initiated across Europe and the globe in an attempt to mitigate the impacts of this economic shock and to help the recovery. However, the pandemic has also created opportunities for certain segments of the economy, as consumers and businesses have radically changed their behaviours. As the pandemic is still unfolding globally, and at the time that a second (and potentially even a third) wave still keeps Europe and the world in its grips, it is too early to assess the full impacts of this crisis – whether negative or positive. Nevertheless, to support policymakers with evidence on the effects on the EU industry manifested so far, this study aims to address the following key questions and objectives:

Table 1: Key questions and objectives of this study

Key questions	Objectives of this study
What is the impact of COVID-19 on the EU economy, and how is the impact distributed among different sectors?	**Assess the extent of effects of the COVID-19 crisis on the European industries:** provision of quantitative and qualitative evidence on the effects on specific sectors and analysis of the expected speed of recovery.
What structural changes has the crisis caused to our economy and the organisation of our value chains, and which value chains should be considered as strategic?	**Assess strategic value chains**: identification of value chains that are strategic for the European industry and assessment of possible relocation scenarios for them (where/if needed).
How comprehensive are the recovery measures, and to what extent they are meeting the needs of the EU industry?	**Assess key Recovery Plan instruments**: provision of recommendations concerning the adequacy and consistency of the Recovery Plan and related national measures.

Source: Author's own elaboration.

This study (carried out in the period November 2020-March 2021) was commissioned by the Policy Department for Economic, Scientific and Quality of Life Policies in the DG Internal Policies of the Union on behalf of the Committee on Industry, Research and Energy (ITRE) of the European Parliament, to provide an independent expert opinion on the COVID-19 effects on the EU industry and the necessary recovery measures. It was structured along four tasks:

(1) structuring: refining of the methodology (problem definition and study design, assessment framework, and consultation strategy);
(2) data/information collection: desk research (see the list of References), case studies for the covered sectors[1], interviews with industry representatives and members of the academia/think-tanks, focus groups (see Annex A – List of interviewees and Annex B - List of attendees to the focus groups);

[1] Automotive, chemical, food and drinks, construction, textile and apparel, digital, aerospace, creative and cultural, healthcare.

(3) analysis: triangulation of the gathered evidence and assessment of the effects of the COVID-19 pandemic on the EU industry and value chains, and analysis of the adequacy and consistency of the recovery measures; and
(4) reporting and presentations.

The results of this analysis are presented in the following chapters:

- **Chapter 1: Impact of the COVID-19 pandemic on EU industries** – analysis of the impact of the crisis and expected recovery scenarios on the EU economy as a whole, followed by a deep dive on several sectors and a cross-sectoral analysis that presents the main similarities and differences between sectors;
- **Chapter 2: Impact on strategic value chains** – overview of the value chains considered strategic for the EU, impact on specific strategic value chains, and assessment of the need to consider relocation policies;
- **Chapter 3: Assessment of the recovery measures** – an assessment of the recovery measures at the EU and Member State levels to identify how these address the pandemic impacts on the industry. It reviews the regulation and guidelines of the Recovery and Resilience Facility (RRF) to evaluate the alignment of those to the longer-term objectives of the EU for key industrial sectors and provides first impressions on the approach of some Member States in drafting the national Recovery and Resilience plans; and
- **Chapter 4: Conclusions and recommendations** – a summary of the main conclusions and recommendations for recovery and resilience actions/directions.

1. IMPACT OF THE COVID-19 PANDEMIC ON EU INDUSTRIES

1.1. Impact on the economy as a whole

KEY FINDINGS

- Compared to the global economy, the euro area has experienced a larger hit in 2020 and will experience a slower recovery in 2021. The EU (3.6 to 4.2% growth forecast for 2021) is significantly lagging behind the recovery forecasts for China (7.9% growth for 2021).
- The real GDP is expected to reach pre-crisis levels by mid-2022 in both the EU and the euro area. However, a return to pre-crisis level of the economic activity would still mean slow growth for the EU economy.
- Manufacturing industries have been impacted by short-term supply shortages, but most manufacturing-based industries recovered relatively quickly during the third quarter (Q3) of 2020.
- However, there are distinct differences among the sectors in the level of severity of impact and extent of rebound. Sectors that require physical proximity, such as the cultural and creative industries, have been the hardest hit by the crisis. At the same time, besides a short and very small dip during Q2, the pharmaceutical and digital sectors have been the least impacted sectors.
- The pandemic has accelerated existing trends, in particular the digital transformation.

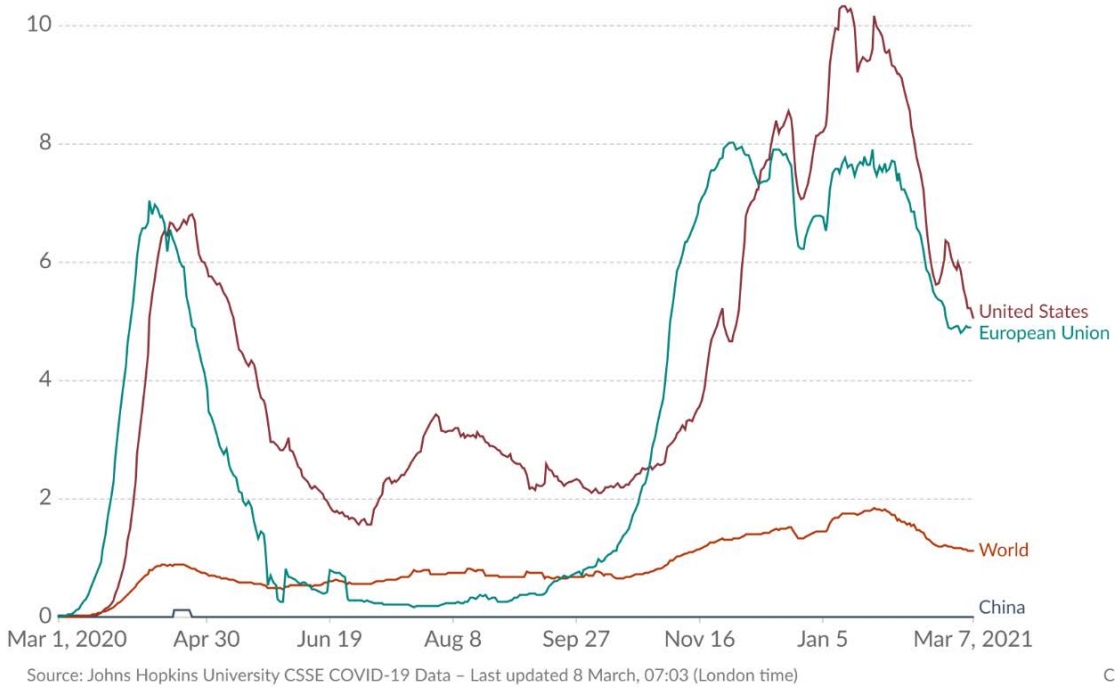
The COVID-19 crisis has taken various forms across the world, and early scenarios of the COVID-19 pandemic often depicted waves, including a second wave in late 2020[2].

The expectations for a second wave in the European Union materialised, and at the time of writing this report, it has still not abated (see Figure 1), with concerns for a possible third wave due to virus mutations. As shown in the graph, **the European Union recorded a higher number of COVID-19 deaths per million people than the global trend** and much higher than the reported cases in China, for instance.

The numbers in the EU are currently lower than in the United States (US), which also experienced a pronounced second wave. However, in terms of vaccinations, the EU is currently lagging behind the US (as shown in Figure 2).

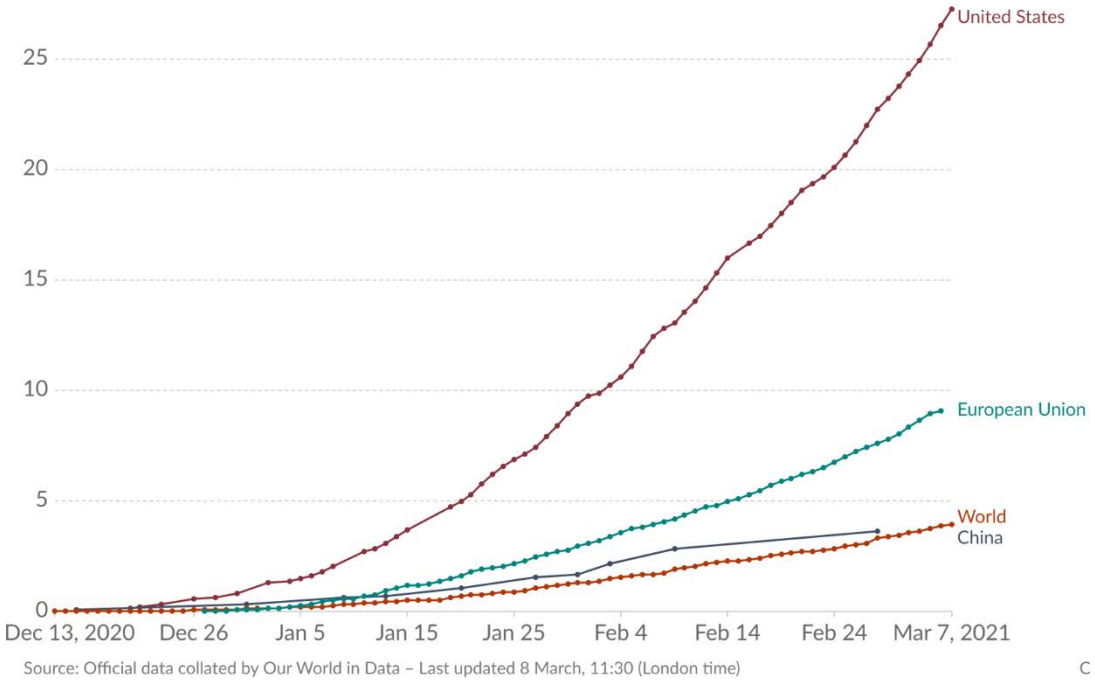
[2] CCSA, *How COVID-19 is changing the world: a statistical perspective*, Volume II, September, 2020, available at: https://unstats.un.org/unsd/ccsa/documents/covid19-report-ccsa_vol2.pdf.

Figure 1: Number of daily new confirmed COVID-19 deaths per million people



Source: Our World in Data (as of 08.03.2021), based on Johns Hopkins University CSSE COVID-19 Data, 2021[3].

Figure 2: Cumulative COVID-19 vaccination doses administered per 100 people



Source: Our World in Data (as of 08.03.2021), based on Johns Hopkins University CSSE COVID-19 Data, 2021[4].

[3] Our World in Data, *Statistics and Research: Coronavirus (COVID-19) Cases*, 2021, available at: https://ourworldindata.org/covid-cases?country=IND~USA~GBR~CAN~DEU~FRA.

[4] Our World in Data, *Statistics and Research: Coronavirus (COVID-19) Cases*, 2021, available at: https://ourworldindata.org/covid-cases?country=IND~USA~GBR~CAN~DEU~FRA.

After the initial shock in the economic activity in Europe in the first half of the year, the EU economy rebounded in the third quarter, as containment measures were gradually lifted. However, the resurgence of coronavirus infections led to another decrease in economic activity in the last quarter of 2020. According to the *European Winter 2021 Economic Forecast*[5], the **real Gross Domestic Product (GDP) is now expected to reach pre-crisis levels by mid-2022** on average in both the EU and the euro area (see Figure 3). For 2021, the projections for the real GDP growth in the euro area range from 3.6 to 4.2% (see Table 2). Even though this can be considered as a positive forecast as compared to the economic forecasts produced in 2020, the dominant outlooks show **a path to slow economic recovery in the next 2 years**. Compared to the estimates for the real GDP of the global economy, the euro area has experienced a larger hit in 2020 and will experience a slower recovery in 2021[6,7]. The EU economy experienced a stronger shock than China and the US (2% growth and -3.6% decrease respectively) in 2020, while it is **significantly lagging behind the recovery forecasts for China** (7.9 and 5.2% change on preceding year for 2021 and 2022, respectively)[8].

Table 2: EU Real GDP estimates (for 2020) and forecasts for 2021-2022 (y-o-y percentage change)

Source	2020	2021	2022
EC (EU27)	-6.3	3.7	3.9
EC (euro area)	-6.8	3.8	3.8
ECB (euro area)	-7.3	3.9	4.2
OECD (euro area)	-7.5	3.6	3.3
IMF (euro area)	-7.2	4.2	3.6
World Bank (euro area)	-7.4	3.6	4.0

Source: EC[9]; ECB[10], OECD[11], IMF[12], World Bank[13], 2021.

There are two important caveats as concerns the above forecasts. Firstly, the COVID-19 pandemic is ongoing, and the situation might change rapidly depending on the speed of rollout of the vaccination process, the efficacy of the vaccines, further mutations of the virus, and government decisions on how to handle the health risks. These will determine the occurrence and strength of further COVID-19 waves. Consequently, the economic forecasts will continue to change (similarly to the adjustments made throughout the whole of 2020). Secondly, **in spite of the improving outlook for the EU on the**

5 European Commission, 2021, 'European Economic Forecast: Winter 2021 (Interim)', *Institutional Paper 144*, Luxembourg: Publications Office of the European Union.

6 World Bank, 2021, *Global Economic Prospects*, Washington, DC: World Bank.

7 IMF, 2021, *World Economic Outlook Update*, available at: https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update.

8 World Bank, 2021, *Global Economic Prospects*, Washington, DC: World Bank.

9 European Commission, 2021, *Winter 2021 Economic Forecast*, available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_504.

10 ECB, 2020, *Macroeconomic projections for the euro area*, available at: https://www.ecb.europa.eu/pub/projections/html/ecb.projections202012_eurosystemstaff~bf8254a10a.en.html.

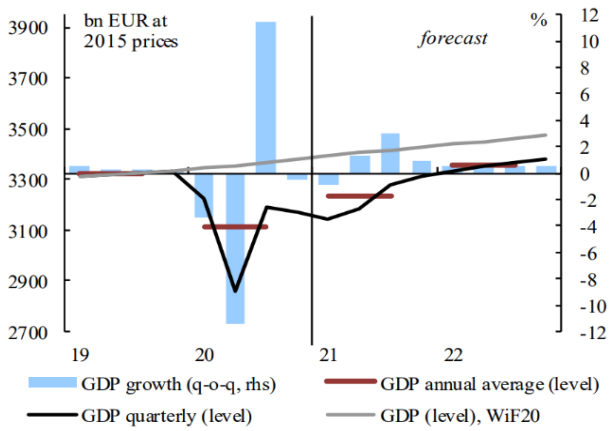
11 OECD, 2020, *Economic Outlook, Volume 2020 Issue 2,* No. 108, OECD Publishing, Paris, available at: https://www.politico.eu/wp-content/uploads/2020/12/01/EO108.PDFO_.pdf.

12 IMF, *January database*, 2021, available at: https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update.

13 World Bank, 2021 *Global Economic Prospects*, available at: https://www.worldbank.org/en/publication/global-economic-prospects.

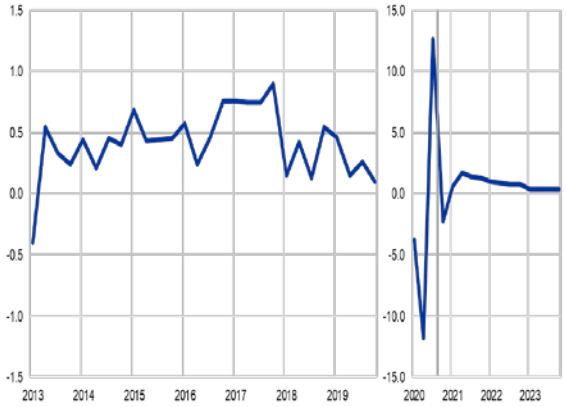
return to the pre-crisis level of the economic activity, such a return would still mean slow growth for the EU economy (as illustrated in Figure 4).

Figure 3: Real GDP growth path, EU



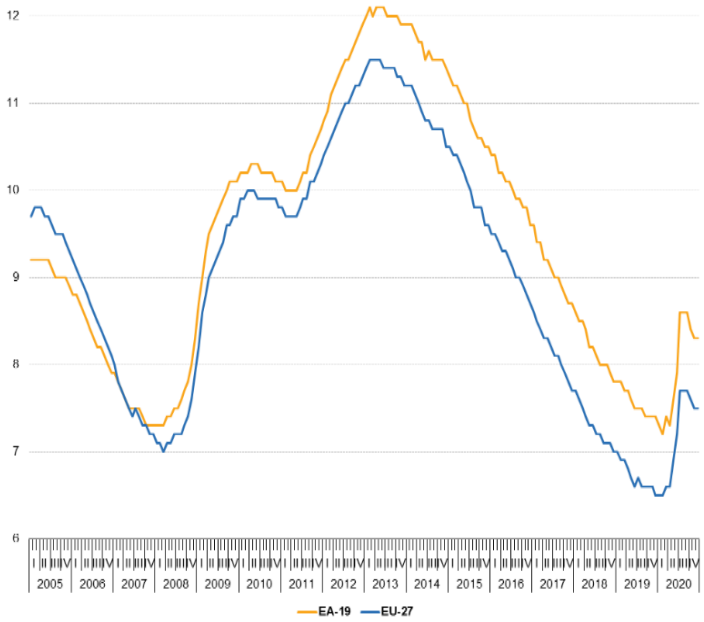
Source: EC, 2021.

Figure 4: Euro area real GDP



Source: ECB, 2020[14].

Figure 5: Unemployment rates EU27 and euro area, seasonally adjusted



Source: Eurostat, 2020[15].

Another concern for the EU economy is **the rise in unemployment**. The unemployment rate increased sharply in 2020, both in the EU27 and the euro area, reaching 7.8% and 8.7% respectively in the period July-September 2020. In the remaining months of 2020, it slowly decreased. On a positive note, the EU unemployment rate is still far from the rates recorded after the 2008 financial crisis. However, **the evolution of labour market slack suggests that the impact of the pandemic has been more severe than indicated by the traditional indicators**[16]. This is illustrated by the index of total actual hours worked. As shown on Figure 6, there was a significant drop in the total hours worked in Q2 2020, which is unparalleled.

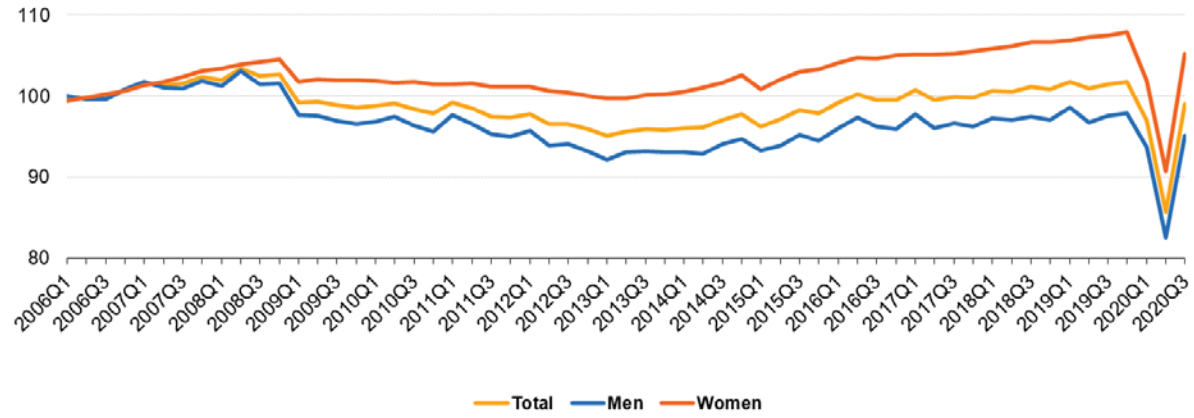
The recovery in Q3 2020 did not reach the levels of actual hours worked preceding the COVID-19 crisis. Furthermore, the labour market situation is expected to further worsen in 2021 (see Table 3) due to the expiry of government measures, with unemployment figures increasing before declining again in 2022.

[14] ECB, 2020, *Macroeconomic projections for the euro area*, available at: https://www.ecb.europa.eu/pub/projections/html/ecb.projections202012_eurosystemstaff~bf8254a10a.en.html.

[15] Eurostat, *Unemployment by sex and age (monthly data) - online data code: une_rt_m*, 2020, available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en.

[16] European Commission, *European Economic Forecast: Winter 2021 (Interim)*, 2021.

Figure 6: Index of total actual hours worked of persons aged 20-64, EU27, 2006-2020



Source: Eurostat, 2021[17].

Table 3: Unemployment rate (number of unemployed as a percentage of total labour force)

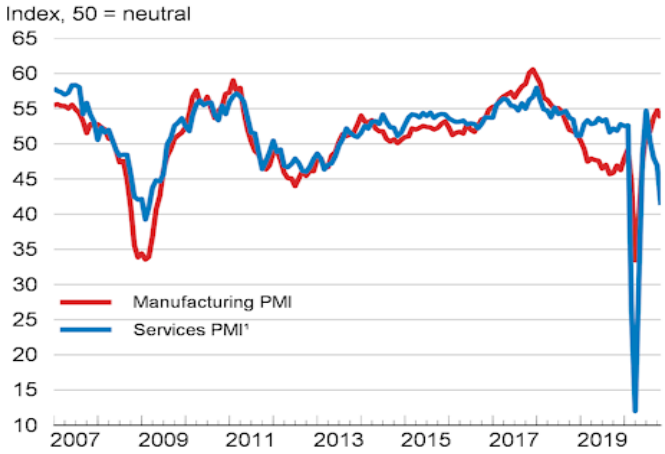
	2020	2021	2022
ECB (euro area)	8.0	9.3	8.2
OECD (euro area)	8.1	9.5	9.1

Source: ECB[18], OECD[19], 2020.

The production in the industry (manufacturing)[20] in the EU27 experienced a sharp decrease in March and April 2020 (respectively -11.1 and -20% change on the previous period), which coincided with the first wave of the spread of the coronavirus. It was then followed by a rebound in May and June 2020 (respectively 13% and 10.4% change on the previous period) and then by a small but increasing values in the period September-November 2020 that coincided with the resurgence of COVID-19 cases.

To some extent, these dynamics point to an adaptation of the EU manufacturing companies to the new realities of the pandemic and a milder impact of the second lockdown upon the EU27 industry.

Figure 7: Manufacturing/services PMI



Source: OECD[21].

Globally, goods trade fell more rapidly and recovered more swiftly than during the previous financial crisis, but so far, services trade remains depressed[22]. In the euro area, there is a clear deviation in the manufacturing and services Purchasing Managers' Index (PMI) since January 2020, with **services clearly hit much harder** (see Figure 7). The PMI shows very different dynamics as compared to the 2008 crisis, when services experienced a smaller decreased as compared to the manufacturing PMI. Yet, the recovery in industrial production remains incomplete due to considerable investment weakness[23].

1.2. Analysis and assessment of the impacts on specific industries

After the analysis of the impact of the COVID-19 crisis on the overall EU economy, in the following sections, we focus on specific sectors of the EU industry before providing a synthesis in section 1.3.

1.2.1. Impact on the automotive industries

Context: Accounting for 5% of the EU total value-added and corresponding to about €675 billion[24], the automotive industry plays a major role in the economy, generating various business services and influencing a vast supply chain. The manufacturing subsector of the automotive industry alone employs 2.6 million people and represents 8.5% of all EU manufacturing jobs[25]. The industry accounted for 2.6% of the total EU value-added in 2019[26]. Already before the global spread of the COVID-19 pandemic, the automotive industry had to face several challenges related to climate change and a fast changing consumer demand. Major disruptions related to connected, autonomous, shared and electric mobility have been transforming industry, consumer behaviour and production facilities and forced industrial players to find new solutions, change production, and initiate new fleets[27,28].

First wave: As outlined in the *Commission Staff Working Document on Identifying Europe's recovery needs*[29], the automotive industry belongs to the industries hit hardest by COVID-19 during the first wave. The supply chains of the European automotive industries were disrupted from the first shutdowns of Chinese factories[30]. More severe, however, was the shutdowns of factories in Europe between March and May. Across the EU Member States, automotive factories were closed for an average of 30 days, with the shortest downtime in Sweden (15 days) and the longest in Italy (41 days)[31]. In the first half of 2020, the EU automotive industry suffered production losses of 3.6 million vehicles, which reflects a loss of €100 billion. Until the end of September 2020, this number increased to 4,024,036 motor vehicles, representing 22.3% of the EU total production in 2020[32]. As of September, the demand for cars in the EU decreased by 28.8% compared to the previous year (see Figure 8)[33].

---

17 Eurostat, 2020, Index of total actual hours worked in the main job in the EU, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Q3_Index_of_total_actual_hours_worked_in_the_main_job_in_the_EU.PNG.

18 European Commission, 2021, *European Economic Forecast: Winter 2021 (Interim)*, available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_504.

19 OECD, 2021, Economic Outlook, Volume 2020 Issue 2, No. 108, OECD Publishing, Paris.

20 Eurostat, 2021, *Production in industry - monthly data, Online data code: STS_INPR_M*, available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_inpr_m&lang=en.

21 OECD, 2021, *Economic Outlook, Volume 2020 Issue 2,* No. 108, OECD Publishing, Paris.

22 World Bank, 2021, *Global Economic Prospects,* available at: https://www.worldbank.org/en/publication/global-economic-prospects.

23 Ibid.

24 European Commission, 2020, *Identifying Europe's recovery needs*, Commission Staff Working Document, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0098(01)&qid=1591607109918&from=IT.

25 European Commission, 2020, *Automotive industry,* available at: https://ec.europa.eu/growth/sectors/automotive_en.

26 EU Science Hub, 2020, *PREDICT – Prospective Insights on R&D in ICT*, available at: https://ec.europa.eu/jrc/en/predict/ict-sector-analysis-2020/data-metadata.

27 Accenture, 2020, *Coronavirs automotive rapid response*, available at: https://www.accenture.com/us-en/insights/automotive/coronavirus-automotive-rapid-response.

28 McKinsey, 2020, *Reimaginig the auto indsutry's future its now or never*, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/reimagining-the-auto-industrys-future-its-now-or-never.

29 European Commission, 2020, *Identifying Europe's recovery needs*, Commission Staff Working Document.

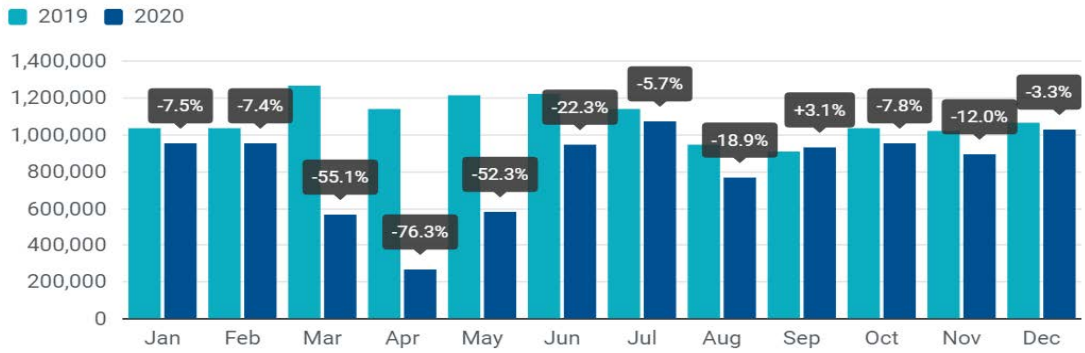
30 Accenture, 2020, *COVID-19: Impact on the Automotive Industry,* available at: https://www.accenture.com/_acnmedia/PDF-121/Accenture-COVID-19-Impact-Automotive-Industry.pdf.

31 ACEA, 2020, *Passenger car registrations*, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-28.8-nine-months-into-2020-3.1-in-september.

32 ACEA, 2021, *Truck makers gear up to go fossil-free by 2040, but EU and Member States need to step up their game*, available at: https://www.acea.be/news/article/interactive-map-covid-19-impact-on-eu-automobile-production-up-until-septem.

33 ACEA, 2020, *Passenger car registrations*, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-28.8-nine-months-into-2020-3.1-in-september.

Figure 8: New car registrations in the EU



Source: ACEA, January 2021[34].

The pandemic **affected more than 1.1 million jobs** directly due to shutdowns of factories between March and May. Additionally to comply with hygiene, distance, and security measures, and due to reduced performance and demand drops, the number of people actively working in the factories was substantially reduced. In addition to workers who were laid off, many were re-employed on short-term contracts: in Germany, for instance, 95% of all companies in the automotive sector set their workforce on short-term working during the first lockdowns[35].

Second wave: New lockdowns and confinement measures taken from November onwards in nearly all EU Member States triggered repercussions on the automotive industry, as dealerships had to close and general economic insecurity of consumers increased. While these effects have been varying significantly across Member States, in general, the second wave has been showing to be less severe in the stringency of its measures. In addition, car purchasing incentives, including **tax incentives and purchase subsidies from governments, have been substantially higher**. Moreover, in many countries, registration offices and service centres have remained open during the lockdowns, which improved the overall business practices during the second wave as compared to the first[36]. Nevertheless, as seen in Figure 8, car registrations also during November-December period have been down by 12.0 and 3.3.% respectively, on a year-on-year comparison[37].

Recovery outlook: The most likely scenario of recovery for the automotive sector at time of writing this report (March 2021) appears to be **U-shaped**. Even though the second wave brings less severe restrictions for the automotive industries and their production facilities, the EU passenger car market contracted by 23.7% year-on-year compared to 2019, corresponding to about 9.9 million units in 2020, due to the COVID-19 pandemic[38]. A persistent drop in sales into 2021 is likely, due to smaller production capacity, as distance regulations remain in place in factories, and decreased consumer confidence. The European Automobile Manufacturers' Association (EAMA) forecasts that the fallout in sales will

[34] ACEA, 2021, *Passenger car registrations: -23.7% in 2020, -3.3% in December*, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-23.7-in-2020-3.3-in-december.

[35] McKinsey, 2020, *Beyond coronavirus the road ahead for the automotive aftermarket*, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/beyond-coronavirus-the-road-ahead-for-the-automotive-aftermarket.

[36] McKinsey, 2020, *The second COVID-19 lockdown in Europe: Implications for automotive retail,* available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-second-covid-19-lockdown-in-europe-implications-for-automotive-retail.

[37] ACEA, 2021, *Passenger car registrations: -23.7% in 2020, -3.3% in December*, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-23.7-in-2020-3.3-in-december.

[38] Ibid.

continue during the first quarter of 2021 before recovery will pick up in the second half of the year. The EAMA expectations are that sales will rise by about 10% during the course of 2021, as compared to 2020.

Another issue emerging in the automotive industry relates to the changing circumstances of the industry, namely relative to the development and expected uptake of connected, autonomous and electric vehicles (see box below). COVID-19 is argued **to accelerate and amplify these trends** and contribute to affect consumer behaviour[39].

Box 1: Electric vehicles

The **impact of COVID-19 on electric vehicles is less severe than the impact on the overall sector**[40]. The average share of electric car sales over total car sales increased from 3.4% in 2019 to 7.8% in the first half of 2020, with a peak of 11% in April and about 8% in May and June. Also with respect to global sales, electric cars have been less hit than non-electric cars[41]. Following the first wave of the pandemic, **electric vehicles** could further increase their market share to 10.5% of the total EU car market[42]. Similarly, electrified vehicles, a category which includes not only fully electric cars but also plug-in as well as pure and mild hybrid vehicles, increased their market share to 26.8% and outsold diesel cars for a second consecutive month in November 2020. Nevertheless, the second wave also caused a significant impact on these industries, taking into account the absolute numbers of new registrations, which fell by 7% in this subsector[43]. **The COVID-19 pandemic seems to accelerate the growth of the electric vehicle market**, as firstly consumer behaviour is changing towards more private mobility instead of pubic mobility to reduce infection risks, while at the same time, regulators are intensifying activities for climate protection in the mobility sector. Moreover, recovery measures linked to the green transition are incentivising investments in this sector[44].

1.2.2. Impact on the aerospace industries

Context: In 2019, the European aerospace (including military aviation) industry generated about €260 billion of total turnover providing about 890,000 direct jobs[45]. Aerospace is considered a 'strategic ecosystem' as defined in *the New EU Industrial Strategy*[46], which will require increasing supply capacity within the EU Single Market to meet the challenges embedded in the twin (green and digital)

[39] McKinsey, 2020, *Beyond coronavirus the road ahead for the automotive aftermarket,* available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/beyond-coronavirus-the-road-ahead-for-the-automotive-aftermarket.

[40] PwC Strategy&, 2020, *The Impact of COVID-19 on the European Automotive Market*, available at: https://www.strategyand.pwc.com/it/en/assets/pdf/S&-impact-of-covid-19-on-EU-automotive-market.pdf.

[41] Mock, P., Yang, Z and Tietge, U., 2020, *The impact of COVID-19 on new car markets in China, Europe, and the United States*, The International Council on Clean Transportation (ICCT), available at: https://theicct.org/blog/staff/impact-covid-19-new-car-markets-china-europe-and-united-states-v-u-w-or-l.

[42] Just Auto, 2021, *Global pandemic sector recovery briefing,* available at: https://www.just-auto.com/news/free-to-read-global-pandemic-sector-recovery-briefing_id197509.aspx.

[43] Just Auto, 2021, *Electrified vehicle buck gloomy covid trend in Europe,* available at: https://www.just-auto.com/news/electrified-vehicles-buck-gloomy-covid-trend-in-europe_id198976.aspx.

[44] McKinsey, 2020 *From no mobility to future mobility: Where COVID-19 has accelerated change,* available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/from-no-mobility-to-future-mobility-where-covid-19-has-accelerated-change.

[45] EUROCONTROL, 2020, *What COVID-19 did to European Aviation in 2020, and Outlook 2021,* Aviation Intelligence Unit, available at: https://www.eurocontrol.int/sites/default/files/2021-01/eurocontrol-think-paper-8-impact-of-covid-19-on-european-aviation-in-2020-and-outlook-2021.pdf.

[46] European Commission, 2020, *A New Industrial Strategy for Europe,* available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0102&from=EN.

transition[47]. These include efforts towards decarbonisation, through the establishment of greener, modern generation aircraft to guarantee emissions and fuel reduction, as well as further digitalisation of factories and logistics to achieve more efficient flight and overall sector management. Guidelines to increase investments in innovation to further enhance Europe's technological stand in the global aerospace sector are presented in the recently published *Action Plan on Synergies between civil, defence and space industries*[48].

First wave: The outbreak of the pandemic in Europe **triggered a sudden drop in demand for civil aviation**, evident in the daily trend of March, a month which ended with an 86.1% decline in air traffic compared to 2019 levels, and in the unprecedented drop by 92.8% in mid-April, when mobility and transport restrictions were implemented by most EU Member States[49]. Between January and June 2020, the number of aircraft grounded in Europe increased by a total of 80% as compared to the previous year, making Europe the region featuring the worst global trends[50]. Figures point to a very moderate recovery starting at the beginning of the summer, with a -72.8% difference in June and a further stabilisation to -51% in August with respect to 2019, in parallel to lifting travel restrictions across the region over the summer[51].

The immediate drop in the demand for the production of aircrafts, coupled with disruptions in the supply of raw materials caused by the limitations in cross-border movements over the first quarter of 2020, triggered **supply delays and massive fallouts in production**. These, in turn, resulted in critical cashflow issues for many companies at all stages of the aerospace supply chain, many of which – notably second- and third-tier suppliers – are small and medium-sized enterprises (SMEs)[52]. In opposition to general trends of the industry, commercial aerospace experienced an **uptake in logistics for specific market subsectors**, especially during the first months of the crisis. These activities, however, did not strongly impact the overall yearly figures.

Second wave: Spiking infection rates and the reintroduction of government restriction measures across Europe caused a traffic decrease at a weekly daily average of -73% between September and December. **European demand for aerospace manufacturing decreased in overall by 43% in 2020**, primarily driven by Airbus order deferrals[53]. As for the service subsectors, airlines have been struggling since the outbreak of the crisis. Many fell into bankruptcy or engaged in strong business restructuring[54] resulting in forced costs and asset reductions, and ultimately job losses[55]. With a total of €56.2 billion of net losses for airlines, airports and air navigation service providers, national markets in the EU fell

---

47 European Cluster Alliance, 2020, *How COVID-19 is impacting the Aerospace sector*, available at: https://clustercollaboration.eu/news/analysis-disruptions-aerospace-defence-ecosystem.

48 European Commission, 2021, *Action Plan on Synergies between Civil, Defence and Space Industries 2021*, available at: https://ec.europa.eu/info/files/action-plan-synergies-between-civil-defence-and-space-industries_en.

49 EUROCONTROL, *Comprehensive Assessment of COVID-19's Impact on European Air Traffic*, 2021, available at: https://www.eurocontrol.int/publication/eurocontrol-comprehensive-assessment-covid-19s-impact-european-air-traffic.

50 ASD, 2020, *Aviation RoundTable Report on the Recovery of European Aviation*, available at: https://www.asd-europe.org/eu-aviation-maps-a-sustainable-post-crisis-future-in-round-table-report.

51 EUROCONTROL, *Comprehensive Assessment of COVID-19's Impact on European Air Traffic*, 2021, available at: https://www.eurocontrol.int/publication/eurocontrol-comprehensive-assessment-covid-19s-impact-european-air-traffic.

52 ASD, 2020, *COVID-19: Proposals for EU Relief Measures for Aerospace, Defence and Security Industries*, available at: https://www.asd-europe.org/covid-19-updates-resources.

53 Accenture, 2020, *Commercial Aerospace Insight Report: In it for the Long Haul*, available at: https://www.accenture.com/ie-en/insights/aerospace-defense/commercial-aerospace-report-lead-in-the-new.

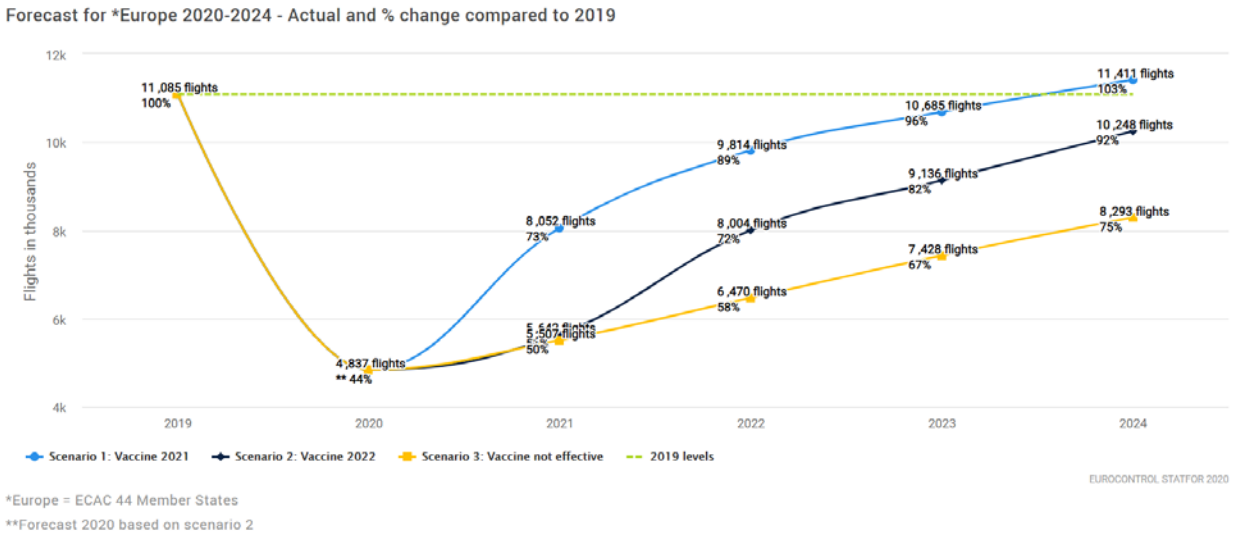
54 Deloitte, 2020, *Post Covid-19 Aerospace Industry: An opportunity to embrace the 4.0 Era?*, available at: https://www2.deloitte.com/fr/fr/pages/covid-insights/articles/post-covid-19-aerospace-industry.html.

55 Albers, S., and Volker, R., 2020, *European airlines strategic responses to the COVID-19 pandemic*, Journal of air transport management 87, available at: https://www.sciencedirect.com/science/article/abs/pii/S0969699720303410.

between 40% and 73% as compared to 2019, with flights decreases ranging from 61% in the UK to 56% in Germany and 60% in Italy. Leading aviation groups experienced unprecedented losses associated with the overall 54% intra-European and 59% extra-European traffic decrease of 2020[56]. **About 191,000 direct jobs were lost for the whole European industry** in 2020, each of which is estimated to support another six jobs in the economy[57].

Recovery outlook: European traffic for 2021 is expected to recover to 51% of the 2019 levels. The sector foresees that a moderated recovery could sustain in 2022, but an effective recovery to pre-COVID-19 levels is not expected before 2024[58]. As illustrated in Figure 9, a largely extended U-shaped recovery is the most likely scenario for the sector, and its patterns will strongly depend on the effects of the vaccinations that are directly interlinked to the state restriction measures adopted at European and global level with respect to national and international mobility.

Figure 9: European Aerospace sector performance forecast (2020-2024)



Source: EUROCONTROL, 2020[59].

1.2.3. Impact on the chemical industries

Context: With a €7,320 billion turnover and a contribution to 12% of EU manufacturing employment[60], Europe is the second-largest chemicals producer in the world after China and owns 16.9% of the total global sales. The *Chemicals Strategy for Sustainability*[61] sets out some of the priorities that the sector will focus on to meet the existing EU industrial challenges in the years ahead, as concerns the twin transition.

---

56 EUROCONTROL, *What COVID-19 did to European Aviation in 2020, and Outlook 2021*, 2020, Aviation Intelligence Unit, available at: https://www.eurocontrol.int/sites/default/files/2021-01/eurocontrol-think-paper-8-impact-of-covid-19-on-european-aviation-in-2020-and-outlook-2021.pdf.

57 Five Aero, 2020, *Perspectives on Passenger Air Transport in a COVID-19 World*, available at: https://665b30d6-afb6-4758-92a3-96543b32cf17.filesusr.com/ugd/6a99d4_2a5c03c48e484a03bd7e8ad14ac883a5.pdf.

58 EUROCONTROL, 2021, *Comprehensive Assessment of COVID-19's Impact on European Air Traffic*, available at: https://www.eurocontrol.int/publication/eurocontrol-comprehensive-assessment-covid-19s-impact-european-air-traffic.

59 EUROCONTROL, 2021, *COVID-19 impact on the European air traffic network*, available at: https://www.eurocontrol.int/covid19.

60 CEFIC, 2020, *The European chemical industry: a vital part of Europe's future*, available at: https://cefic.org/our-industry/a-pillar-of-the-european-economy/facts-and-figures-of-the-european-chemical-industry/.

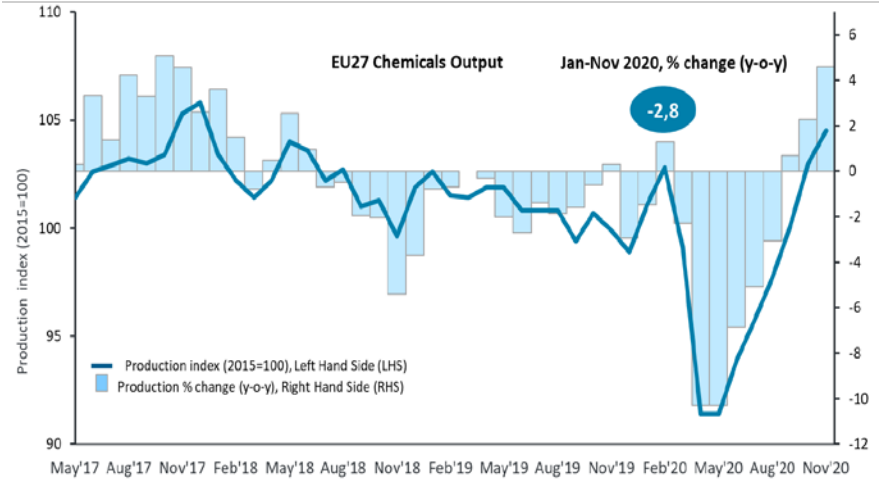
61 European Commission, 2020, *Chemicals strategy*, available at: https://ec.europa.eu/environment/strategy/chemicals-strategy_en.

First wave: The performance of the EU chemical industry during the first year of the COVID-19 crisis generally followed the overall EU industry trends. In the EU as well as globally, overall demand for chemicals featured severe shocks across many end-markets, mainly due to disruptions in global supply chains, drops in consumption, and ultimately in manufacturing. The fall in demand for chemicals inevitably resulted in shrinking production and reduced supply[62]. Between January and June 2020, **chemical output in the EU27 dropped by 5.2% compared to the previous year's levels**, with the lowest point reached in April. In June, a 2.9% output growth was registered compared to May, showing some early and modest signs of recovery.

The priority of the industry during the first months of 2020 was to secure supplies of critical chemicals into supply chains considered 'essential' during the pandemic outbreak, such as the medical and food sectors', amidst border closures, mobility restrictions and lockdown measures[63]. The manufacturing output of these industry subsectors remained stable or even experienced growth following increasing demand during the first semester of the year. Growth occurred, for instance, in the production of disinfectants[64].

Second wave: Demand, as well as chemicals output, increased from September onwards due to the relative revival in consumption during the summer, coupled with the capacity of businesses to adapt their operations to the sanitary and distancing requirements of governments. Q3 experienced an increase of 6.1% from the previous quarter. Output performance, however, was highly country-dependent, with some EU Member States experiencing growth from 2019 (e.g. Spain and Poland, with an increase of about 5% in September) and others featuring pitfalls (e.g. France and Italy, with -11.7% and -6.7% respectively). Altogether, the total output for the chemical sector dropped by 2.8% from January to November 2020 compared to 2019.

Figure 10: EU27 Chemicals Output (January-November 2020)



Source: Eurostat and Cefic[65].

Recovery outlook: Recent data suggest that, despite the drop that the sector experienced during the first two months of the pandemic, the prospects for recovery of the whole chemical sector are positive,

[62] PwC Strategy&, 2020, *COVID-19: Consequences for the chemicals industry – preparing for 'the day after' the global pandemic*, available at: https://www.strategyand.pwc.com/de/de/implications-of-covid-19/consequences-for-the-chemicals-industry.html.

[63] CEFIC, 2021, *COVID-19 Helpdesk*, available at: https://cefic.org/the-european-chemical-industry-covid19-help-desk/.

[64] Process Worldwide, *Insight into the EU Chemical Industry*, 2020, available at: https://www.process-worldwide.com/insight-into-the-eu-chemical-industry-a-962997/.

[65] CEFIC, 2020, *Chemical Quarterly Report (CQR)*, available at: https://cefic.org/app/uploads/2020/09/Cefic-Chemicals-Quarterly-Report-CQR-September-2020.pdf.

pointing to a **V-shaped recovery**. Nonetheless, major differences in the impacts of the crisis across countries and across subsectors point to **a likely diverse recovery outlook**. Some European chemical companies, especially players in end-markets that have profited or that have not been strongly impacted by the pandemic, have weathered the effects of the pandemic surprisingly well and seem to be well-positioned to take advantage of any market rebound in 2021. By contrast, **companies exposed to end markets such as textile, automotive or aerospace manufacturing** will continue to suffer from the negative impact of COVID-19 through the whole of next year, being their performance directly correlated to that of their sectorial counterparts[66].

1.2.4. Impact on the construction industries

Context: The EU construction sector provides 18 million direct jobs within the EU and contributed about 9% to the EU's GDP in 2019, accounting for about €1.216 billion[67]. It is a sector that is very sensitive to economic cycles[68], and it was hit hard during the 2008 financial crisis.

Additionally, the construction industries are facing challenges associated to stimulating demand, the uptake of innovation and new technologies, as well as incorporating and implementing energy efficiency and addressing climate change[69].

While the European *Green Deal* has major implications for the construction industries and will require major adaptations, it is claimed that the green transition and the need to shift to a circular and climate neutral economy will have significant positive effects on the sector[70].

First wave: While it is estimated that **construction industries in the euro area were operating at 25% to 30% below their normal capacity during the first wave**, which represents the period under strictest confinements, the situation across the EU is very diverse. In some Member States, it was possible to continue activity more or less as before (e.g. in Germany), while in some countries (such as Italy, Spain, Slovakia, Ireland or France), construction sector activities were severely limited. Even if in most countries, construction industries have been allowed to take up production quickly again, a number of difficulties arose due to the confinement measures and travel bans: labour shortages, supply chain disruptions leading to shortages of construction material, as well as additional costs due to intensified health and security measures[71].

Due to COVID-19, the winter slowdown in **production** substantially intensified by a drop of about 20% and prolonged until April, before recovery started. Until August 2020, production recovered from -11.5% year-on-year growth to -9.1%[72].

Overall, the **labour market** in the construction industries was affected substantially during the first wave, particularly in consideration of temporary layoffs and reduced hours: the risk of being subject to

---

66 C&EN, 2021, *World Chemical Outlook 2021*, available at: https://cen.acs.org/business/CENs-World-Chemical-Outlook-2021/99/i2.

67 European Commission, 2021, *Construction Industry*, available at: https://ec.europa.eu/growth/sectors/construction_en#:~:text=The%20construction%20industry%20is%20very,social%2C%20climate%20and%20energy%20challenges.

68 International Labour Organization, 2020, *Briefing note*, available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_767303.pdf.

69 European Commission, 2021, *Construction Industry*, available at: https://ec.europa.eu/growth/sectors/construction_en#:~:text=The%20construction%20industry%20is%20very,social%2C%20climate%20and%20energy%20challenges.

70 Trading Economics, 2020, *European Union Construction Output*, available at: https://tradingeconomics.com/european-union/construction-output.

71 FIEC, 2020, *Statistical Report*, available at: https://fiec-statistical-report.eu/european-union.

72 KHL, 2020, *Euroconstruct issues forecasts for 2021-2023*, available at: https://www.khl.com/1147226.article.

temporary layoffs or reduced hours has been slightly above 20% in the construction sector during Q2 2020. Nevertheless, as in other industries, impacts on employment differ between Member States and across subsectors: In Germany, the number of persons employed in the construction of residential and non-residential buildings decreased by on average 0.3% between April and November, while persons working in civil engineering increased by on average 2% during the same period[73].

Second wave: The **second wave is expected to impact construction industries much less**, as the industries had time to adjust to new security measures. Additionally, confinement measures have been more defined, and no shortages of inputs are to be expected as supply chains adjusted and have been more protected than during the first wave in Spring 2020[74]. Until August 2020, production recovered from -11.5% year-on-year growth to -9.1%[75]. The construction sector performance stabilized, with production in November 2020 levels recovering to 97.5% of the pre-crisis level of February 2020[76].

Recovery outlook: According to forecasts, recovery will start in 2021 with a forecasted growth of 4.1% for 2021, 3.4% in 2022, and 2.4% in 2023[77]. Hence, the recovery scenario for the general construction sector will be similar to **a V-shape.**

Figure 11: Year on year change in construction output and real GDP

Source: EUROCONSTRUCT, 2020.

Nevertheless, a complete recovery back to pre-crisis 2019 levels will take until 2023[78]. In parallel to the different intensity of impacts of the pandemic on the industries across the different Member States, recovery will vary substantially across Member States, in speed as well as intensity.

While Poland and Portugal have been forecasted with growth levels for the sector above 2019 levels from mid-2021 already, countries that have been hit harder, such as the Netherlands, Ireland, Slovakia, France or Sweden, will experience a longer recovery period and will need more time to get back to pre-crisis levels[79].

1.2.5. Impact on the food & drinks industries

Context: The food and drinks industries employ about 4.82 million people and generated a value-added of €266 billion in 2019[80]. In addition, the food industries have substantial linkages and

[73] Deutsches Statistisches Bundesamt, 2021, *Short-Term indicators Construction industry,* available at: https://www.destatis.de/EN/Themes/Economy/Short-Term-Indicators/Construction-Industry/pqw211.html.

[74] KHL, 2020, *Euroconstruct issues forecasts for 2021-2023*, available at: https://www.khl.com/1147226.article.

[75] Ibid.

[76] European Commission, 2021, *Impacto of COVID-19 crisis on construction*, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Impact_of_Covid-19_crisis_on_construction.

[77] Euroconstruct, 2020, *Briefing on European Construction August 2020*, available at: https://euroconstruct.org/ec/blog/2020_08.

[78] KHL, 2020, *Euroconstruct issues forecasts for 2021-2023*, available at: https://www.khl.com/1147226.article.

[79] Euroconstruct, 2020, *Briefing on European Construction August 2020*, available at: https://euroconstruct.org/ec/blog/2020_08.

[80] FoodDrinkEurope, 2020, *Data & Trends of the European Food and Drink Industry 2020*, available at: https://www.fooddrinkeurope.eu/publication/data-trends-of-the-european-food-and-drink-industry-2020/.

interrelations to other sectors such as agriculture and the hospitality sector. Already before the COVID-19 pandemic hit, the food industries have been subject to changing consumer behaviour and emerging trends, such as rising demand for more local products, and hence keeping shorter supply chains. The *Farm to fork strategy*[81] and the general awareness of the need for a higher degree of sustainability, healthy and nutritious food are forcing suppliers to adapt.

First wave: To assess the impacts of the COVID-19 pandemic on the EU food industries, it is of particular importance to differentiate between the different subsectors, as the impacts are highly diverse. While **subsectors with close links to the Hotellerie-Restaurant-Café (HORECA) were hit the hardest**, **food retailers experienced increased sales**[82] due to a drastic shift in consumer behaviour from outdoor eating towards food consumed at home. Retailers of frozen and packaged foods experienced the steepest increase in sales. For example, during the second half of March, sales of frozen foods have been 63% higher in France than during the same period in 2019. Similarly, packaged food sales in Germany increased by 56% during late March, compared to 2019. Even after the initial spike during the first weeks of the pandemic, demand stabilised at +15-20% during the summer, compared to the same period in 2019.

In general, the decline in food and drink industry production was much lower compared to total manufacturing production (-9.1% in Q2 2019). A similar trend was observed for the year-on-year development in food and drink industry turnover compared to total manufacturing (-6.6% and -22.9% respectively compared to Q2 2019)[83]. Similarly, **the employment levels in the food and drink industry decreased as well, but to a lesser extent than for total manufacturing**[84].

The supply chains of the food industries remained relatively resilient. At the same time, some bottlenecks emerged due to closed borders, which distorted the supply for inputs, transport of goods as well as through confinement caused labour shortages. Another problem in supply arose from panic buying and stockpiling by consumers in the first weeks of the pandemic. Nevertheless, as stockpiling behaviour disappeared and supply chains have been supported by measures such as green lanes and considering food industry employees as 'essential', supply chains stabilised quickly and remained resilient.

Second wave: During the second wave, the **food industries have been impacted to a much lower extent than the first wave**. While the subsectors linked to the HORECA have still been negatively affected, this is likely to be less intense, as some producers have been able to adapt to new demand and adjusted packaging, labelling, and production. Additionally, borders remained open, and consumers refrained from panic buying and stockpiling. Hence no shortages emerged, and supply chains remained resilient.

Production in the EU food and drink industry continued to recover in Q3 2020 with an 8.2% increase compared to Q2 (see Figure 12). Turnover also increased by 5.9%, compared to the previous quarter. On a year-on-year basis, the food and drink industries experienced only a low decline of 0.4% to Q3 of the previous year and hence nearly recovered to pre-crisis levels. Similarly, turnover for Q3 of the

---

81 European Commission, 2020, *Farm to Fork Strategy – for a fair, healthy and environmentally-friendly food system,* available at: https://ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategy-info_en.pdf.

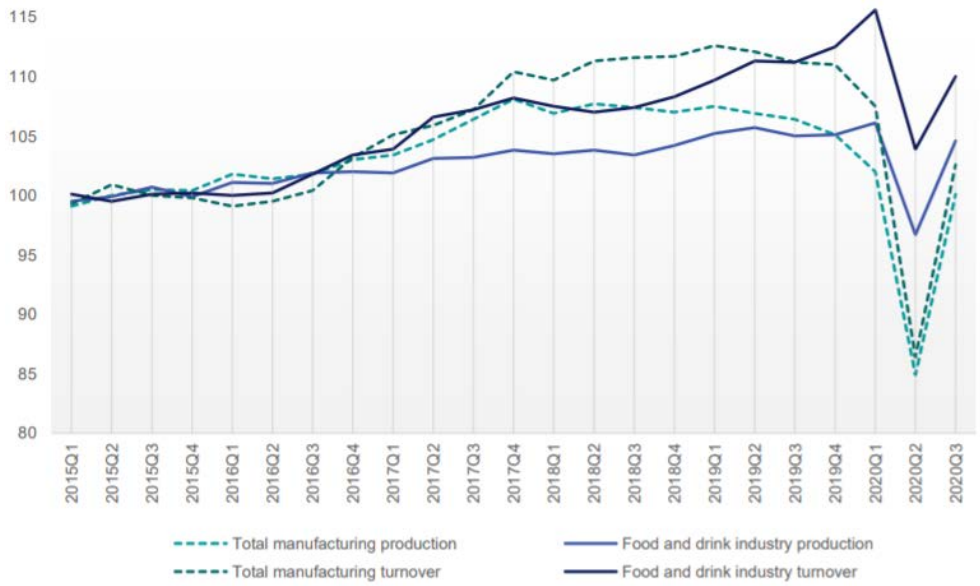
82 European Commission, 2020, *Statistics Explained: Impacto f Covid-19 crisis on short-term business statistics*, available at: https://ec.europa.eu/eurostat/documents/4187653/10278432/Impact+of+Covid-19+crisis+on+short-term+business+statistics/18b8a72d-1aa0-bf69-e8a1-4e9e3e4c65db.

83 FoodDrinkEurope, 2020, *Economic Bulletin Q2 2020*, available at: https://www.fooddrinkeurope.eu/uploads/publications_documents/FoodDrinkEurope_Economic_Bulletin_Q2_2020.pdf.

84 Ibid.

complete food and drink industry was only 1.1% below Q3 in 2019. The year-on-year employment in the food and drink industries decreased by about 1.2% for food and 2.2% for drinks industries. Similarly to **the first wave, the food sector has been the most successful in retail and even increased employment compared to the previous year by 2.4%**[85].

Figure 12: EU quarterly manufacturing production and turnover, 2015-2020



Source: FoodDrinkEurope, 2021[86].

Recovery outlook: Recovery in the food and drinks sector **depends substantially on the subsector.** While food retailers have been able to adjust to the changing demand, in particular in the case of large retailers, the recovery of the catering subsector focussing on hotels, fairs and events, will largely depend on the possibility to re-open hotels, hold fairs and organise events. Hence the recovery seems to be very similar to that of the hospitality sector. For the overall sector, a **V-shaped recovery** seems most likely, as a very quick rebound started already during Q2 and continued in Q3. For other sectors of the food and drinks industries, the question is not necessarily how long the recovery will last but how long it will take consumers to re-adapt their behaviour to the 'new normal'. It is highly likely that as soon as restaurants are open again, fewer people will cook at home than at present. Similarly, the trends of consumers **increasing the demand for food labelled as healthy, sustainable and local food**, which have been growing already before the pandemic and have only been accelerated by it, are

[85] FoodDrinkEurope, 2021, *Economic Bulletin Q3 2020*, available at: https://www.fooddrinkeurope.eu/uploads/publications_documents/FoodDrinkEurope_Economic_Bulletin_Q3_2020.pdf.

[86] Ibid.

unlikely to change substantially. Additionally, it is likely that demand for basic foods, e.g. pasta, potatoes, rice, and flour, will decrease again with increasing economic and labour market security[87].

1.2.6. Impact on the textiles & apparel industries

Context: The European textiles and apparel (T&A) sector is made of about 170,000 companies (99.8% of which are micro-companies and SMEs[88]) that altogether generate a yearly turnover of almost €180 billion, employing 1.7 million people[89]. The industry experienced a transformation over recent years, through which production of simple, mass consumption items was drastically reduced for the industry to vertically integrate towards higher value-added products such as technical and industrial textiles[90]. The *EU Textile Strategy*[91] currently under development will highlight the focus investment needed by the European T&A industry to contribute to the objective to achieve a green, digital and resilient EU economy, in addition to the more recently emerging needs of the industry triggered by COVID-19.

First wave: Short and long-distance mobility restrictions worldwide had strong repercussions on this labour-intensive and highly globalised industry. At the start of 2020, the global health crisis and subsequent government measures caused both a drop in production and considerable disruption in textile supply chains, creating spill-overs at the cross-regional level. With China being a critical global supplier of textile inputs, when disruptions started, the trade impacts on manufacturing consequently extended throughout the whole global market, including the EU's[92]. Reflecting a drop in overall supply, production in Europe declined by more than 10% in Q1 as compared to the previous year, reaching **a difference of 38% in textile and 57% in the clothing subsectors in April 2020**. Concerning employment, the labour market for T&A experienced a relatively limited setback over the first months of the crisis, with a 1.5% decrease in textile and 4.9% in clothing in the whole EU in comparison to 2019, partly thanks to the short-term measures taken at the national level to support employment[93].

Whereas imports for traditional textile items from China decreased, they increased for specific sanitary products, above all **masks whose imports increased from €0.5 billion to €12 billion from 2019 to 2020**[94]. Moreover, over the course of the year, some fashion enterprises in certain national industries shifted part of their established production to new categories of products, namely sanitary/masks[95], pointing to first tendencies towards transformation in supply chain manufacturing in this specific industry subsector. Due to lockdowns that forced the shutdow of shops and mobility restrictions in many countries, demand for especially the clothing subsector of the overall industry dropped significantly, with retail sales falling by 18.8% in the EU during Q1. 60% of European textile companies interviewed in a survey carried out between March and April 2020 expected sales drop by more than

---

87 McKinsey, 2020, *How European Shoppers Will buy groceries in the next normal*, available at: https://www.mckinsey.com/industries/retail/our-insights/how-european-shoppers-will-buy-groceries-in-the-next-normal.

88 EURATEX, 2020, *Facts and key figures of the European textile and clothing industry* , available at: https://EURATEX.eu/wp-content/uploads/EURATEX-Facts-Key-Figures-2020-LQ.pdf.

89 EURATEX, 2020, *The European Textiles and Apparel Industry in the Post Corona Era: Proposals for Recovery*, available at: https://EURATEX.eu/wp-content/uploads/Post-Corona-Strategy-Final.pdf.

90 Ibid.

91 European Commission, 2020, *Strategy for textiles*, available at: https://ec.europa.eu/growth/industry/sustainability/textiles_en.

92 Chakraborty, S., and Biswas, M.C., 2020, Impact of COVID-19 on the Textile, Apparel and Fashion Manufacturing Industry Supply Chain: Case Study on a Ready-Made Garment Manufacturing Industry, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3762220.

93 EURATEX, *Autumn Report 2020*, available at: https://euratex.eu/spring-and-autumn-reports/.

94 Ibid.

95 Morning Future, 2020, *Face masks, sanitiser gel and ventilators – those Italian factories switching their production*, available at. https://www.morningfuture.com/en/article/2020/05/04/masks-companies-production-covid-19/912/.

half; 7 out of 10 faced serious financial difficulties, and 8 out of 10 stated that they reduced, at least temporarily, their workforce[96].

While retail sales dropped, **sales through online channels hit historical records** in some EU countries, pointing to a change in consumer behaviour towards e-commerce which continued over the rest of 2020[97]. Such a transition to online shopping, however, failed to offset the overall drops in sales of the whole industry.

Second wave: After the unprecedented plunge of April and with the easing EU government restrictions over the Summer months, the **industry started to recovery in Q3 2020**, although at a relatively slow pace. Production experienced a rebound from Q2 by 25% in the textiles and 33% in the clothing subsectors. Sales figures also improved, with an overall retail sales recovery by 62% from Q2. Nonetheless, all-year growth figures for the industry are negative when compared with 2019. Production and retail sales dropped by **15% and 9.4% for clothing and 7% and 9.7% for textile, respectively**, driven mostly by a decreased interest to buy clothes (lack of events and ungratifying buying experience due to restrictions/shutdowns)[98]. The trends in employment worsened by the end of the year, with drops by 2.9% and 7.5% for the respective subsectors in Q3 2020[99].

Recovery outlook: Overall **turnover in the industry is expected to bounce back by about 15% in 2021** (with a potential catch-up of consumer spending)**, but it is not expected to return to pre-crisis levels until Q3 2023**, assuming a progressive easing of the sanitary emergency and substantial support measures to the economy[100]. Estimates for total employment in the sector suggest that the actual shock in the labour market of T&A is yet to come, as the latter could decline by as much as -8% (about 158,000 jobs) by the end of 2021. Company count, in addition, is expected to decrease by -6% (about 13,000 companies) in the same year[101]. Based on these predictions, the recovery scenario of the overall sector will likely be **U-shaped**, with increasing uptakes in output figures but possible further pitfalls in employment figures, as well as in the wearing apparel (clothing) subsector, whose performance appears to be at least partly dependent on trends relative to lockdown and other government restriction measures (see Figure 13).

---

96 EURATEX, *CORONAVIRUS survey 2020*, internal resources.

97 McKinsey, 2020, *The State of Fashion 2021: In search of promise in perilous times*, available at: https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.

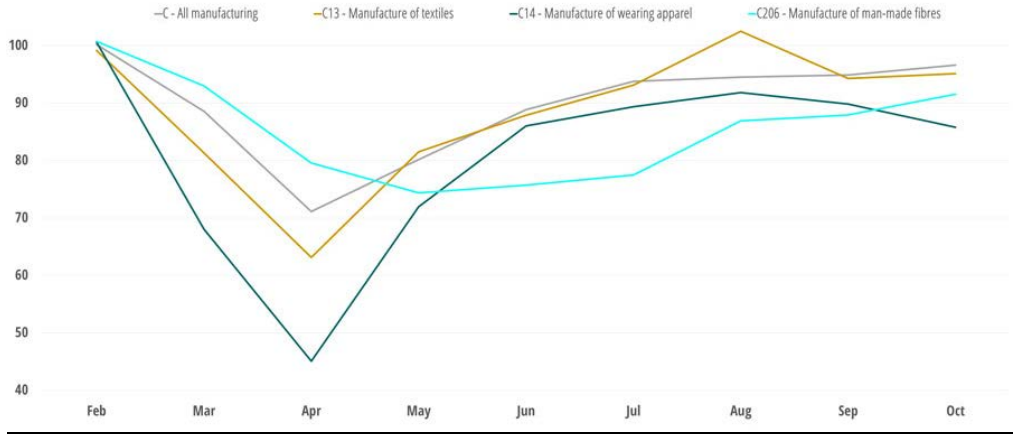
98 EURATEX, 2020, *A complete recovery is still uncertain, despite some positive signals – the latest economic data show*, available at: https://EURATEX.eu/news/a-complete-recovery-is-still-uncertain-despite-some-positive-signals-the-latest-economic-data-show/.

99 EURATEX, 2020, *Economic update*, available at: https://EURATEX.eu/economic-update/.

100 Euler Hermes, 2020, *Bruised but not beaten, Europe's textile industry is a perfect candidate for a greener and digital recovery*, available at: https://www.eulerhermes.com/en_global/news-insights/economic-insights/Bruised-but-not-beaten-Europe-s-textile-industry-is-a-perfect-candidate-for-a-greener-and-digital-recovery.html.

101 Ibid.

Figure 13: Monthly output index of EU T&A sectors



Source: EURATEX[102].

Digitalisation and shifts in consumer preferences towards online commerce will play an important role in the speed of the (sub)sector's recovery. Based on trends relative to digital sales in Europe since the start of the COVID-19 outbreak, the EU showed to feature a lower e-commerce penetration as compared to other advanced economies such as the US or Japan. However, estimates for 2021 foresee sales through digital channels to continue growing in Europe by more than 30% from 2019[103].

1.2.7. Impact on the cultural and creative industries

Context: In 2019, the sector generated approximately €643 billion in turnover, contributing to about 4.4% of the EU GDP[104]. Around 7.6 million people in the EU are employed in Cultural and Creative Industries (CCIs), representing almost 4% of total employment[105].

In the EU, self-employed constitute about 33% of the cultural sector, a proportion representing more than double the average observed for the rest of the EU economy (14%)[106]. Moreover, the sector features a significant presence of short-term, seasonal and part-time contracts, while many of its professionals belong to the informal economy.

For these reasons, employment in CCI is frequently qualified as precarious[107], and the severity of the impacts of COVID-19 on the sector can be only partly captured by national statistics.

First wave: At the outbreak of the pandemic, **almost all cultural production sites were forced to close in most EU countries in an effort to contain the spread of the virus**. Whereas some CCI actors had the capacity, skills and resources to adapt their business models to the new circumstances (e.g.

---

[102] EURATEX, *Economic update, 2020*, available at: https://EURATEX.eu/economic-update/.

[103] McKinsey, *The State of Fashion 2021: In search of promise in perilous times*, 2020, available at: https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.

[104] EY, 2021, *Rebuilding Europe The cultural and creative economy before and after the COVID-19 crisis*, GESAC, available at: https://www.rebuilding-europe.eu/.

[105] Eurostat, *Culture statistics - cultural employment, 2020*, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Culture_statistics_-_cultural_employment.

[106] Ibid. Eurostat, 2020, *Culture statistics - cultural employment,* available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Culture_statistics_-_cultural_employment.

[107] European Parliament, 2019, *Employment in the cultural and creative sectors,* available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/642264/EPRS_BRI(2019)642264_EN.pdf.

through online performances and virtual museum visits)[108], this was not possible for many businesses. Moreover, the cultural sector's higher fragmentation level, its jobs' reliance on live events and physical venues and the lack of capacity of a large part of its employees to benefit from social protection schemes indicate that **cultural industries were generally more affected than creative ones**[109].

IT and software industries, on which economic growth concentrated during the crisis, contributed to the restructuring and repositioning of CCIs industries in the market, with new value chains appearing in the music, cinema and publishing industries[110]. Television, streaming, music and radio services endured a solid uptake; technology and logistics providers and suppliers of home-based leisure (e.g. Netflix, Amazon, Facebook) also largely profited.

In addition, quarantine conditions triggered the emergence of new activities, including home-based arts and crafts, and practitioners[111].

Whereas the crisis was more severe for cultural professionals, COVID-19 impacted various subsectors of the whole CCIs, including suppliers of infrastructures, equipment and facilities constituting the CCIs production system, providers of marketing, advertising, selling and distribution of products and services[112].

In a survey carried out with more than 7,000 European CCIs representatives between March and April 2020, 60% of respondents indicated they experienced or anticipated a drop in sales over to 30% during the first two months of the crisis; in the long-terms, 45% expect a decline in sales of up to 40%, and 52% expect losses of 50% to 75%[113].

Second wave: With many EU Member States easing restriction measures, from June onwards, certain production activities re-started, and cultural production places partly re-opened with the adoption of stringent sanitary rules and social distancing measures[114]. Clubs and other live venues were, for the most part, excluded from such partial re-opening. In addition, citizen behaviour affected by the high risk of contagion linked to limits to the mobility of people contributed to discouraging the frequentation of creative venues, concentrated in large European cities where the numbers of COVID-19 cases were substantially higher[115][116].

Thus, most CCIs subsectors experienced drops in both supply and demand. In October, the increasing number of COVID-19 cases across the EU and subsequent governmental restrictions triggered the

---

[108] Banks, M., *The work of culture and C-19*, European Journal of Cultural Studies, 2020, available at: https://journals.sagepub.com/doi/full/10.1177/1367549420924687.

[109] Montalto, V., et al., 2020, *European Cultural and Creative Cities in COVID-19 times: Jobs at risk and the policy response*, available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120876/kjna30249enn_1.pdf.

[110] Salvador, E., Navarrete, T., and Srakar, A., 2020, *Creative Industries and the COVID-19 Pandemic*, available at: https://euram.academy/content/contributions/20200918-182614_X3pI4bRs.pdf.

[111] Banks, M., *The work of culture and C-19*, European Journal of Cultural Studies, 2020, available at: https://journals.sagepub.com/doi/full/10.1177/1367549420924687.

[112] Banks, M., 2020, *The work of culture and C-19*, European Journal of Cultural Studies, available at: https://journals.sagepub.com/doi/full/10.1177/1367549420924687.

[113] ECBN, 2020, *White paper: Breaking out of the COVID-19 Crisis: Restarting the Cultural Creative Industries is at the centre of an open, sustainable and democratic Europe*, available at: https://www.ecbnetwork.eu/ccis-coronacrisis-update-15-white-paper-restarting-the-cultural-creative-industries-in-europe/.

[114] KEA, 2020, *The impact of the COVID-19 pandemic on the Cultural and Creative Sector*, available at: https://keanet.eu/publications/the-impact-of-the-covid-19-pandemic-on-the-cultural-and-creative-sector-november-2020/.

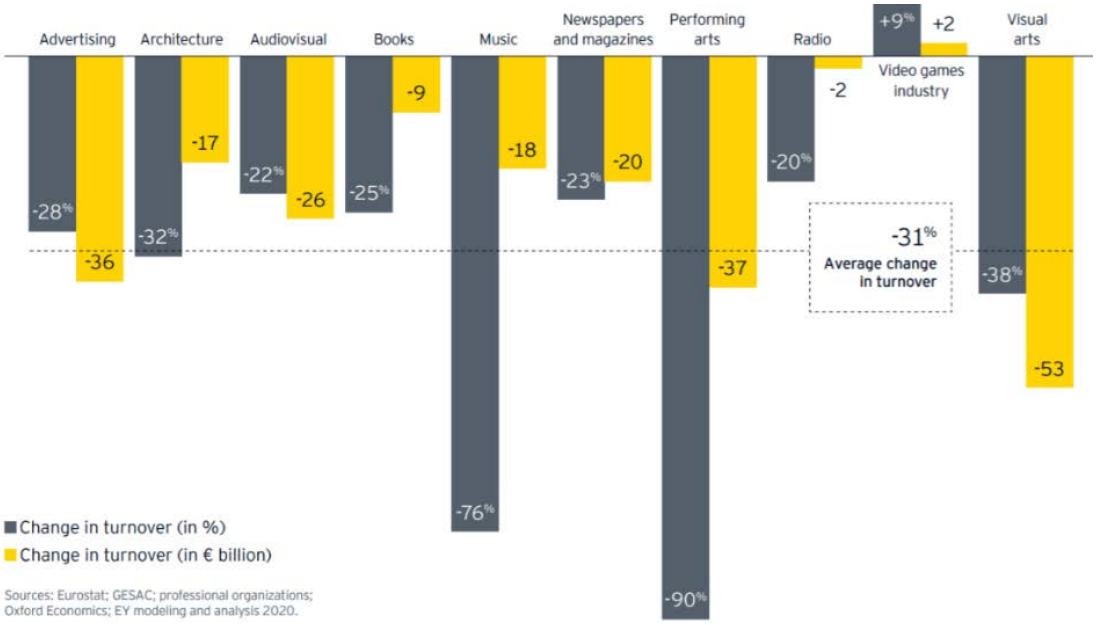
[115] Montalto, V., et al., 2018, *Are capitals the leading cultural and creative cities in Europe?*, available at: https://www.researchgate.net/profile/Valentina_Montalto4/publication/330933998_Socio-economic_regional_microscope_series_Are_capitals_the_leading_cultural_and_creative_cities_in_Europe/links/5c5c3e6e92851c48a9c16a53/Socio-economic-regional-microscope-series-Are-capitals-the-leading-cultural-and-creative-cities-in-Europe.pdf.

[116] Ibid.

shutdow of spaces that had benefitted from partial re-opening in the summer. In many countries, the situation has not changed to date.

Based on available sectoral data, it is estimated that, **in 2020, the overall European industry will experience a net decrease in revenues by 31% (worth €199 billion) from 2019**. In this context, it is important to note that the gains from the further acceleration of digital trends in the overall sector are far from compensating the losses through the absence of live and physical event sales. Music and performing arts were the worst-hit, with an expected revenue decrease by 90% and 76%, respectively. The only subsector that to date benefitted from the crisis is that of **video games, for which an increase of 9% in revenues was foreseen for 2020**[117].

Figure 14: Estimated change in turnover 2019-20 by CCI sector



Source: EY/GESAC, 2020[118].

No comprehensive data is currently available on the estimate job losses in European CCI since the outbreak of COVID-19, due partly to the difficulty to perform an early assessment, and partly to the incomplete figures depicting numbers of active professionals in the sector. However, jobs at risk are estimated to range from 0.8 to 5.5% of total CCI employment across the Organisation for Economic Cooperation and Development (OECD) regions[119]. In Germany, the CCI unemployment rate was 6.2% in June, representing a **higher number than the unemployment rate in the whole economy**, with product and visual designers (9.2% and 10.6% respectively) and performing arts professionals (13.1%) being the most affected subsectors[120].

Recovery outlook: Together with the aerospace sector, CCIs are the most adversely affected by the pandemic. The uncertainties featuring the sector's recovery outlook suggest a largely **extended U-shaped, if not an L-shaped recovery scenario**. As for the aerospace industry, government restrictions

[117] EY, *Rebuilding Europe The cultural and creative economy before and after the COVID-19 crisis*, GESAC, 2021, available at: https://www.rebuilding-europe.eu/.

[118] Ibid.

[119] OECD, 2020, *Culture shock: COVID-19 and the cultural and creative sectors*, available at: https://www.oecd.org/coronavirus/policy-responses/culture-shock-covid-19-and-the-cultural-and-creative-sectors-08da9e0e/.

[120] Soendermann, M., 2020, *Zur Arbeitslosigkeit im Kultur-/Kreativsektor, Nr. 03,* available at: https://kulturwirtschaft.de/zur-arbeitslosigkeit-im-kultur-kreativsektor-nr-03/.

on the mobility of people, in addition to strong sanitary and distancing requirements, are the major factors negatively affecting the sector's performance during the pandemic. Therefrom, recovery scenarios are **strongly dependent on the effects of the vaccine** and governments' policies but also on the **capacity of players in the sector to adapt to public requirements** in case of a persisting emergency. In this regard, it is crucial to note that the overall impact picture in the sector has so far been varied.

If well-established and more structured businesses (e.g. national theatres or top-performing artist crews) suffered, smaller and independent entities faced even stronger challenges due to the lack of skills, resources and overall capacity to adapt their businesses to health demands in times of a pandemic. This increased the already consistent inequalities that characterise the sector.

1.2.8. Impact on the digital industries

Context: The digital sector is one of the most dynamic and Research and Development (R&D) intense ecosystems of the European economy. In 2019, the industry employed more than 6 million people in the EU and represented 4.77% of the EU27 value-added, accounting for about €645 billion [121]. While the further development of the digital ecosystem and a digital economy is a priority of the EU, as also indicated in the *EU Digital Strategy* [122], the ecosystem was weakened before the COVID-19 pandemic hit the globe. It suffers from low and fragmented investments and slow adoption of digital innovations in both the public and private sectors [123].

First wave: The **pandemic boosted the penetration of Information and Communications Technology (ICT) and digital adoption** (digital adoption increased from 81% to 95% in the EU [124]): however, also the digital sector experienced negative impacts from the pandemic, in particular during the first wave. Supply chains have been disrupted and slowed down or stopped production in many countries. In addition to hampered supply, a fall in demand hit the manufacturing part of the sector's supply chains (e.g. demand for hardware). Demand was further contracted by confinements of industries such as the automobile or the hospitality sector (due to their face-to-face Business-to-Consumer (B2C) character), implying lower demand for digital manufacturing and service products [125,126]. Nevertheless, due to the need for telework, the demand for digital infrastructure increased substantially.

In April, a survey among European ICT companies (including service-oriented and manufacturing-oriented ICT companies) showed that one third of the companies have been expecting layoffs. While total employment increased by 0.5% in Q2 compared to the previous year, hours worked per person decreased by 6.4% in the same period [127]. Although this implies that short-time working schemes have

---

[121] EU Science Hub, 2020, *PREDICT – Prospective Insights on R&D in ICT*, available at: https://ec.europa.eu/jrc/en/predict/ict-sector-analysis-2020/data-metadata.

[122] European Commission, 2020, *The European Digital Strategy*, available at: https://ec.europa.eu/digital-single-market/en/content/european-digital-strategy; European Commission, 2020, *Shaping Europe's digital future*, available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en.

[123] European Commission, 2020, *Identifying Europe's recovery needs*, Commission Staff Working Document, available at: https://ec.europa.eu/jrc/sites/jrcsh/files/jrc-identity-banner-predict-2016.png.

[124] McKinsey, 2020, *Europe's digital migration during Covid-19 getting past the broad trends and averages*, available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/europes-digital-migration-during-covid-19-getting-past-the-broad-trends-and-averages.

[125] EY, 2020, *COVID-19: Technology sector perspectives*, available at: https://assets.ey.com/content/dam/ey-sites/ey-com/en_ca/topics/technology-sector/pdf/ey-covid-19-technology-sector-perspectives-v7.pdf?download.

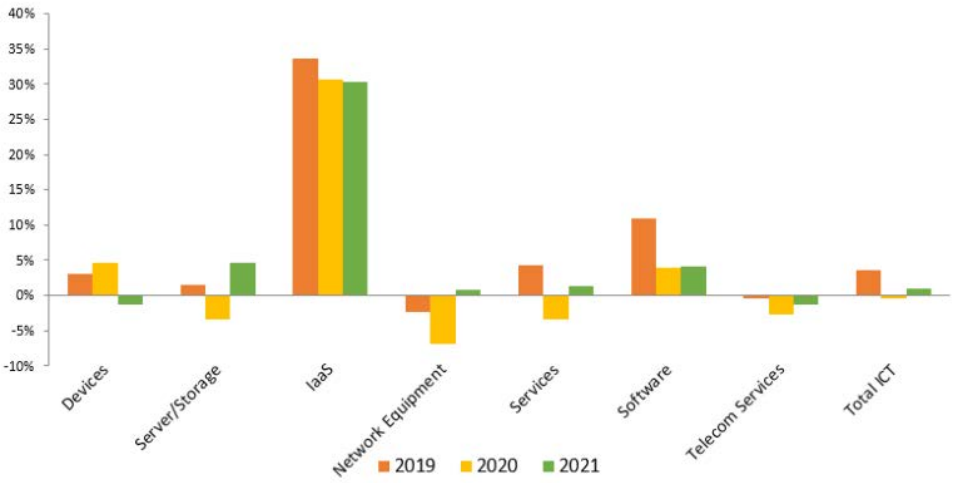
[126] Deloitte, 2020, *Understanding Covid-19's impact on the technology sector*, available at: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-covid-19-s-impact-on-the-technology-sector-.html.

[127] European Central Bank, 2021, *Statistical Data Warehouse*, available at: https://sdw.ecb.europa.eu/reports.do?node=1000004819.

also been in place in the digital sector, the sector scores relatively well compared to others. This can also be observed by the annual changes in value-added of Q2, featuring **a decrease of 4.8% and making the digital industries is among the sectors which experienced the smallest drop, compared to the previous year**[128].

Second wave: During the second wave, the sector seems not to have been negatively impacted by the pandemic. The number of people employed in the industry grew by 0.9% in Q3 compared to the previous year; similarly, the value-added in Q3 increased by 1.8% compared to the previous year[129]. As shown in Figure 15, in particular infrastructure as a service experienced continuous year-on-year growth in demand in 2020, compared to 2019. Another sub-sector within the industry that even benefited from the crisis is that of devices, such as Personal Computers (PCs) and tablets, for which demand rose by 4.6% year-on-year until December 2020. Similarly, demand for the software market focussing on remote collaboration and consumer experience gained from work-from-home policies and demand increased by 4% during 2020.

Figure 15: ICT spending by segment in Europe



Source: IDC, 2020[130].

While these positive shifts limit the overall damage in the sector, general purchases by enterprises decreased. Additionally, server, storage and network equipment contracted by more than 5% during 2020; last, SMEs, which constitute a large part of the sector, have been hit particularly hard by the pandemic and the confinement measures[131].

Recovery outlook: The recovery outlook for the sector is relatively positive, and most digital industries which have been damaged by the crisis are expected to start recovering during 2021. The latest available forecasts for total ICT spending show that the latter will be lower (-1.8%) in 2020: however, to a lesser extent than feared during the first wave. While early signs of recovery are expected in 2021, full recovery is forecasted for 2022, and post-crisis ICT spending is expected to outperform the pre-crisis

[128] Ibid.

[129] Ibid.

[130] IDC, 2020, *Despite COVID-19 IDC predicts stable 2020 European ICT spending, growing in 2021*, 2020, available at: https://www.idc.com/getdoc.jsp?containerId=prEUR247087620.

[131] Ibid.

forecasts in 2022[132]. Hence, the recovery could be described as a flat **v-shape** (with a small temporary decrease), as the initial drop in spending on the industry is not far-reaching.

Box 2: Artificial Intelligence

Focusing on the impact of COVID-19 on Artificial Intelligence (AI), the International Data Corporation (IDC) **expects spending in AI to rise by 33% between 2020 and 2023**, despite budget reductions following the COVID-19 pandemic. AI and automation are seen as a short-term response to the pandemic, and it is likely that AI will benefit in the longer term as well, as companies that would otherwise not have considered AI adoption might invest in AI to remain competitive[133].

1.2.9. Impact on the healthcare industries

Context: The healthcare industries provided more than 7 million jobs in 2018.[134] Also highlighted by the COVID-19 crisis, the Pharmaceutical industry is a key industry within the EU Economy. Although it is significantly smaller than other industries in terms of employment (providing about 800,000 jobs in 2019)[135], it accounted for about €213 billion in market value in 2019[136].

Another main pillar of the manufacturing side of the industries is the medical technology sector, which was worth €120 billion in 2018[137] and provided jobs to about 730,000 people[138].

As stated by the *Communication on Digital Transformation of Health and Care in the Digital Single Market*[139], trends, which started to introduce changes within the healthcare industries and its supply chains before the pandemic started, are related to AI and eHealth.

First wave: In general, the **healthcare industries have not been hit as hard as other industries** covered in this study. While the sector has not escaped from being negatively impacted by the consequences of the COVID-19 pandemic, the negative externalities did not spread across the complete sector[140].

The healthcare sector has been negatively impacted as demand was curbed, in particular during the first wave, in order to keep capacities free for COVID-19 patients as well as due to the fear of infection and hence the postponing of 'non-essential' treatments and surgeries by patients. In this regard, the

---

132 Ibid.

133 Smart Energy International, 2020, *Europe to record a 33% increase in AI spending despite 2020 budget cuts*, available at: https://www.smart-energy.com/regional-news/europe-uk/europe-to-record-a-33-increase-in-ai-spending-despite-2020-budget-cuts/.

134 Eurostat, 2020, *Statistics explained – Healthcare personnel statistics – nursing and caring professionals*, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_personnel_statistics_-_nursing_and_caring_professionals#Healthcare_personnel.

135 EFPIA, 2020, *The Pharmaceutical Industry in Figures*, available at: https://efpia.eu/publications/downloads/efpia/2020-the-pharmaceutical-industry-in-figures/#:~:text=annual%20statistics%20leaflet-,The%20pharmaceutical%20industry%3A%20a%20key%20asset%20to,progress%20and%20the%20European%20economy&text=The%20industry%20contributes%20over%20%E2%82%AC,million%20in%20R%26D%20in%20Europe.

136 EFPIA, 2020, *The Pharmaceutical Industry in figures*, available at: https://efpia.eu/media/554521/efpia_pharmafigures_2020_web.pdf.

137 MedTech Europe, 2021, *The European Medical Technology in Figures - Market*, available at: https://www.medtecheurope.org/datahub/market/.

138 Medtech Europe, 2020, *The European Medical Technology in Figures – Employment and Companies*, available at: https://www.medtecheurope.org/datahub/employment-companies/.

139 European Commission, 2018, *Communication enabling digital transformation health and care in the digital market*, available at: https://ec.europa.eu/digital-single-market/en/news/communication-enabling-digital-transformation-health-and-care-digital-single-market-empowering.

140 SPGlobal, 2020, *Covid-19 the road ahead is bumpy as the European health sector recovers*, available at: https://www.spglobal.com/ratings/en/research/articles/200519-covid-19-the-road-ahead-is-bumpy-as-the-european-health-care-sector-recovers-11482475.

income of hospitals decreased as more profitable surgeries and check-ups have been cancelled, so that ICU beds can be reserved for COVID-19 patients.

Along with the decline of 'non-essential' surgeries, demand for related treatments and equipment dropped as well, affecting, in particular, the generic pharmaceuticals sector. Hospitals, as well as other health care practice services, had to face inconsistencies in the demand-supply ratio[141].

While the retail trade volume of pharmaceutical products increased between February and March, lockdown and confinement measures led to a drop in pharma retail trade by about 12% in April[142]. This was also influenced by **initial supply chain challenges** due to closed factories globally, as well as closed borders within the EU. However, a central problem leading to shortages of pharmaceuticals and healthcare equipment in some countries and regions arose from the stockpiling of pharmaceuticals and healthcare equipment around the globe as well as in the EU. Hence, it was not disrupted supply chains that led to shortages, but mainly distribution problems instead: these were due to closure of borders, confinement of workers as well as stockpiling (e.g. stockpiling of medical masks in some Member States led to simultaneous shortages in other Member States). Nevertheless, retail trade picked up again and increased slowly but steadily[143].

Second wave: While demand for face masks remained high over summer, distribution channels stabilized and were secured, and shortages prevented. Production in the innovative pharmaceutical sector has substantially increased, as well as demand, due to the development of vaccines, which will continue throughout 2021.

Similarly, in September 2020, retail in pharmaceuticals has increased by 12% as compared to April, when sales have been the lowest. This implies that **until September the sector managed to recover by 98% to pre-crisis levels**[144].

Recovery outlook: The whole healthcare sector will be impacted in the longer-term as the trends of telemedicine, eHealth and AI, which already started emerging before the pandemic, accelerated substantially through the pandemic. For the pharmaceuticals sector, as it was barely hit, and only during the early stages of the pandemic, a **relatively quick recovery of a flat v-shape** is most likely. Demand for generic medicine is relatively stable, and innovative medicine expanded production due to testing and developing new vaccines as well as researching for COVID-19 treatments.

1.3. Cross-sectoral analysis

Manufacturing industries have been impacted by **short-term supply shortages** due to closed borders and factories in the EU as well as beyond. Furthermore, the confinement measures during the first wave of the pandemic led to **partial shutdowns of factories**, as employees had to stay home or could attend the workplace in limited numbers.

The first wave posed bottlenecks to nearly all sectors in the beginning, as transborder transports have been stopped, workers have been confined at home and strategic stockpiling led to shortages.

---

[141] Infosys BPM, 2021, *The Covid-19 era a new learning curve for global healthcare*, available at: https://www.infosysbpm.com/blogs/healthcare/Pages/the-covid-19-era-a-new-learning-curve-for-global-healthcare.aspx.

[142] Eurostat, 2021, *EU-27 development of retail trade volume according to product groups, January to October 2020,* available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:EU-27_development_of_retail_trade_volume_according_to_product_groups,_January_to_October_2020.png.

[143] Ibid.

[144] Ibid.

Nevertheless, most **manufacturing-based industries recovered relatively quickly during Q3 2020**, as confinement measures in this large economic sector were increasingly lifted and as a result of various measures, such as the recognition of 'essential' sectors and their workers and green lanes to ensure transborder transport and supply chain functioning.

A common trend across the sectors reviewed in this study is that for the EU industries such as the chemicals, food, construction, automotive, digital, and pharmaceutical sectors, **the second wave seems to have been less harmful than the first one**, as factories and borders largely remained open and supply chains intact, workplaces had adapted to new security and distance requirements, and dealerships could continue online.

This confirms the general finding (presented in section 1.1) that the manufacturing sector is more or less slowly adapting to the current realities of the pandemic. At the same time, the second wave impact for Cultural and Creative Industries seems to be significant and further intensifying the negative impacts of the first wave.

Naturally, the impact of the pandemic on different businesses also depends on the size and location within the company life cycle (start-up, scale-up, maturity). Those companies building up production have been hit hard also during the second wave, due to the lower capital stock at hand, while those companies which are up and running since a certain time have been more affected during the first wave rather than during the second one. **The pandemic has led to critical cashflow issues for small and medium-sized enterprises** (SMEs), e.g. in the aerospace and T&A sectors, but even in well-performing sectors like the digital one.

There **are distinct differences among the sectors in the level of impact and extent of rebound**. Pharmaceutical production, as well as the production of devices such as computers and tablets, have been affected the least through the first months of the COVID-19 pandemic (Q2 2020), and production was extended during the course of the year.

Other manufacturing industries, which have been hit relatively hard during Q2, such as the automotive and textile industries, undertook a path towards recovery during the course of Q3, as supply shortages were solved and production started rebounding.

On the other hand, **sectors that are dependent on human contact and interaction, such as the cultural and creative industries and the aerospace industry** (due to the decrease in mobility and tourism activities), have been the hardest hit by the pandemic and the related confinement measures. Government restrictions to the mobility of people, in addition to strong sanitary and distancing requirements, are the major factors negatively affecting these sectors' performance during the pandemic: 'non-essential' activities such as leisure time and travels in particular affected these industries, as well as the negative effect that consumers' economic insecurity had on 'luxury goods'. At the same time, financial services, and particularly fintech services, did not experience such a strong COVID-19 impact[145].

Services-based subsectors of the food, health, automotive and textile sectors have been suffering more than other subsectors of the respective industries. This happened mainly due to interdependencies on heavily hit sectors, such as food production for the HORECA, aerospace or physical retail sector, as well as hospitals.

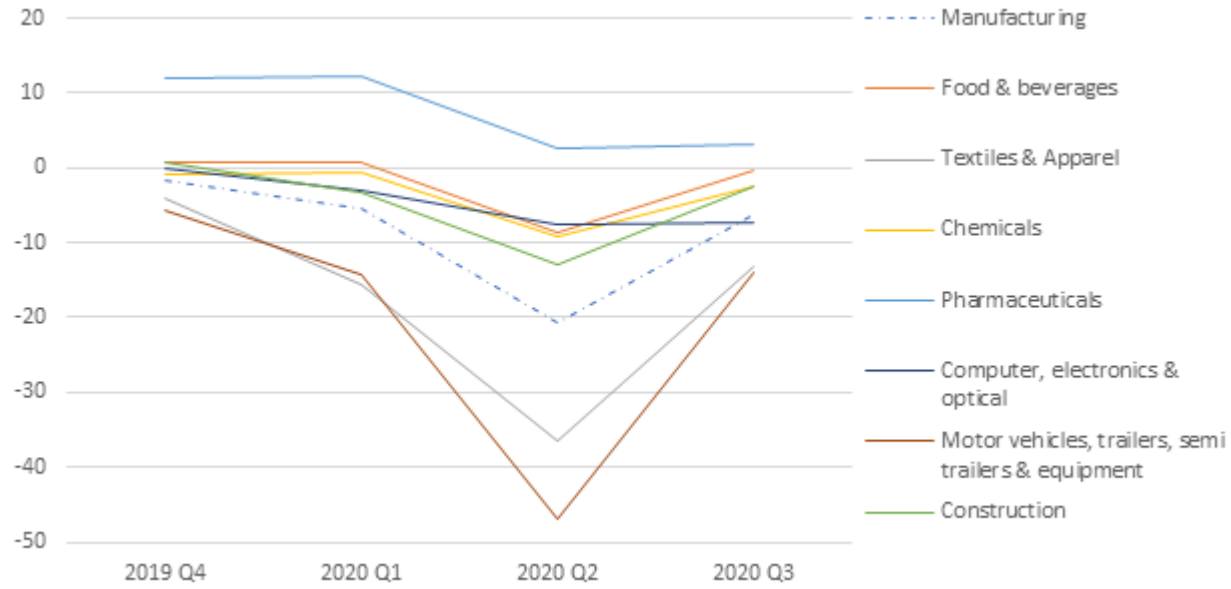
[145] KPMG, 2020, *Payments deals forge ahead despite COVID-19,* available at: https://home.kpmg/xx/en/blogs/home/posts/2020/07/payments-deals-soar-despite-covid-19.html.

An exception in this context refers to the digital sector, in which service-related subsectors, such as Infrastructure as a service (IaaS) or cloud computing services, sustained the rapid growth of the last year and have been more resilient than the manufacturing subsectors.

Among the industries covered in this study, **the cultural and creative industries and the aerospace sector have faced the hardest challenges related to the COVID-19 crisis**. Many companies are at risk of insolvency, and the CCIs are the industries that endured the longest and most far-reaching confinement measures. Hence, the sector is expected to experience an extended U-shape, or even an L-shaped recovery.

Even though the aerospace sector experienced a small rebound in the summer months (e.g. when travel bans were lifted), its recovery is expected to be featuring a long U-shaped pattern. The recovery outlook for the apparel sector also has an extended U-shape.

Figure 16: Manufacturing industries production (q-o-q percentage change)



Source: Authors' own elaboration, based on Eurostat[146].

Note: q-o-q: Quarter on quarter.

The **textile and the automotive sector have also experienced a significant hit in 2020**, to a lesser extent than CCI or aerospace industries, but more than the total average manufacturing (see Figure 16). These sectors have additionally been affected by the second wave to a larger extent than other manufacturing industries due to the shutdow of dealerships and shops. In general, they are expected to recover along a U-shaped pattern.

The food and beverages industries, as well as the chemicals and construction industries, have been initially affected by the confinement measures during April, however ensuring the functioning of their supply chains, with borders kept open for essential products and workers and allowing

[146] Eurostat, 2021, *Production in Industry – quarterly data [sts_inpr_q]*, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_inpr_q&lang=e.

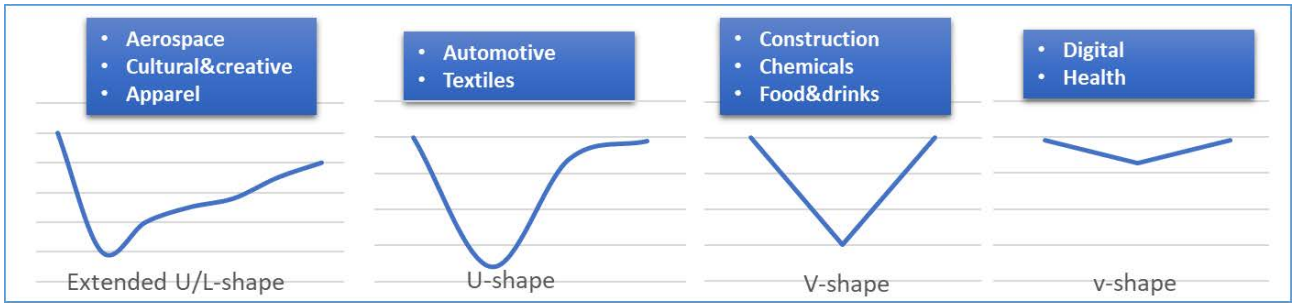
'essential' work to be performed, facilitated a quick recovery and prevented the production stops to be too severe. These three industries are most likely to recover along a V- or slightly prolonged V-shape.

Besides a short and very small dip during Q2, the pharmaceutical and digital sectors have been the least impacted sectors, and recovery already happened to a substantial extent during 2020, while some of their respective subsectors even benefitted. A flat v-shaped recovery best describes the recovery of these industries.

Moreover, taking into account the acceleration of digitalisation across many industrial sectors as well as the focus on digitalisation of the EU industry foreseen as part of the national recovery packages, the **digital sector is expected to be boosted by the COVID-19 pandemic** and its consequences.

The described recovery outlooks are presented graphically in the following graph:

Figure 17: Recovery outlooks - summary



Source: Authors' own elaboration.

The presented recovery outlooks are based on the information on current trends. As mentioned, they will be strongly dependent on the rollout and efficacy of the vaccination process, government policies, and the capacity of businesses to adapt. Furthermore, **delayed or unrecorded effects of the crisis should also be considered**.

Delayed effects could be employment hits (in particular as concerns youth unemployment and structural unemployment) in 2021-2022, which are already forecast in various outlook analyses (e.g. World Bank, ECB, OECD).

Another possible delayed effect is future liquidity problems for small as well as large businesses in several sectors due to revenues that have not been collected in the past year. Unrecorded effects can be illustrated by the cultural and creative sector, which has a significant presence of short-term, seasonal, and part-time contracts and professionals belonging to the informal economy. The effects of the crisis on this group are barely captured by national statistics.

The COVID-19 pandemic **has also offered the opportunity to accelerate the existing trends in relation to the twin transition.** Moreover, the **recovery plans will entail a focus on a digital and green recovery across all industries** in order for them to adjust for the current and future challenges linked to sustainable growth and climate change.

While confinements, in particular during the first lockdown, hampered efforts for research and development across sectors (as people participating in innovative pharmaceutical studies could not continue; autonomous driving experiments had to stop due to confinements and generally factories were closed), there was a boost in the uptake of already developed, yet not widely used technologies, such as robots on hospitals, increased e-health consultations, teleworking, and e-schooling.

Moreover, the digitalisation of supply chains through leveraging technologies or tools underpinning smart manufacturing such as the Internet of Things (IoT), artificial intelligence, big data analytics, cloud computing and 3D printing would be an important step for companies to prepare for and mitigate against disruptions, attain business resilience[147], and create opportunities for the circular economy.

The impact on supply chains, including digital strategic value chains, is analysed in the next chapter.

[147] Ibn-Mohammed, et al., 2021, A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies, Resources, Conservation and Recycling, Volume 164, 105169, ISSN 0921-3449, available at: https://doi.org/10.1016/j.resconrec.2020.105169.

2. IMPACTS ON STRATEGIC VALUE CHAINS

KEY FINDINGS

- Most value chains recovered relatively quickly from the first wave and have been affected less by the second wave of the COVID-19 pandemic, due to companies adapting and borders remaining open to the movement of goods.
- Previously identified strategic value chains such as microelectronics, autonomous driving, batteries, and AI have increased their importance due to the accelerated pace of digitalisation caused by the COVID-19 pandemic and the wider strategic goals of the EU. These trends, however, also further highlight the dependency of the EU industry on imports. For example, nearly 80% of semiconductor foundries and assembly operations are concentrated in Asia, while in terms of processed materials and components for Li-ion batteries, China, Japan, and South Korea account for 86% of the global supply.
- The crisis highlighted also the strategic importance of value chains such as pharmaceutics and protective medical equipment. For the former, the highly innovative European pharmaceutics sector was among the fastest to develop vaccines highlighting not only strong R&D capabilities, but also showing that Europe can be fast in turning innovation into products.
- Despite the pandemic, the EU will continue to rely on global value chains and vice versa third countries will continue to rely on the EU. Therefore, it is important to build on the EU strengths by investing in strategic industries, R&D and skills and not try to artificially reach self-sufficiency. In addition, innovation, circular economy approaches, diversification and in some cases domestic sourcing can reduce dependencies.

2.1. Overview of strategic value chains

The crisis impacted many different industrial ecosystems and affected their value chains. In many cases, these value chains have been trimmed over past years to be as efficient as possible through just-in-time and lean production methods. A question that was raised in the first months of the COVID-19 crisis was whether the revealed fragility could accelerate trends of reshoring industries, which have been started by labour cost saving technologies[148]. A Eurofound study showed that there had been an upward trend in companies relocating back to Europe already before the pandemic[149]. This is echoed by a more recent study on how COVID-19 impacted reshoring, which found that reshoring had been on the rise since the last decade, especially for larger firms in medium to high-tech industries. Specific drivers of reshoring are automation but also the aim for increased flexibility and reduced lead times[150].

Considerations of reshoring or nearshoring are not only caused by the concerns over the security of global value chains, but also by strategic considerations. Already before the pandemic, EU Commission's President Ursula von der Leyen called for technological sovereignty, describing it as "the

[148] Fortunato P., 2020, *How COVID-19 is changing global value chains*, UNCTAD, available at: https://unctad.org/news/how-covid-19-changing-global-value-chains.

[149] Eurofound, 2019, *Reshoring in Europe: Overview 2015–2018*, Publications Office of the European Union, Luxembourg, available at: https://www.eurofound.europa.eu/publications/report/2019/reshoring-in-europe-overview-2015-2018.

[150] European Parliament, 2021, *Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy*, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf.

capability that Europe must have to make its own choices, based on its own values, respecting its own rules". Furthermore, the EU's *New Industrial Strategy* calls for retaining and strengthening Europe's technological and digital sovereignty. These discussions often revolve around so-called strategic value chains. However, what makes a value chain strategic?

For the EU, this discussion is reflected in several concepts. One concept is the **Key Enabling Technologies (KET)**, which are seen as high impact technologies that will determine key economic and political developments. KETs were first defined in 2009[151]. However, they have since then been redefined several times with the progress of technology[152] and currently cover a wide variety of technological fields[153]. While being an important factor, technology alone does not make a value chain. Building on this, the **Strategic Forum for Important Projects of Common European Interest (IPCEI)**, provided the following three characteristics to define strategic value chains: (1) Technological innovativeness (i.e. exploitation of KETs); (2) Economic and market potential; and (3) Societal and political importance. In 2019, recommendations on nine strategic value chains for Europe were published: clean, connected, and autonomous vehicles; low CO_2 emissions industry; smart health; hydrogen technologies and systems; industrial Internet of Things; cybersecurity; batteries; microelectronics; and high-performance computing[154].

The pandemic also left a mark on what should be considered strategic. On the one hand, it elevated some of the value chains in their importance (i.e. any related to digital and automation as the former allowed us to stay connected, and for the latter, the hope is that it can keep supply chains and factories running during future pandemics). On the other hand, it has also increased the relevance of value chains that were previously not considered strategic. Specifically, **pharmaceutics** (which is partially covered as a KET under life sciences) became even more relevant with the rush for COVID-19 vaccines. Furthermore, as described in section 2.2, specifically during the first lockdown, production capacities of **protective medical equipment** and **ventilators** became the focus of attention.

In our analysis, we cannot look at all strategic value chains. Therefore, we made a selection that connects to three of the sectoral analyses in chapter 2.

Table 4: Overview of strategic value chains analysed

Representative sectors	Strategic value chains
Automotive industries	Connected and autonomous vehicles Batteries
Digital industries	Artificial Intelligence Micro- and nanoelectronics
Healthcare / Chemical industries	Pharmaceuticals Medical Protective Equipment

Source: Authors' own elaboration.

[151] European Commission, 2009, *Preparing for our future: Developing a common strategy for key enabling technologies in the EU*, COM/2009/0512 final, available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52009DC0512.

[152] European Commission 2018, *EC Key enabling technologies policy*, available at: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies_en.

[153] The current KETs are Advanced manufacturing; Advanced Materials and Nanomaterials; Life-science technologies; Micro/Nano-electronics and Photonics; Artificial Intelligence; Security and Connectivity.

[154] European Commission, 2019, *Strengthening Strategic Value Chains for a future-ready EU Industry. Report of the Strategic Forum for Important Projects of Common European Interest*, available at: https://ec.europa.eu/docsroom/documents/37824.

2.2. Impact on strategic value chains

The impact on value chains has been more short-lived than the initial expectations. While global trade slowed down in the first and second quarter of 2020, it has started recovering in the third quarter, and the subsequent outbreaks seemed to have less of an effect[155]. In the EU and across the world, borders have remained largely open for the circulation of goods with fewer interruptions to supply. Moreover, there has not been a big reshuffling of value chains as a result of the COVID-19 pandemic, but it is much more that underlying economics have been changing[156], which affects global value chains in the longer term. Overall, while the initial shock uncovered weak spots in supply chains, EU industries showed a great deal of resilience in adjusting to it. This was also confirmed in a panel discussion during the EU Industry Days[157], where panellists seemed to agree that **globalised supply chains are needed for the EU** to remain efficient and competitive. The **EU should focus on its strengths**, as third countries also rely on the EU in other areas, and work towards fair and reliable partnerships in third countries[158].

In the following sections, we take a more in-depth look at the six selected value chains.

2.2.1. Automotive strategic value chains

Building on the analysis of this traditional European sector in section 1.2.1, we analyse further two strategic value chains relevant for a future-oriented automotive industry, namely connected and autonomous vehicles and batteries.

a. Connected and autonomous vehicles

Connected and autonomous vehicles (CAVs) are identified as strategic for the EU because the transition to autonomous driving offers a significant potential to expand Europe's economic and innovative power. CAV technology is seen as a crucial innovation for the EU, not only for sustaining market leadership and employment but also for improving motorway safety and the efficiency and resilience of supply chains. Apart from the traditional automotive value chain subsectors, the CAV value chain is characterised by **key technologies**. These technologies include Light detection and ranging (LIDAR), radar and camera sensors, mapping hardware and software, control systems and computing hardware and software, among others. It is estimated that about 68 to 70% of CAV innovations come from European suppliers, and the export share of European suppliers is estimated to be at around 15%[159].

The **coronavirus pandemic** has had disruptive effects on the CAV value chain and impacted the operations of numerous Original Equipment Manufacturers (OEMs) in R&D and production during the first lockdown (e.g. through delays in setting up pilots or trials and through cuts in investment to favour short-term cash management)[160]. Automakers had to delay their CAV R&D programs in order to

---

[155] UNCTAD, 2020, *Global Trade Update: Global trade: a frail recovery in the second half of 2020*, available at: https://unctad.org/system/files/official-document/ditcinf2020d4_en.pdf.

[156] Such as continued market growth in Asia, technological change and automation reducing the importance of labour costs, and rising wages in China reducing the country's role as a low cost location leading to countries looking for low-cost alternatives.

[157] European Commission, 2020, *EU Industry Days*, available at: https://ec.europa.eu/info/policies/business-and-industry/eu-industry-days_en.

[158] Plenary session at the EU Industry Days, 2021, *Lesson learnt from COVID crisis? Resilience through increasing Europe's strategic capacity*, available at: https://www.youtube.com/watch?v=G4en7Et6Kkw&feature=youtu.be.

[159] Ecorys, TRT Srl., and M-Five GmbH, 2020, *Study on exploring the possible employment implications of connected and automated driving. Annexes* , available at: https://www.ecorys.com/cad.

[160] Ibid.

improve their liquidity[161]. The second lockdown, however, seems to have had no sizeable effect on the CAV value chain. Despite the short-term disruption to CAV development, this disruption may also **generate new opportunities** and accelerate the adoption of CAVs. The pandemic has highlighted the potential for CAV adoption by logistics companies, delivery companies, and the foodservice industry, allowing for efficient and reliable transport of goods throughout the supply chain[162]. For example, COVID-19 tests were delivered in Florida by self-driving shuttles[163].

Europe is well-positioned to take a leadership position in the market of CAVs, due to its strong legacy and innovation in Advanced Driver-Assistance Systems (ADAS) and Cooperative Intelligent Transport Systems. Many initiatives, supported by the EC, for large scale testing on public roads are already underway in Member States, and a legal framework for CAVs, including driving licence equivalents for CAVs, has been reviewed in the Netherlands and Germany[164]. However, the success of CAVs also depends on many other factors such as public acceptance, costs and investments in technology and infrastructure.

b. Batteries

The **European battery value chain** is seen as strategic for the EU because the production of batteries within the EU is expected to be a key driver for the EU's future industrial competitiveness[165]. Batteries are an **indispensable component in the decarbonisation of the European mobility sector** and the EU's shift towards a circular and sustainable economy. Lithium-ion (Li-ion) batteries are the main type of batteries used for electric vehicle battery packs. The Li-ion battery value chain extends from raw material extraction to battery recycling, with China being the major supplier along the whole value chain[166].

In terms of **processed materials and components for Li-ion batteries**, China, Japan, and South Korea account for 86% of the global supply, while European firms are producing less than 20 % of the global quantity. This is seen as insufficient to satisfy European demand for Li-ion batteries. Concerning the processes of cell assembling and battery pack manufacturing, China accounts for 66 % of global cell production. In contrast, Europe is almost fully dependent on imports of battery cells, exposing the industry to supply unpredictability and potentially higher costs[167].

The **COVID-19 pandemic** initially had a disruptive effect on the battery value chain. During the first months of the pandemic, China endured complete shutdowns, and as a consequence, the global Li-ion value chain was put on hold. Additionally, large mining centres in Africa and Latin America limited the movement of personnel, and international travel restrictions limited the labour supply needed for full operation. This led to decreases in the extraction of cobalt and lithium needed for battery production.

---

[161] Moore, W. P., 2020, *How Will COVID Affect the Future of Autonomous Vehicles*, available at: https://www.walterpmoore.com/how-will-covid-affect-future-autonomous-vehicles.

[162] LEVITATE, 2020, *Automated vehicles and COVID-19 – what we can learn from it*, available at: https://levitate-project.eu/2020/05/14/automated-vehicles-and-covid-19-what-we-can-learn-from-it/.

[163] O'Keane, S., 2020, *Supervised self-driving shuttles are moving COVID-19 tests in Florida*, available at: https://www.theverge.com/2020/4/6/21209964/self-driving-shuttles-covid-19-tests-florida-beep-jacksonville-navya.

[164] Ecorys, TRT Srl., and M-Five GmbH, 2020, *Study on exploring the possible employment implications of connected and automated driving. Annexes*, available at: https://www.ecorys.com/cad.

[165] European Commission, 2019, Strengthening Strategic Value Chains for a future-ready EU Industry. Report of the Strategic Forum for Important Projects of Common European Interest, available at: https://ec.europa.eu/docsroom/documents/37824.

[166] Lebedeva, N., Di Persio, and F., Boon-Brett, 2017, *Lithium ion battery value chain and related opportunities for Europe*, Publications Office of the European Union, Luxembourg, available at: https://core.ac.uk/download/pdf/154760177.pdf.

[167] Dyatkin, B., and Meng, Y., 2020, *COVID-19 disrupts battery materials and manufacture supply chains, but outlook remains strong*. MRS Bulletin, 45(9), 700-702, available at: https://www.cambridge.org/core/journals/mrs-bulletin/article/covid19-disrupts-battery-materials-and-manufacture-supply-chains-but-outlook-remains-strong/158FE30E4868EE8D2952216B6CCB8B4F.

While lithium could potentially be sourced fully in the EU, cobalt and nickel cannot. Specifically for cobalt, concerns over shortages have resulted in its decreased use in batteries[168]. However, it should be noted that the required raw materials can relatively easy be stored to bridge supply chain disruptions, and circular economy approaches encouraging recycling could also increase the supply of raw materials within the EU[169]. These disruptions and the accompanied demand contraction forecast a reduction of battery shipments to carmakers by 14% in 2020. Nonetheless, as noted in section 1.2.1 on the automotive sector, the electric vehicle field is expected to grow rapidly and offset pandemic-related demand reductions.

There is an **ambition to strengthen Europe's role in all parts of the battery value chain**. In December, a proposal for a new battery regulation was adopted by the European Commission with the goal to develop sustainable battery production. The establishment of the European Battery Alliance launched in 2017, and subsequent investments[170] seem to have invigorated the value chain. There are more than ten battery factories under construction in Europe. Due to the push towards sustainability, continued demand for electromobility and strong public support, we expect that the value chain will continue to grow in the EU. In fact, investments in the EU were outperforming the US and China in 2020[171].

2.2.2. Digital strategic value chains

Section 1.2.8 showcased the resilience of the digital sector as the industry was only slightly affected during the first lockdown and, in some ways profited from the increased demand for digital solutions. In this section, we will focus on two strategic value chains, which contribute to the modernisation of many other industries: artificial intelligence and micro- and nanoelectronics.

a. Artificial intelligence

Artificial Intelligence (AI) is general use technology and, therefore, of key importance for the technological development of Europe. The potential applications of AI are far-reaching. For example, AI has the potential to revolutionise manufacturing by improving or automating many industrial processes. Moreover, AI is central in the field of mobility and autonomous driving and can also be applied in healthcare and medicine for the diagnosis and prevention of diseases. Across these applications, **the availability, quality, and integrity of data is a major challenge**.

The **AI value chain** can be divided into three elements: raw materials, hardware, and software. In terms of **raw materials (i.e. access to data)**, European companies cannot compete with large American and Chinese competitors such as Alphabet, Facebook, Baidu, and Alibaba. Moreover, reluctance when it comes to sharing data and lack of trust in AI in the EU means also that less data is generated than in China and in the US. EU policies, such as the General Data Protection Regulation (GDPR) (and the upcoming EU ePrivacy Regulation), further complicate data use[172]. Similarly, in **hardware production**,

---

[168] In 2016, 54 % of global cobalt was extracted from mines in the Democratic Republic of the Congo, whilst 46% of refined cobalt came from China. Moreover, around 90 % of global lithium output came from Chile (40 %), Australia (29 %) and Argentina (16 %), whilst China held most (45%) of the world's lithium hard-rock minerals refining facilities. Source: Huisman, J. et al., 2020, *RMIS – Raw materials in the battery value chain*, Publications Office of the European Union, Luxembourg.

[169] Pagliaro, M., and Meneguzzo, F., 2019, *Lithium battery reusing and recycling: A circular economy insight*, Heliyon, Volume 5, Issue 6, available at: https://www.sciencedirect.com/science/article/pii/S2405844019347012.

[170] For example, a first IPCEI in the areas of batteries was approved by the European Commission in December 2019 with about €3.2 billion in public support and a second one in January 2021 with another €2.9 billion public support.

[171] Ribeiro H., 2020, *Deglobalization trend gains pace in lithium battery supply chain*, S&P Global, available at: https://www.spglobal.com/en/research-insights/articles/deglobalization-trend-gains-pace-in-lithium-battery-supply-chain.

[172] Castro, D., and McLaughlin, M., 2021, *Who Is Winning the AI Race: China, the EU, or the United States? – 2021 Update*. Center for Data Innovation, available at: https://datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/.

the EU lags behind with 14 companies developing chips for AI use cases (5 of which are in the UK), compared to 29 in China and 62 in the US. The EU lags behind also in overall semiconductor production and in the number of supercomputers[173]. Finally, for **software and the research into algorithms**, the EU is doing relatively well on the academic side (e.g. number of AI research papers) but lags behind in R&D spending of software and computer firms[174].

The AI value chain has not been impacted by COVID-19 due to its digital nature. In fact, as highlighted in Section 1.2.8, spending on AI is actually expected to increase. Nevertheless, the pandemic had impacts on AI development. The need for quick decision-making in the crisis sped up the development of AI solutions. Before the crisis, it took three to four months from initial conception to production deployment. During the crisis, some solutions were developed within one week. Increased uncertainty because of emotionally driven responses (e.g. stockpiling of toilet paper) and fast policy changes, as well as lack of historical data, also led to more dynamic algorithms that rely initially more on models than data[175]. In this regard, AI has been applied for diagnosis, public health, clinical decision making, and therapeutics. It has the potential to support our efforts in addressing pandemics. However, the need for quick decisions and insufficient data brings also limitations and dangers such as the risk of bias and unreliable predictions[176].

The EU's ambition is to provide a safer and more ethical alternative in AI. While the EU has no big tech companies, there are various SMEs and a growing number of start-ups. Higher consumer trust in Europe due to its strict privacy rules could benefit these companies[177]. Moreover, the proposed EU Data Governance Act aims to improve data availability through the reuse of public sector data. Finally, other regions seem to also favour a more regulated approach, leading to EU privacy policies being exported to other regions of the world (e.g. in California)[178]. However, the UK's departure from the EU is a challenge for the EU's ambition. The UK accounted for 57% of EU AI firm's funding in 2019, and without the UK, the EU's relative standing in AI investment is expected to drop in the coming years[179].

b. Micro- and nanoelectronics

All kinds of digital and computing technologies rely on **micro- and nanoelectronics**. The technology has the potential to improve the performance of electronics, reduce their size, weight, and power requirements. It is needed in many other value chains such as Autonomous Vehicles (AVs) and AI. Micro- and nanoelectronics, therefore, play a **key role in digitalisation and competitiveness**.

The value chain for micro- and nanoelectronics has been heavily outsourced and globalised. European companies depend largely on non-European suppliers, and Europe has shifted from a

---

[173] Ibid.

[174] R&D spending by software and computer services firms in top 2,500 (2019): The United States ($124.5billion), China ($23.7 billion) and the European Union ($14.6 billion). Spending per worker, the United States ($750.4), the European Union ($58.1) and China ($30.3). Source: Castro, D., and McLaughlin, M., *Who Is Winning the AI Race: China, the EU, or the United States? – 2021 Update*. Center for Data Innovation, 2021.

[175] Rao, A., 2020, *3 ways COVID-19 is transforming advanced analytics and AI*, World Economic Forum, available at: https://www.weforum.org/agenda/2020/07/3-ways-covid-19-is-transforming-advanced-analytics-and-ai/.

[176] Wynants, L. et al., 2020, *Prediction models for diagnosis and prognosis of covid-19: systematic review and critical appraisal*, available at: https://doi.org/10.1136/bmj.m1328.

[177] Pressley A., 2019, *GDPR is transforming consumer trust and data security in Europe, according to Check Point survey*, Intelligent CIO, available at: https://www.intelligentcio.com/eu/2019/10/31/gdpr-is-transforming-consumer-trust-and-data-security-in-europe-according-to-check-point-survey/.

[178] McKinsey, 2020, *The consumer-data opportunity and the privacy imperative*, available at: https://www.mckinsey.com/business-functions/risk/our-insights/the-consumer-data-opportunity-and-the-privacy-imperative.

[179] Castro, D., and McLaughlin, M., 2021, *Who Is Winning the AI Race: China, the EU, or the United States? – 2021 Update*. Center for Data Innovation, available at: https://datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/.

manufacturer of such technologies to a user. Nearly 80% of semiconductor foundries and assembly operations are concentrated in Asia. Therefore, with close to 60% market share, the leading exporters for electronic circuits are in Asia, specifically China (34%), Taiwan (14%), South Korea and Singapore (both 11%). The best performing EU Member States were Germany ranked 11, and the Netherlands ranked 13 (2% each)[180]. Beyond the outsourced aspects of semiconductor production, **the US leads the high-tech market** with 47% of global sales shares. Next to the US, South Korea and the EU lead in certain product categories of semiconductors[181].

The EU's dependency can be a risk. Recent reports from vehicle manufacturers[182], which were confirmed by interviews with EU industry representatives, highlight a shortage of semiconductor chips. These effects were, however, not caused by COVID-19 but protectionist measures in the US. **Effects on micro- and nanoelectronics were limited**, with chip sales declining in the first half of the year due to factories closing down in China, but demand bounced back in the third and fourth quarters. In fact, the pandemic seems to be driving demand now, with connectivity and digital communication increasing in importance[183]. Global semiconductor sales are expected to have increased to $439 billion in 2020, recovering from a previous cyclical decrease to $412 billion in 2019. Semiconductor sales in Europe, however, seem to be recovering slower than global sales[184]. COVID-19 is also not expected to increase reshoring in the semiconductor industry as the high capital intensity of the industry would require large-scale investments as well as support to increase the highly skilled and specialised workforce. [185]

Nevertheless, **Europe is still well placed with companies** that deliver quality research and products in micro- and nanoelectronics[186]. With automation, labour costs have also become less of a central factor in microelectronics. However, the main challenge in setting up high-end factories in Europe is the **need for large-scale investments**. In this regard, the EU set up an **IPCEI on Microelectronics** that allows Member States to set up cooperation projects and be granted exceptions from EU State Aid rules. The IPCEI on Microelectronics, initially set up by France, Germany, Italy and the UK, received approval for €1.75 billion in public investment[187]. Furthermore, a joint declaration of several Member States called using investments from the Recovery and Resilience Facility to bolster Europe's electronics industry and its research, design and production capabilities[188].

---

[180] Based on 2019 data from the International Trade Centre: World exports of Electronic integrated circuits (HS code 8542).

[181] Semiconductor Industry Association, 2020, *State of the U.S. Semiconductor Industry*, available at: https://www.semiconductors.org/wp-content/uploads/2020/06/2020-SIA-State-of-the-Industry-Report.pdf.

[182] Nienaber, M., 2021, *Germany urges Taiwan to help ease auto chip shortage*, available at: https://www.reuters.com/article/us-taiwan-autos-chips-idUSKBN29T04V.

[183] Calone, J., 2020, *Pandemic limits distributors' semiconductor sales*, Electronics Sourcing, available at: https://electronics-sourcing.com/2020/12/17/pandemic-limits-distributors-semiconductor-sales/.

[184] European Semiconductor Industry Association, 2021, *Press release. Semiconductor market up 6.5% in 2020,* https://www.eusemiconductors.eu/sites/default/files/ESIA_WSTS_PR_2012.pdf.

[185] European Parliament, 2021, *Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy*, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf.

[186] Such as the French-Italian STMicroelectronics, NXP Semiconductors in the Netherlands, and Infineon Technologies in Germany. Moreover, with ASML Holding, a Dutch company is the leading supplier of photolithography systems (machines for the production of integrated circuits) and IMEC in Belgium is one of the leading innovation hubs in nanoelectronics.

[187] For more information on the IPCEI on Microelectronics, available at: https://www.ipcei-me.eu/.

[188] European Commission, 2020, *Joint declaration on processors and semiconductor technologies*, available at: https://ec.europa.eu/digital-single-market/en/news/joint-declaration-processors-and-semiconductor-technologies.

2.2.3. Healthcare and chemicals strategic value chains

In this section, we focus on two value chains, related to the chemicals and healthcare sectors, that have been critical during the pandemic and therefore have received more strategic considerations recently: the pharmaceutical and medical protective equipment value chains.

a. Pharmaceuticals

The pharmaceutical value chain is seen as strategic for the EU, not only because it is expected to be a driver for the EU's industrial competitiveness but also because it involves the wellbeing of Europeans. The COVID-19 pandemic has shown that the production and distribution of high-quality pharmaceuticals is a complex task involving various stakeholders across the value chain, including manufacturers, distributors, and regulators. The value chain is also highly globalised, and the EU is the world's leading exporter growing its trade surplus to €109 billion in 2019[189].

The initial R&D stage plays a critical role within the value chain. The R&D process is the most costly and time-consuming step in the value chain. For this reason, biopharmaceutical firms, such as AstraZeneca, Pfizer and BioNTech, regularly form strategic R&D outsourcing partnerships with academic organisations, biotech start-ups and contract research organisations[190]. This outsourcing allows for decreased research times and provides value-added in the form of scientific knowledge and technological advancements that diffuse throughout the value chain. Beyond R&D, there are **two main manufacturing steps**: 1) Active Pharmaceutical Ingredients (API) manufacturing to produce raw ingredients, dominated by Chinese and Indian producers; and 2) finished form manufacturing to produce the final product (generic drug companies)[191].

The initial impact of the pandemic on the pharmaceutics value chain was not as grave as expected. Initial panic-buying for chronic disorder pharmaceuticals was estimated to have increased demand by 9%, causing temporary shortages for these drugs[192]. Most pharmaceutical companies were able to rapidly adopt safety measures in their facilities, allowing for continued production[193]. Nonetheless, the slowdown in production in India and China led to shortages and price increases in certain essential APIs, leading the Indian Pharmaceutical Alliance to push for restrictions on exports[194]. However, these restrictions only led to shortages in generic medicines as the EU is less dependent on importing ingredients for innovative medicines. A survey among members of the European Federation of Pharmaceutical Industries highlighted that 77% of APIs for innovative medicines are also manufactured in Europe[195]. Moreover, as discussed in 1.2.9, shortages in healthcare industries were

[189] Eurostat, 2020, *International trade in medicinal and pharmaceutical products*, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_medicinal_and_pharmaceutical_products.

[190] Buvailo, A., 2020, *Pharma R&D Outsourcing Is On The Rise*, BiopharmaTrend, available at: https://www.biopharmatrend.com/post/30-pharma-rd-outsourcing-is-on-the-rise/.

[191] Aitken, M., 2016, *Understanding the pharmaceutical value chain*, Pharmaceuticals Policy and Law 18, 55–66, available at: https://content.iospress.com/articles/pharmaceuticals-policy-and-law/ppl432.

[192] Das, S., 2020, *Coronavirus outbreak: Pharma market grows 9% in March due to panic buying*, Business Standard, available at: https://www.business-standard.com/article/companies/panic-buying-amid-coronavirus-lockdown-helped-pharma-market-grow-9-120040801570_1.htm.

[193] Mullin, R., 2020, *COVID-19 is reshaping the pharmaceutical supply chain*, Chemical & Engineering News, available at: https://cen.acs.org/business/outsourcing/COVID-19-reshaping-pharmaceutical-supply/98/i16.

[194] Ayati, N., Saiyarsarai, P., and Nikfar, S., 2020, *Short and long-term impacts of COVID-19 on the pharmaceutical sector*. DARU Journal of Pharmaceutical Sciences, 28(2), 799-805, available at: https://link.springer.com/article/10.1007/s40199-020-00358-5.

[195] European Federation of Pharmaceutical Industries and Associations (EFPIA), 2020, *EFPIA contribution to DG Trade Consultation on "A renewed trade policy for a stronger Europe" - November 2020*, available at: https://www.efpia.eu/media/578016/efpia-input-to-trade-policy-review-consultation-final.pdf.

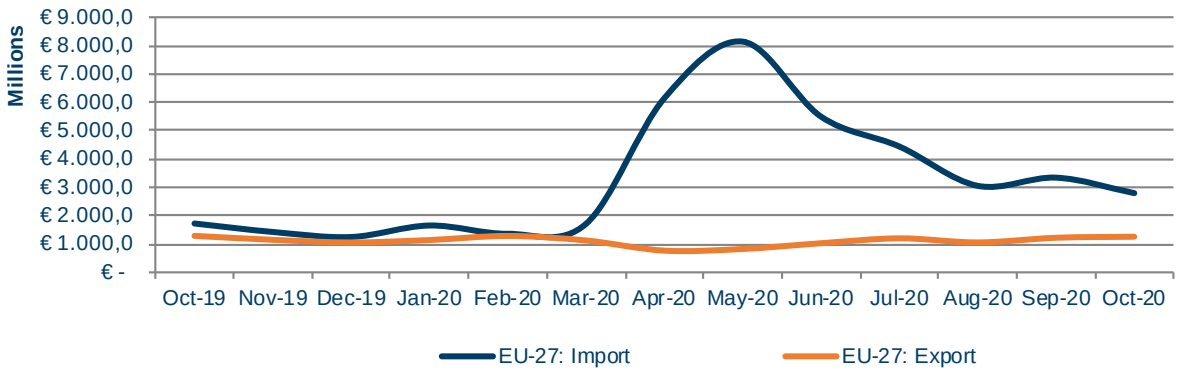
more of a stockpiling and distribution issue and **the key question seems not to be reshoring but the diversification of suppliers**.

This crisis may therefore cause structural changes in the value chain and generate new opportunities. The pandemic has highlighted the need for flexibility and agility. Pharmaceutical companies will likely avoid single sourcing, and might look to partner more with European contract manufacturing organisations and even move API plants to Eastern Europe[196]. Thus, **the coronavirus crisis could accelerate the trend to diversify and, as a consequence, increase manufacturing in Europe**. This also corresponds to the findings in section 1.2.3 on companies in the chemicals industries considering relocating production of certain critical chemicals. The EU's *Pharmaceutical Strategy,* published in late 2020, also calls for enhancing crisis preparedness through diversified and secure supply chains[197]. In order to support the strategy, the new €5.1 billion EU4Health programme was agreed upon in December 2020. It aims at ensuring the availability and accessibility of medicines, including the COVID-19 vaccine, by encouraging and financially supporting European pharmaceutical research and domestic manufacturing[198].

b. Personal protective medical equipment

The value chain that received the most attention during the pandemic is the production of Personal Protective Equipment (PPE). While traditionally not considered a strategic value chain, the COVID-19 and subsequent shortages of medical face masks caused by spikes in demand[199] highlighted the importance of PPE. Figure 18 highlights how EU imports exploded in April and May 2020 and subsequently started to flatten out again. One can also notice first an increase in exports and a drop in imports in February 2020, highlighting how initially European producers supplied other countries before the domestic situation escalated.

Figure 18: Imports and exports of medical protective equipment



Source: Authors' own elaboration based on Easy Comext data (Import and export data for protective garments).

[196] Atheneum Partners, 2020, *Pharma Value Chain & COVID-19. Interview Transcript*, available at: https://www.atheneum.ai/2020/04/20/pharma-value-chain-covid-19/.

[197] European Commission 2020, *A Pharmaceutical Strategy for Europe*, COM/2020/761 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0761.

[198] European Commission, 2021, *EU4Health 2021-2027 – a vision for a healthier European Union*, available at: https://ec.europa.eu/health/funding/eu4health_en.

[199] OECD, 2020, *The face mask global value chain in the COVID-19 outbreak: Evidence and policy lessons*, available at: http://www.oecd.org/coronavirus/policy-responses/the-face-mask-global-value-chain-in-the-covid-19-outbreak-evidence-and-policy-lessons-a4df866d/.

The most widespread PPE product are surgical masks. They are a basic and normally cheap product. However, **their production is a relatively sophisticated process** as different layers of non-woven fabric and textile need to be made and then attached together. These are normally two outside layers and a third filter layer in-between. The most commonly used material for the filter is polypropylene, a polymer derived from petroleum oil. This material is the main bottleneck in the value chain since the machinery to extract it requires high initial investments making it difficult to increase supply. Masks are then sterilised before testing, packaging and distribution[200].

While advanced economies such as Germany and other European countries have specialised in the high-tech medical devices sector, **low-cost countries such as China and Malaysia were the leading producers of PPE, including face masks**. COVID-19 greatly affected this market as many countries boosted domestic output and imposed export restrictions[201]. For example, in April 2020, China produced 200 million face masks a day, a tenfold increase compared to February 2020[202]. The EU was among those imposing new export restrictions[203]. Countries also stressed the importance of keeping supply chains open, and in many cases (incl. the EU), import tariffs on faces masks were lifted. Export restrictions can, however, also backfire as they hinder investments and, in some cases, led to EU countries stopping exports to other Member States[204].

Overall, the responses of the EU and its Member States to the shortages were **a mix of openness and protectionism**. It is clear, however, that no country alone can ensure sufficient domestic production of PPE during a pandemic. While domestic production was increased, the EU overall relied on imports, and buyers were able to find alternative sources from other non-traditional exporters of PPE at short notice. Moreover, domestic production is likely to decrease once demand decreases again, and factories return to their original business models. Reshoring in this value chain is unlikely due to required economies of scale, established regional supplier networks, and the higher wages and sustainability standards in the EU[205]. Instead, **openness and fair access to international markets** through collaboration with third countries, while ensuring **sufficient stockpiles of essential medical goods**, seems to be the way forward[206].

2.3. Relocation policies for Europe's strategic autonomy

The pandemic elevated the concept of resilience, highlighted in the fact that Europe's recovery should be not only green and digital but also resilient. In this regard, policymakers across Europe have been calling for strategic autonomy, digital sovereignty and technological sovereignty[207]. These terms have

---

200 Ibid.

201 Gereffi, G., 2020, *What does the COVID-19 pandemic teach us about global value chains? The case of medical supplies*, Journal of International Business Policy: 3, 287–301, available at: https://link.springer.com/article/10.1057/s42214-020-00062-w.

202 Park, CY., et al., 2020, *Global Shortage of Personal Protective Equipment amid COVID-19: Supply Chains, Bottlenecks, and Policy Implications*, Asian Development Bank Briefs, available at: http://dx.doi.org/10.22617/BRF200128-2.

203 European Commission, 2020, European Commission narrows down export authorisation requirements to protective masks only and extends geographical and humanitarian exemptions, available at: https://trade.ec.europa.eu/doclib/press/index.cfm?id=2132.

204 OECD, 2020, *The face mask global value chain in the COVID-19 outbreak: Evidence and policy lessons*, available at: http://www.oecd.org/coronavirus/policy-responses/the-face-mask-global-value-chain-in-the-covid-19-outbreak-evidence-and-policy-lessons-a4df866d/.

205 European Parliament, 2021, *Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy*, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf.

206 Lowe, S., 2020, *Securing Europe's Medical Supply Chains Against Future Shocks*, Centre for European Reform, available at: https://www.cer.eu/publications/archive/bulletin-article/2020/securing-europes-medical-supply-chains-against-future; Cernat, L. (ed.), 2020, *Chief Economist Note. Trade policy reflections beyond the COVID19 outbreak*, European Commission, DG TRADE.

207 For example: Le Maire, B., 2020, *Strengthening the EU's resilience and strategic autonomy*, The European Files, available at: https://www.europeanfiles.eu/industry/strengthening-the-eus-resilience-and-strategic-autonomy; Von der Leyen, U., 2020, *State of the*

only been loosely defined and are used interchangeably, however as suggested by Commission President von der Leyen at the start of this chapter, they call for **the ability of Europe to be able to make its own choices and act independently based on Europe's values and rules**. In order to have this ability, Europe requires capabilities in developing, producing or accessing materials and products.

In light of this ambition, it becomes crucial to consider **if there is a need for policies pursuing relocation of certain value chains to Europe**. As we have shown, the impact on value chains has not been as severe and structural as initially feared. In addition, the pandemic highlighted how digital technologies connected European citizens and kept Europe open for business. Many of these solutions were based on existing international infrastructures and technologies (e.g. online communications or streaming services). **Protectionist policies could in the long run hurt Europe's resilience** and threaten access to crucial technologies, especially for smaller Member States that rely more on access to foreign technologies[208]. One should also note that reshoring policies in third countries (Japan, USA and the UK) had limited effects apart from a few individual success stories[209].

Nevertheless, global value chains will remain vulnerable to exogenous shocks. Resilience can be increased through companies improving monitoring and due diligence systems, stockpiling to bridge short-term interruptions and diversification[210]. In fact, industries, in general, are not looking for ways to move their complete value chains back but rather focus on **diversifying their sourcing**. Nevertheless, there are limits to diversification, and bottlenecks will remain. Future supply or demand shocks caused by pandemics, protectionist policies or other events could lead to scarcities. Policies such as the ***EU Action Plan on Critical Raw Materials***[211] recognise this and call for reducing dependency for certain critical materials through innovation and circular economy approaches as well as through strengthening sourcing domestically and diversifying sourcing from third countries. An industry-driven European Raw Materials Alliance has been set-up to respond to these challenges[212].

Calls for **European strategic autonomy do not aim for protectionism**. Instead, the objective is to improve European capacities to innovate and produce in strategic areas as well as to have reliable partners in third countries along the value chain. For example, the previously discussed battery and micro- and nanoelectronics value chains show how large-scale investments could strengthen regional value chains in the EU, contributing to a wider global system. This idea of **identifying and then building on Europe's strength through investments in R&D as well as production**, specifically in areas contributing to a climate-neutral and competitive Europe, was also voiced by experts at the EU Industry Days[213].

A framework for policy measures is provided by the concept of **governing missions**, created by Prof. Mariana Mazzucato. Governing missions aim to provide a shared vision and ambition connecting

---

Union Address by President von der Leyen at the European Parliament Plenary, European Commission, available at: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1655.

208 Bauer, M., and Erixon F., 2020, *Europe's Quest for Technology Sovereignty: Opportunities and Pitfalls,* ECIPE occasional paper, 2020, available at: https://ecipe.org/publications/europes-technology-sovereignty/.

209 European Parliament, 2021, *Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy*, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf.

210 Ibid.

211 European Commission, 2020, *Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability,* available at: https://ec.europa.eu/docsroom/documents/42849.

212 European Commission, 2020, *Press release, Commission announces actions to make Europe's raw materials supply more secure and sustainable*, available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1542.

213 EU Industry Days, 2021, *Plenary Session - Lesson learnt from COVID crisis? Resilience through increasing Europe's strategic capacity,* available at: https://www.youtube.com/watch?v=G4en7Et6Kkw&feature=youtu.be.

Member States, businesses and citizens in order to generate more from public investments[214]. Building on this framework, **Member States need to consider how their national plans contribute to a green, digital and resilient recovery**. After all, value chains will remain global and cannot be recreated at national level, but can be strengthened at the European level. In order to do this, Member States should be encouraged to look for synergies in the national recovery plans of other Member States and elaborate on how their planned investments will benefit other Member States.

Strategic orientation and guidance need to come from the EU to ensure complementarity and coordination of these plans. Therefore, the EU should further define the strategic goals and missions and link them to specific value chains giving Member States a better overview of what to focus on. This should lead to a **continuous debate on what should be considered strategic**. The pandemic has shown how that perception can change quickly, and experiences have shown that the strategic importance of an area is only recognised once there is a large foreign company dominating it. Foresight is required. Bodies such as the European observatory for clusters and industrial change or the Advanced Technologies for Industry project[215] already provide monitoring, however, their coverage needs to be continuously reviewed, and currently regulatory issues are covered less well.

Finally, **beyond coordination at the EU level, also collaboration at the international level is needed**. Trusted partnerships need to be established and strengthened, through trade and other agreements, in order to facilitate access to more diverse supply chains. Furthermore, collaboration on critical technologies facilitates the access of European researchers and companies to the newest technologies and allows them to participate in the discourse on standards and future applications.

[214] Mazzucato M., 2019, *Governing Missions in the European Union. Independent Expert Report,* European Commission, available at: https://ec.europa.eu/info/sites/info/files/research_and_innovation/contact/documents/ec_rtd_mazzucato-report-issue2_072019.pdf.

[215] European observatory for clusters and industrial change, see: https://ec.europa.eu/growth/industry/policy/cluster/observatory_en; Advanced Technologies for Industry project, see: https://ati.ec.europa.eu/.

3. Assessing the recovery measures

KEY FINDINGS

- The main motivation behind the EU/national level measures in 2020 was to support policy responses that would mitigate the immediate effects of the health crisis on national economies. Most measures consisted of horizontal support instruments without pre-determined focus.
- While the cushioning support in 2020 is understandable, the subsequent assistance should focus on longer-term strategic objectives and on investments based on strategies aligned to the EU's current policy priorities. At the same time, there is a problem of multiplicity of targets that national recovery and resilience plans need to accomplish (twin transition, building resilience, consistency with the country-specific recommendations).
- The disbursement of the recovery and resilience funding will be linked to the achievements of milestones, while it is rather difficult to envisage that such complex expectations for milestones can be achieved in such a short period. This challenge is compounded by the fact that some Member States are considerably behind in the commitments and payments of the MFF 2014-2021.
- However, the pressure to commit in time large sums of support and the fear not to reach milestones can lead Member States to be risk-averse and propose eligible, but less ambitious milestones. Furthermore, there is a risk of weakening the impact by distributing the funding thinly over many areas of intervention.
- The RRF and the guidelines offer little relevant guidance on industrial value chains. Furthermore, due to the national focus of the plans, there is little mention of value chains and resolving the lack of collaboration across the EU. The review of draft national plans reveals a potential divergence in the level of analysis and details of the full proposals.

3.1. Overview of recovery measures taken so far

Shortly after the breakout of the pandemic and the deployment of the first containment measures adopted by Member States, the EU brought forward an ambitious support package to repair the economic and social damage triggered by the health crisis and set the Union on the path to a sustainable and resilient recovery[216]. The support packages that power the Recovery Plan for Europe comprehend actions that mobilise EU budget covering both the 2014-2020 and the 2021-2027 programming periods[217].

3.1.1. Measures taken by the EU

The measures adopted during the first months of the crisis as a part of the 2014-2020 Multiannual Financial Framework (MFF) sought to provide immediate assistance to the economy, embodying short-

[216] European Commission, 2020, *Identifying Europe's recovery needs*, Staff Working Document, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0098.

[217] European Parliament think tank, 2020, *Research for REGI Committee – Cohesion Policy Measures in Response to the COVID-19 Pandemic*, https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2020)652216.

term recovery actions addressed to primarily cover for the inactivity of companies and the loss of jobs in specific sectors. A temporary **safety net for workers, businesses and Member States** operational as of June 2020[218] allocated €540 billion to support EU economies under three actions: a €200 billion Pan-European guarantee fund for loans provided by the European Investment Bank (EIB) to enterprises; €240 billion support from the European Stability Mechanism (ESM) for countries and €100 billion support to citizens via the new Unemployment Risks in an Emergency (SURE) instrument. Additional actions were implemented to allow for the mobilisation of unallocated EU budget and increased flexibility mechanisms for co-financing, transfers of allocations and payments. These include the major temporary framework to increase the flexibility of state aid and broaden the scope of public financing and the two **Coronavirus Response Investment Initiative Packages (CRII and CRII+)** that mobilised €37 billion from unallocated Cohesion funds[219]. €3.1 billion were mobilised from the budget reserve and, among other programme-specific interventions, €1 billion were allocated to R&I in the health sector under Horizon 2020. Finally, around **€800 million from the EU Solidarity Fund** were mobilised to provide direct support for the healthcare sector.

3.1.2. Measures taken by Member States

To support their national economies in coping with the immediate repercussions of the health crisis, Member States implemented a wide range of measures, mainly of fiscal nature. The focus was on mitigating the short-term impact of government restrictions, including falling demand and production, income reductions and unemployment. These encompass four main typologies:

i. **discretionary support:** measures targeting expenditure (e.g. income and employment support, interest subsidies, credit losses provisions, exceptional spending on healthcare and research), and revenues (e.g. tax payment reliefs and cuts in tax rates);

ii. **financial instruments:** measures aimed at support enterprises' cashflow or solvency position, through liquidity funnelling through loans or equity injections;

iii. **guarantees:** measures aimed at support enterprises' liquidity position through guaranteed debts granted by a financial institution undertaken by governments; and

iv. **tax payment:** measures aimed at temporarily increasing the liquidity position of enterprises through deferrals of taxes or social contribution payments[220,221].

By June 2020, almost 1,250 fiscal measures accounting for about €3.5 trillion, namely 27% of EU27 GDP estimated for 2020 were adopted by Member States with the objective of mitigating both the health and economic effects of the pandemic. Among these, 59% of the measures consist of guarantees, 19% and 5% of discretionary stimulus measures targeting expenditure and revenues, respectively, 11% of financial instruments and 6% of tax payment measures. The nature of the measures varies considerably across Member States, and their volumes can be directly correlated to the amount foreseen by the state

[218] European Council, 2020, *Conclusions of the President of the European Council following the video conference of the members of the European Council*, available at: https://www.consilium.europa.eu/en/press/press-releases/2020/04/23/conclusions-by-president-charles-michel-following-the-video-conference-with-members-of-the-european-council-on-23-april-2020/.

[219] European Parliament think tank, 2020, *Research for REGI Committee – Cohesion Policy Measures in Response to the COVID-19 Pandemic*, https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2020)652216.

[220] European Court of Auditors 2020, *Review No 06/2020: Risks, challenges and opportunities in the EU's economic policy response to the COVID-19 crisis*, https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=57497.

[221] Anderson, J. et al., 2020, *The fiscal response to the economic fallout from the coronavirus*, available at: https://www.bruegel.org/publications/datasets/covid-national-dataset/.

aid schemes approved at EU level, which also vary substantially across Member States[222]. The largest fiscal packages were implemented by Germany, whose package amounted to about 43% of the country's GDP, followed by Italy (37% of national GDP), France (23%) and Spain (22%). Lithuania represents a notable exception with a package worth 29% of national GDP despite the relatively low volume of its state aid scheme. Member States that received smaller fiscal packages include Bulgaria (2%), Slovakia (5%) and Romania (5%)[223].

The main motivation behind the EU and national level measures taken in 2020 was to support Member States in rapidly implementing policy responses that would mitigate the immediate effects of the health crisis on national economies. While some schemes were sector or target-specific, **most consisted of horizontal support instruments without pre-determined focus**. Some sectoral targeting related to immediate needs such as healthcare and digital received larger assistance than industries considered less 'essential' such as culture and recreation[224]. Even for sectors deemed as 'essential', like agriculture[225], or owning a high share of GDP of the overall EU economy, like aerospace, the extent of support differed across countries. There has also been a very uneven response across the EU based on the fiscal capacity of the Member States with support in countries with lower GDP providing a lower level of support. Similarly, with respect to employment support, SURE's efficiency has been noted to largely depend on countries' respective short-term working schemes design features[226].

For the large part**, support implemented at EU level served for cushioning the immediate impacts of the pandemic over the 2021-2023 period** through *ad-hoc* fiscal instruments and uncommitted funds. Alike, **measures implemented at national level mainly focused on immediate mitigation** of unemployment and insolvencies that tended to feature a short-term recovery strategy. For instance, among the 100 national cohesion programmes that presented amendments in August 2020 to account for the new CRII budget, there were significant allocation increases for access to health services and infrastructure and support for entrepreneurship and start-ups, whereas allocations in strategic areas including greening and digitalisation of SMEs decreased[227].

Flexibility in EU spending rules strengthened Member States' capacity to direct support to meet their respective industries' needs with the objective to slow down the negative impacts on the economy. This was important to avoid hardship for companies and workers and understandable, given the urgency of the situation. Nevertheless, this approach has some negative implications. The first implication is that this approach gives a lifeline to all businesses regardless of their solvency in normal conditions. In addition, many businesses have taken soft loans provided by support measures which they may not be able to repay.

While the initial rollout of support is understandable, the subsequent assistance should focus on longer-term strategic objectives and on investments based on strategies aligned to the EU's current policy priorities.

---

222 Van Hove, J., 2020, *Impact of state aid on competition and competitiveness during the COVID-19 pandemic: an early assessment*, available at https://www.europarl.europa.eu/RegData/etudes/STUD/2020/658214/IPOL_STU(2020)658214_EN.pdf.

223 European Court of Auditors, *Review No 06/2020: Risks, challenges and opportunities in the EU's economic policy response to the COVID-19 crisis*, 2020, https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=57497.

224 Böhme, K., and Toptsidou, M., 2020, *Scenario snapshots of a post COVID-19 EU: Recovery strategies shaping new normals*. Spatial Foresight Briefing, Luxembourg, available at: https://www.spatialforesight.eu/files/spatial_theme/spatial/publications/Brief_2020-14_201119.pdf.

225 Ibid.

226 Tesche, T., 2020, *The European Union's response to the coronavirus emergency: an early assessment*. LSE 'Europe in Question', Discussion Paper Series, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3624730.

227 European Parliament think tank, 2020, *Research for REGI Committee – Cohesion Policy Measures in Response to the COVID-19 Pandemic*, https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2020)652216.

3.2. The Recovery Plan and the Multiannual Financial Framework 2021-2027

With the COVID-19 pandemic becoming a crisis that would not end in a short period, it became clear that further and more targeted action was necessary. As shown by the analysis in this study, different sectors are not affected in the same way. In addition, other high priority objectives need attention, such as investments to mitigate the impacts of climate change and modernising the economy.

Thus, the European Commission designed a substantial pandemic recovery instrument with the twin objectives of supporting the economic recovery as well as targeting the climate and industrial objectives of the EU. This led to the EC's ambitious proposal in May 2020 entitled NextGenerationEU (NGEU) for a €750 billion package borrowed from the financial markets. With some alterations and a different share of grants and loans, the European Council reached a political agreement on the launch of the NGEU in addition to the Multiannual Financial Framework for 2021-2027 on 21st of July 2020.

The stimulus package, which is the largest ever for the EU, was adopted on 17th December 2020. This package consists of grants financed by the EU budget Own Resources and loans repaid directly by the Member States. While Member States would repay the loans, which the EU budget only guarantees in case of default, the funding raised for grants would be repaid from the Own resources of the EU until 2058.

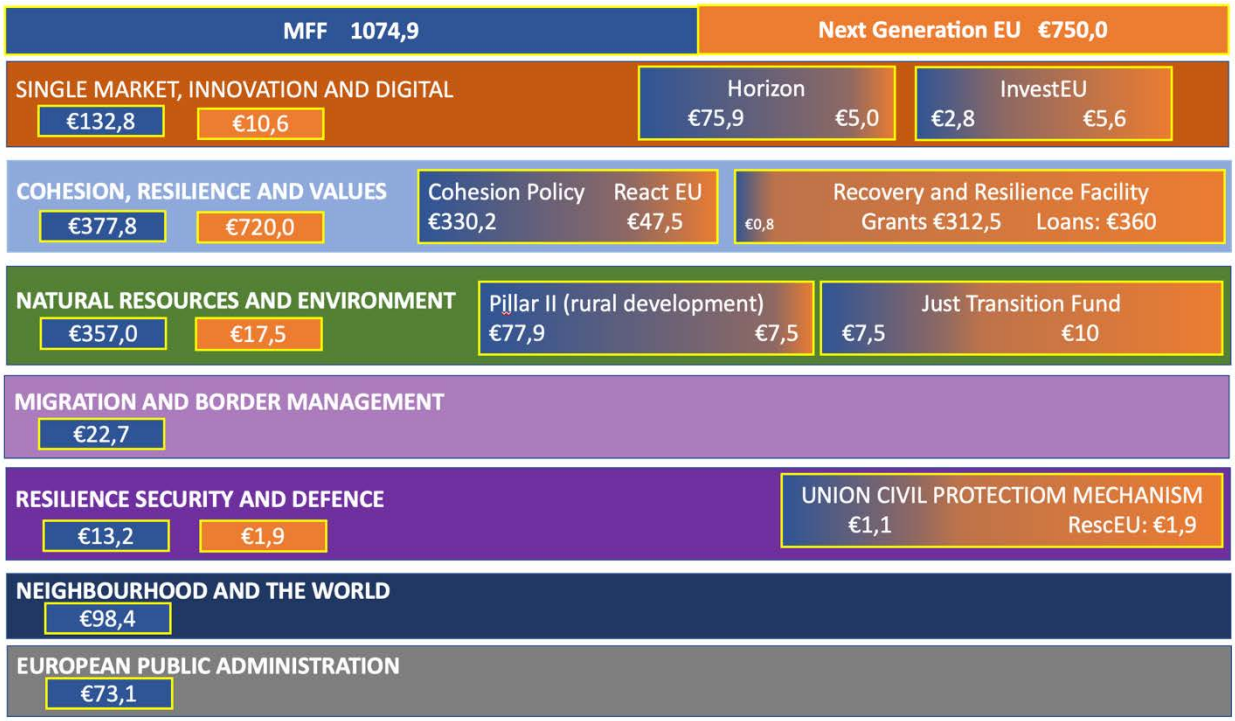
Of the total sum borrowed, €672.5 billion will be allocated through the Recovery and Resilience Facility (RRF) subject to the approval of national recovery programmes produced by the Member States. The current breakdown foresees €312.5 billion to be borrowed in the form of grants and up to €360 as loans. The remaining NGEU budget will be allocated to the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU) initiative and five other EU programmes: InvestEU, Horizon Europe, the EU civil protection mechanism (RescEU), the Rural Development and the Just Transition Fund (JTF). NGEU will be implemented on top of a strengthened long-term EU budget of €1,074 trillion, making up the next MFF in place from 1st January 2021.

The Framework also foresees conditions for stronger flexibility for its implementation, encompassing budgetary reinforcement of funding instruments, lower thresholds for their activation, and extension to include unexpected major restructuring events such as an economic crisis.

The instruments involved include the Solidarity and emergency aid reserve, the Solidarity Fund, the European Globalisation Adjustment Fund and a Brexit Adjustment Reserve.

An overview of the long-term budget and the Next Generation EU recovery package is presented in the figure 19.

Figure 19: Structure and allocations for the MFF 2021-2027 and NextGenerationEU



Source: Authors' own elaboration based on European Commission data.

One aspect affecting the capacity of the EU to address the challenges of the future with the NGEU is the national focus. The original proposal of the European Commission had €95 billion in grants dedicated to EU level cross border actions and EU financial instruments. However, only €12.5 billion remain in the final decision on the package, severely reducing the EU level transnational nature of the recovery. This means that important EU level objectives have been undermined as national plans may not live up to the expectations. Of course, other MFF instruments and the reinforced InvestEU and Horizon can still take an important role, but **the "re-nationalisation" of NGEU** and the elimination of the Strategic Investment Facility and the Solvency Support Instrument considerably weakened the focus on cross border strategies making the NGEU largely a sum of separate national bubbles.

3.2.1. The approval and implementation process

While the MFF 2021-2027 and NGEU were adopted by the Council and ratified by the European Parliament, both are not yet being implemented in practice. The MFF requires the adoption of all regulations and subsequently the approval of all the strategies and operation programmes from the Member States. The legislative process should be completed soon, as draft regulations were prepared in advance of the agreement on the MFF and thus largely ready for adoption by the Council and European Parliament. For the Recovery and Resilience Facility, the regulation has been approved on 12 February 2021[228]. The Own Resources Decision, however, which is essential to finance the recovery package, requires ratification in the parliaments of all Member States. This process is ongoing but should not be considered as a mere procedural issue[229], given that in case a national parliament refuses to ratify the Own Resources agreement, the whole process will be in jeopardy.

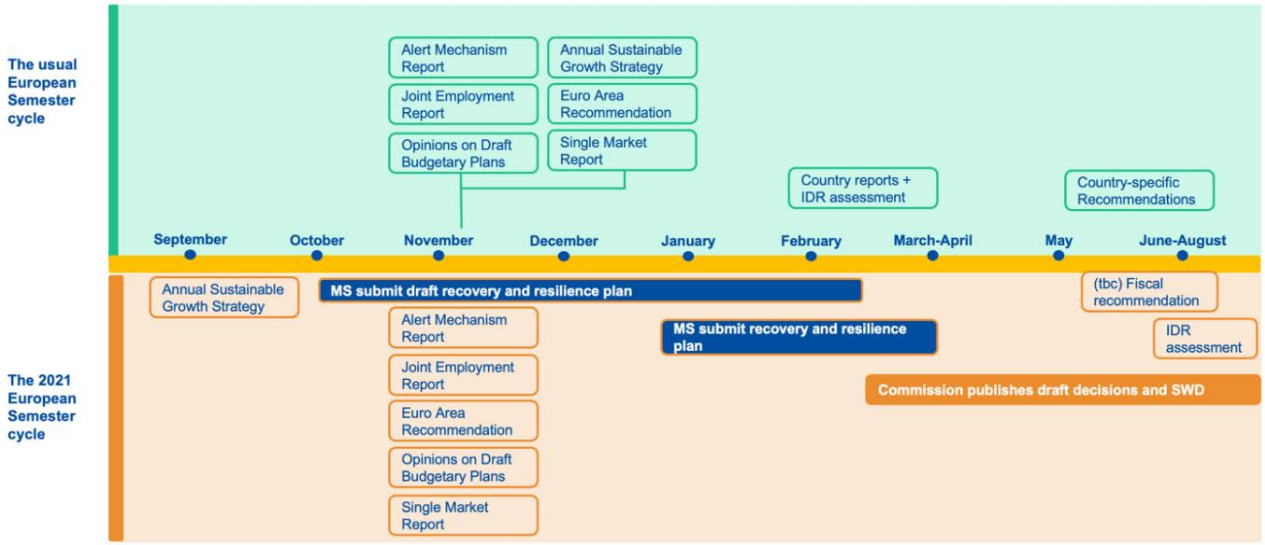
This report focuses principally on the RRF, which comprises €672.5 billion of the €750 billion NGEU (89.7%). It also poses the challenge that it is the most difficult to assess as it is largely in the hands of

[228] European Commission, 2021, *Regulation 2021/241 establishing the Recovery and Resilience Facility*, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0241.

[229] As of 6 February 2021 only six Member States have ratified the Own Resources Decision.

the Member States to decide how and on what to invest the grants and loans. The approval of the EU Recovery Plans of Member States entails a difficult and long process (as illustrated in the figure below), which involves institutional actors at EU and national level.

Figure 20: Changes to the 2021 European Semester cycle



Source: European Commission, 2020.

While the ratification process is ongoing, the Member States are preparing their national recovery and resilience plans. The Member States have to submit the full plan by the end of April and optionally also send a preliminary draft until mid-February for discussion with the Commission. According to a Commission presentation on February 3rd 2021, 16 countries submitted to the European Commission first drafts with a large number of detailed components, six presented early drafts and five only engaged in discussions without a written draft submitted[230].

The Commission provides guidelines[231] to Member States in drafting the national plans that should address the general and country-specific challenges identified in the European Semester and contribute to the twin transition through investments and reforms in specific EU flagship areas linked to the greening and digitalisation of the European economy[232]. The EC will assess the national recovery plans based on: a) their contribution to effectively address the challenges identified in the country-specific recommendations; b) their inclusion of measures that effectively contribute to the twin climate and digital transition, c) their contribution to strengthening the Member State's growth potential, job creation and socio-economic resilience. For the latter, the plans have to provide also a plan of structural reforms in line with the Country Specific Recommendations[233]. Based on the Commission's assessment, the Council will have to approve by Qualified Majority Voting the national plans.

---

230 European Commission presentation at the European Parliament event "Enabling impactful investments via the next EU budget and Next Generation EU: From policy to implementation", 3 February 2020.

231 European Commission, 2021, *Guidance to Member States Recovery and Resilience Plans*, Staff working documents 12 final part 1 and 2, available at https://ec.europa.eu/info/files/guidance-member-states-recovery-and-resilience-plans_en.

232 European Commission, 2020, *Recovery and Resilience Facility*, available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en#:~:text=term%20EU%20budget.-,National%20recovery%20and%20resilience%20plans,should%20be%20implemented%20by%202026.

233 European Commisison, 2020, *European Semester: Country Specific Recommendations / Commission Recommendations*, available at: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/european-semester-timeline/spring-package_en?2nd-language=fi.

The implementation schedule is intensive. To access the full amount of the grants, 70% of commitments have to be submitted by 31 December 2022 and the remaining 30% by 31 December 2023. For loans, all commitments are due by 31 December 2023. The payments on the measures Committed have to be completed by 2026 at the latest[234]. The disbursement will be made according to the progress achieved by the individual Member States on the specific milestones set out in the national plans.[235]

The decision-making process of the national recovery and resilience plans is different from the one in use for the EU's cohesion policy. The European Commission does not have in this instance the decision-making power to approve the plans of the Member States, which is now in the Council. However, the influence of the European Commission is strong, as it controls the timing of the submission of the assessments to the Council. It may retain necessary to delay this if the plans of countries are not up to scratch. Eventually, the Commission will have to submit the national plans to the Council for consideration.

Based only on the declarations of the Council conclusions of July 2020, NGEU and its RRF support is also not an integral part of the MFF. Thus, **it is not fully accountable to the European Parliament** and in principle, not necessarily formally subject to auditing by the European Court of Auditors. However, the conclusions called for the "strong involvement"[236], and the regulation of the recovery and resilience facility introduces a high level of scrutiny on the plans and the achievements of milestones to have the payments by the EU approved. In 2028, the Commission also has to release an evaluation on the level of achievements of the objectives. It even calls for the recovery and resilience facility to fall under the discharge procedure of the EU budget, and thus the discharge by the European Parliament.

On the approval of the plans, an agreement was reached with the European Parliament to involve it in a 'constructive dialogue' which is not well defined as there is no formal procedure with that name in existence. Any issues raised by the European Commission or the auditors will have to be discussed at the level of the European Council. The facility will, however, be subjected to the discharge procedure as is the case with the annual budgets.

Another difference with the normal EU budget is the absence of the principle of specification, i.e. the requirement that expenditures are addressed specifically at precise programmes. Instead, the RRF will be more flexible. However, in order to ensure the alignment of the plans to the objectives of the EU, the European Commission provides, together with the guidelines, rather precise tables to complete with an itemisation of expenditures intended by the Member States, with milestones to achieve, for which they need to report progress and which the European Commission will be monitoring. The disbursement of the recovery and resilience funding will be linked to the achievements of milestones. This is a challenge of a tall order, as **it is rather difficult to envisage that such complex expectations for milestones can be achieved in such a short period**, particularly if the investments are supposed to focus on developments for the future.

A number of difficulties arise from the process. The first challenge is the contradiction between the need for the Recovery package to act urgently to help bring the EU economy out of a strong ongoing recession and the speed of the process to start the implementation. **In case of delays in implementation, the negative impacts of the COVID-19 pandemic on the economy and**

[234] Based on Articles 11 and 12 of the proposal for a regulation, as in the present state of the compromise in Co-decision 2020/0104 COD.

[235] European Commission, 2020, Questions and answers: Commission presents next steps for €672.5 billion Recovery and Resilience Facility in 2021 Annual Sustainable Growth Strategy, available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1659.

[236] European Council, 2020, *European Council Conclusions 17, 18, 19, 20 and 21 July 2020,* available at: https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf.

industries may deepen further. However, the European Commission is under pressure to ensure the EU support is well spent and could lead to a certain level of gold-plating in the rules, making the disbursement difficult and slow. The balance between expediency and control has not been found yet. This is a problem the European Commission has faced in the past, i.e., the difficulty to ensure good projects are selected nationally and recover funds after programmes have been financed where irregularities seem to have occurred. Also, recovering funding from eligible projects, even if performing poorly, is not possible as long as there are no procedural violations. This leads to an increase in pre-emptive requirements. The requirement to achieve milestones to get the payments approved reduces to some extent this problem. However, the pressure to commit in time large sums of support and the fear not to reach milestones can lead Member States to be risk-averse and propose eligible, but less ambitious milestones. In any case, a central problem is that for many investments, the milestones will come too early for an assessment of the impacts. Where those may offer a powerful incentive is for reforms. Reforms in the public administration and its modernisation can be put in motion rather fast, and the milestones will put pressure for those to be implemented quickly. Even if the actual plans may leave space for improvement, even following the strict minimum of the guidelines, those impose on the Member States a significant change in direction.

Nevertheless, it is important to acknowledge that **RRF has very high goals, which are on the borderline of incompatible and unrealistic**. These are: a) the ambition for national plans to be quickly approved and implemented reflecting the link to the pandemic, b) the requirement of ambitious, transformative plans and reforms with a longer-term view, and c) the request to complete milestones to demonstrate progress in a relatively short period to be able to receive reimbursements.

The challenge is compounded by the fact that **some Member States**, and particularly Spain and Italy, **are considerably behind in the commitments and payments of the MFF 2014-2021**. It is therefore not outlandish to question how reasonable it is to expect a rapid acceleration in the number of good projects with a long-term transformative view over and above those in the new MFF. In addition, this schedule and the milestones discourage exactly the kind of ambitions and transformative programmes that are anticipated.

3.2.2. Assessment of the guidelines for the national recovery and resilience plans

This section summarises the requirements that the European Commission has drafted for the strategic quality of the plans of Member States, and presents a preliminary view over the prioritisation proposed by some Member States in their draft plans.

The Recovery and Resilience Facility does not only have the objective to counteract the negative implications of the pandemic, but also to redirect the economies to make them more resilient in line with future needs. The RFF has to provide particular emphasis on the twin transition (37% allocation of funding to climate objectives and 20% for the digital transformation) and to be consistent with the country-specific recommendations. In addition, it aims to include addressing social inequalities.

The expectations for the national recovery and resilience plans are presented in the regulation establishing the Recovery and Resilience Facility. The guidelines by the Commission are numerous and all-encompassing, with a large number of requirements ex-ante. The European Court of Auditors has already expressed concern for the large number of objectives, many of those being very broad and difficult to monitor. This points out to **a risk of weakening the impact by distributing the funding thinly over many areas of intervention**.

The requirements for the plans are summarised in Box 3.

Box 3: National recovery and resilience plans: main requirements presented in the guidelines[237,238]

Macroeconomic and reform requirements:

- consistency with the Country Specific Recommendations (CSR) to the Member States emerging from the European Semester;
- reforms linked to improving the business economy;
- substantial reforms in the public administration and public investment, including mechanisms of public-private partnerships; and
- the avoidance of aggressive tax planning as distortions in competition between firms.

Overarching new environmental conditions:

- ensure the programmes "Do no significant harm" to any of the six environmental objectives as defined in Article 17 of the *EU Taxonomy Regulation*[239].

Scope:

- refer to policy areas of European relevance structured in six pillars: 1) green transition; 2) digital transformation; 3) smart, sustainable and inclusive growth, including economic cohesion, jobs, productivity, competitiveness, research, development and innovation, and a well-functioning internal market with strong SMEs; 4) social and territorial cohesion; 5) health, and economic, social and institutional resilience, with the aim of, *inter alia*, increasing crisis preparedness and crisis response capacity; and 6) policies for the next generation, children and the youth, such as education and skills.
- to contribute to the seven European Flagships: 1) Power up; 2) Renovate; 3) Recharge and Refuel; 4) Connect; 5) Modernise; 6) Scale-up and 7) Reskill and upskill;
- an explanation of how the measures in the plan are expected to contribute to gender equality and equal opportunities for all and the mainstreaming of these objectives in line with the principles;
- to contribute to the strategic autonomy of the Union;
- to have 37% of the RFF dedicated to climate investments; and
- dedicate 20% of the funding to the digital transition.

Monitoring requirements:

- to present milestones, targets, and measures of progress, including a monitoring system.

Eligible measures:

- The potential measures and projects cover every possible problem angle - biodiversity protection, green farming, social exclusion, connecting marginalised regions, handling gender equality, social housing, coastal protection and so forth.

[237] European Commission, 2021, *Guidance to Member States Recovery and Resilience Plans – Part 1,* available at: https://ec.europa.eu/info/files/guidance-member-states-recovery-and-resilience-plans_en.

[238] European Commission, 2021, *Guidance to Member States Recovery and Resilience Plans - Part 2,* available at: https://ec.europa.eu/info/sites/info/files/document_travail_service_part2_v3_en.pdf.

[239] European Commission, 2020, *Sustainable finance taxonomy - Regulation 2020/852,* available at https://ec.europa.eu/info/law/sustainable-finance-taxonomy-regulation-eu-2020-852_en.

The problem of such **multiplicity of targets** and the fact that all issues from impacts to the industry due to COVID, climate change and social and territorial cohesion problems are presented with a similar level of urgency, is that **Member State's plans may end excelling at ambitions and being less clear on direction**.

The RRF guidelines lack a clear weighting between the priorities to ensure that the implementation of the plans results in a resilient recovery. Much emphasis is placed on complex methodologies to ensure investments tick the box on their climate or digital percentage virtue, or that a number of EU long-term objectives are mentioned. In this list of long-term ambitions and 'taxonomised' list of items, the core enabling reforms are not highlighted sufficiently. Ensuring the right share of expenditure categories tick the right climate and digital boxes is not enough to ensure resilience and sustainability. Reforms to create the right framework conditions for a more advanced, flexible, and also greener economy and economically sustainable economy are the base for any success.

The lack of EU level instruments in the recovery and resilience facility is also a missed opportunity to reinforce the cross-border value chains. The guidelines do present the option of multi-country projects, but leaving it to Member States to design them. How far this will be taken on board is questionable, and the NGEU funding, which was linked to EU level instruments, is no longer present. The European Commission is ready to provide support, coordination mechanisms and technical assistance, but will this attract countries focused on internal problems?

On the industrial sector in general, neither the regulation nor the guidelines directly refer to the *New Industrial Strategy* of the Commission, nor do they mention the need for safeguarding "technological and digital sovereignty", but require that the Member States focus on strengthening key value chains with the objective to "contributing to the strategic autonomy of the Union alongside an open economy"[240].

On the sectors reviewed in this paper, the issues and needs raised do not seem to be properly reflected in the guidelines. Here is a short evaluation of the guidelines in relation to the analysis:

a. Connected and autonomous vehicles

The development of technologies in this area will depend largely on the private sector, but the guidelines encourage the programmes to support the development of the infrastructure necessary for carbon-free transport[241].

b. Batteries

The EU has a strong battery strategy, but the incentives for the national recovery plans to consider it are scant. Due to demand growth and the interest of the industry for batteries, the drivers will largely be private. The growth in demand from electromobility, supported by NGEU through the RFF and potentially also ReactEU, should have a positive impact on demand and thus promotion of battery manufacturers.

c. Digital value chains

Digitalisation is, of course, transversal and covers the improvement of infrastructures, as well as the support of businesses and the provision of e-services by the public administration. However, the

[240] European Council, 2020, *European Council Conclusions 17, 18, 19, 20 and 21 July 2020,* available at: https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf.

[241] European Commission, 2021, *Guidelines to Member States Recovery and Resilience Plans – Part 1,* available at: https://ec.europa.eu/info/files/guidance-member-states-recovery-and-resilience-plans_en.

limitation is the national focus of the programmes and the focus on infrastructure, software and skills. There are mentions encouraging the Member States to introduce measures in line with the *White Paper on Artificial Intelligence* or *the EU's cybersecurity strategy*, but overall, there is little prescription or impulse to take on the challenges in semiconductor production and hardware.

The digital sector depends on micro-and nanotechnologies, and the guidelines cover the microelectronics sector[242] and promote investments in this area. The Italian programme reserves some funding for microprocessors, but there is no direct mention in the German programme, and the other draft programmes reviewed lack detail at this stage.

d. Healthcare and chemicals strategic value chains

The healthcare components are partially covered by measures in the CRII to reinforce capacity, but in addition, the guidelines promote the use of the RFF to modernise the healthcare sector. The weakness of the programmes for health is that despite the need for closer integration, the health sector is largely a national matter. The pharmaceutical sector and its value chains are absent from the NGEU guidelines. The same is true also for the chemical industry despite its importance in the EU.

Overall, on the above sectors, the **RRF guidelines do not give enough consideration to industrial value chains, and this is also reflected in the reviewed draft plans**.

3.2.3. Alignment of the draft national plans to the EU guidance and industry needs

This section provides examples of the alignment of the plans presented by France, Spain, Italy and Germany to the RFF regulation, guidelines, and needs covered in the analysis in sections 2 and 3.

It has to be acknowledged that the below analysis is based on draft documents. The French plan *France Relance*[243], used in the analysis, is actually a national plan for recovery and resilience rather than an official plan submitted to the European Commission, but covers closely the same objectives and will likely be reflected in the recovery plan. The Spanish plan *España Puede*[244] is a draft that gives an overview of the priorities but does not go into the specifics, and the financial allocations are only on broad categories. The Italian draft *Linee Guida per la Definizione del Piano Nazionale di Ripresa e Resilienza*[245] is already very detailed with a comprehensive list of planned expenditures using the RRF funding. The reviewed German plan *Deutscher Aufbau- und Resilienzplan (DARP)*[246] offers a less detailed analysis, and it does not present an itemised list of priorities and fund allocations. For *France Relance* it is unclear what would be financed by national funds and what would be financed through the NGEU. The resulting analysis is thus only very indicative, but **reveals a potential divergence in the level of analysis and details of the full proposals. This may explain the appearance of new guidelines with rather precise tables to complete at a rather high level of granularity**.

Another difficulty with the current information available is that the presentation of the figures does not follow the same model. In addition, the Italian programme includes ReactEU, while the German one does not. Both programmes do not mention the JTF, which is indeed not a part of the RFF, but

---

[242] Ibid.

[243] Gouvernement français, 2020, *France Relance*, available at: https://www.tresor.economie.gouv.fr/Articles/926304d1-725d-460e-9341-539298a8dbba/files/1fb207b6-9c97-44ec-988e-cad25c27927d.

[244] Presidency of the Government of Spain, 2020, *España Puede: Plan de Recuperación, Transformación y Resiliencia*, available at: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/espana-puede.aspx.

[245] Governo Italiano – Dipartimento per le Politiche Europee, 2020, *Linee Guida per la Definizione del Piano Nazionale di Ripresa e Resilienza*, available at: http://www.politicheeuropee.gov.it/it/comunicazione/notizie/linee-guida-pnrr/.

[246] Bundesfinanzministeriums (BMF), 2021, *Deutscher Aufbau- und Resilienzplan (DARP)*, available at: https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/2021-01-13-deutscher-aufbau-und-resilienzplan.pdf?__blob=publicationFile&v=9.

nevertheless, the **plans require coherence to avoid overlapping programmes**. For example, the JTF may support financially the workers having to transition to other kinds of employment. Similarly, the RRF may be financing employment programmes that would complement the JTF or support to develop new industries. The demarcation lines between the policies should be clear in the plans. In general, the complementarity of the different funds, Cohesion Policy, ReactEU, JTF and RRF needs to be guaranteed.

The reviewed plans are sectoral, inward-oriented and do not have an industry-specific focus. The missing cross border components are no surprise given the process for the preparation of the plans and the urgency of national needs. Thus, **the potentials and weaknesses of intra-EU value chains are not addressed**. This will need to improve, especially if in the future the development of circular economy solutions needs to expand, for example, or the EU wants to have a rational approach to autonomy for critical needs, which should be done at EU level and not in each country. One option to facilitate such intra-EU coordination is to use the opportunity presented in the RRF regulation to allocate up to 4% of the RRF to the Member State compartments in InvestEU, but with the objective to launch coordinated investments with other Member States. This would need, however, from the side of the European Commission an effort to make this option more explicit and functional. There are also very few mentions to address critical trends exposed, such as the trends in **automation** and thus to pre-empt changes with the adapted social and employment programmes.

The reviewed plans of Member States envision actions that support strongly digitalisation in the business, industry and public sectors, as well as measures to promote the green transition. Depending on the economic structure, the focus of support varies.

For the industry in general **digitalisation is a primary focus**. Here the Italian and Spanish programmes allocate an important share of the support. For Spain, 17.1% of the RRF is directed to the modernisation and digitisation of industry and small and medium-sized enterprises alone. Other programmes which have digitisation at the core for public administration, R&D and education cover 38% of the amount. Thus, the amount in this area is expected to exceed 20%. As for Italy, digitisation is recognised as a serious barrier, with an estimated share of RRF dedicated to it that exceeds 25%. All countries have this as a priority, but Italy and Spain face important challenges to catch up in this if one looks at the national coverage of high-speed internet in EU Member States. **Due to the national focus of the plans, there is little mention of value chains and resolving the lack of collaboration across the EU**.

In Italy, a considerable share of the RRF is dedicated to energy efficiency, circular economy and clean transport indicating that after applying the Rio markers, 37% of funding to the **green objectives** is most likely achieved. The allocations are too broad in the Spanish plan to make any assessment. For Germany, the alignment to green, digital and reform objectives is highlighted in each investment group. When it comes to energy for the industrial sector, Germany places considerable weight on decarbonisation using hydrogen technologies, while Italy has a stronger focus on circular economy and energy efficiency. For Germany, which faces a strong challenge to decarbonise its economy comprising many high energy-intensive industries, the expenditure in hydrogen with RRF support is over 50% higher (€3.3 billion) than the proposed support in the Italian plan (€2 billion), despite the fact that the RFF size in Italy is more than twice the size.

All of the reviewed plans prioritise support for **research, innovation and education, including for innovation in the business sector**, followed by many actions across sectors and on the labour market. **Reforms of the public sector are also essential, as well as of the labour policies**, to adapt to the needs of the future, as the Country Specific Recommendations for Spain and Italy indicate. These are investments that will be needed in all the sectors reviewed in this study, but there are not enough details at the present state of the plans to judge the extent to which they are addressed.

The reviewed plans put a considerable focus on the **healthcare industry**, and dedicate a sizeable sum in telemedicine and innovation in the digitalisation of medicine (Italy €5.3 billion, Germany €4.5 billion). However, there is clearly an atomised approach with each member state building its own national system. This can lead to future bottlenecks if a more European-wide system is needed in an area as serious as health.

4. CONCLUSIONS AND RECOMMENDATIONS

The COVID-19 crisis has had an **abrupt impact on the EU27 economy.** By and large, **the economic shocks related to the second and subsequent waves have been more cushioned** compared to the first one. The real GDP is expected to reach pre-crisis levels by mid-2022 in both the EU and the euro area. This outlook is more positive than the initial forecasts from the beginning of the crisis, but a return of the economic activity to the pre-crisis levels would still be **slow growth for the EU industry** as compared to other leading economies.

Most manufacturing-based industries started recovering relatively quickly in Q3 2020, as confinement measures were increasingly lifted and as a result of various measures (e.g. the recognition of 'essential' sectors and their workers and green lanes to ensure transborder transport and supply chain functioning). However, there are **remarkable differences in performance amongst but also within sectors**. Large parts of the digital industry have performed well, and so has the healthcare industry. Enabling industries like chemicals, construction, and the food and drinks sector are likely to experience a V-shaped recovery. Despite the initial shocks, automotive and textile industries appear to be on a recovery path since the first lockdowns. **Sectors that are dependent on human contact and interaction, such as the cultural and creative industries and the aerospace industry** (due to the decrease in mobility and tourism activities), have experienced substantial hits by the crisis, and they are likely to suffer for extended periods from these unprecedented shocks.

The sectoral and value chain analyses show that **the pandemic acted as an accelerator of digitalisation**. The different trends in the COVID-19 effects are partially explained by the ability of businesses to go digital. In the case of the creative industries, e.g. streaming services, have largely profited from the crisis. The pandemic is also creating new opportunities for growth in the sector of autonomous vehicles. Furthermore, the crisis leads consumers to re-assess their needs and **allows for a potential acceleration of the green agenda**. For example, in the automotive sector, despite the decline in the demand for new vehicles, the impact of the pandemic on the demand for electric vehicles seems to be much less severe. This also affects the positive forecasts for the rebound of the batteries supply chain. Overall, the pandemic has increased the awareness of the benefits of the digital and green transition, which needs to be coupled with investments and political drives.

In order to remain internationally competitive, the EU will need to continue to rely on global value chains. However, the resilience of the value chains have been tested: the COVID-19 pandemic unveiled weaknesses, as many businesses were initially not able to cope with shortages in supplies caused by closed borders and closed manufacturing sites. Nevertheless, most supply chains quickly recovered and have been affected less severe during subsequent waves of infections. The overall view from industry and experts alike is that value chains can be strengthened through increased **diversification rather than reshoring/onshoring**. The crisis accentuated the strategic importance of value chains such as microelectronics, autonomous driving, batteries, and AI in light of the accelerating digital transformation and growing demand for electric vehicles. These value chains need to receive continued support and attention to ensure access to materials, investment, and skills. However, this should not lead to a sustained policy drive for relocation, as this trend could be at odds with the need to keep the EU industry internationally competitive. Furthermore, industry leaders and experts alike point to the limited stability of the investment climate in the EU's Neighbourhood countries and the reluctance to place (strategic) investments (including in R&D) in these countries.

The heterogeneity of impacts on EU industries illustrated by this study needs to be fully taken into account when preparing and elaborating recovery measures. The EU recovery package provides a

unique opportunity to strengthen the competitiveness of the EU industry by making it more green, digital, and resilient. **However, the measures in the national recovery and resilience plans will only be justifiable, effective, and efficient when these plans take full account of the underlying economic and sector-specific characteristics. If not, they may turn out to be the wrong vaccine.**

In the following paragraphs, we provide recommendations on the design and focus of the recovery measures and policies.

Recommendation 1: Ensure that the national recovery and resilience plans are considering the specificities of the industrial tissue (there is no 'one size fits all')

The need for urgent cushioning support at EU/Member State level in 2020 resulted in a lack of specific focus of most measures implemented so far. At the same time, the effects of the pandemic across and within sectors differ significantly. Thus, to tackle the effects of the COVID-19 pandemic, the national recovery and resilience plans should:

- Be based on detailed **analyses along and within different sectors of the Member State economies** – interdependencies of supply chains intertwine sectors into networks and ecosystems, and hence imply spill-over effects from more affected to less affected sectors. Nevertheless, the analysis shows that there are significant differences in the COVID-19 effects on the different sectors. **So far, most of the reviewed draft plans do not show the necessary detail for targeted sector/subsector support**;
- Transform the identified needs into **sector-specific objectives** rather than equal support for all sectors and sub-sectors;
- **Consider the expected recovery paths of the different sectors** – as illustrated in this study, sectors that are driven by mobility and human interaction (like aerospace and cultural/creative industries) are expected to have a slow recovery path, while sectors and subsectors that are driving the digital transformation have experienced short-lived impacts; and
- **Anticipate and conceive solutions for possible unrecorded** (e.g. on professionals in the informal economy), **or delayed effects** (e.g. on employment and liquidity due to uncollected revenues) of the COVID-19 crisis.

Recommendation 2: The national recovery and resilience plans should aim to boost the competitiveness of the EU industry via investments in R&D and digital re/upskilling (and go beyond recovery to pre-crisis levels)

As mentioned, the EU recovery is expected to be slower than other leading economies. This is why the unprecedented support by the Recovery and Resilience Facility should aim to boost the EU competitiveness through public and private investments in research and development (R&D) and re/upskilling to meet the current realities of withholding private R&D investments and accelerated digital transformation.

Recommendation 2.1: Ensure support is provided to aligned EU and national public and private R&D investments

The coronavirus pandemic has had disruptive effects on the R&D decisions of companies[247]. In many cases, the balance sheet capacity for increased investment has been damaged by the COVID-19 pandemic, and actual capital will be more constrained as a consequence of the pandemic. R&D

[247] Dachs, B., and Peters, B., 2020, *Covid-19 Crisis and the Expected Effects on R&D in Businesses*, ZEW policy brief No. 20-02, Mannheim available at: https://www.zew.de/en/publications/covid-19-crisis-and-the-expected-effects-on-rd-in-businesses.

spending cuts will likely have a long-term impact on those industries which have been withholding their investments spending. For example, in the automotive sector, R&D testing and investments were delayed due to the need for short-term cash management. In the case of SMEs, the COVID-19 crisis is likely to have significant impacts on their willingness to sustain their investments in R&D and innovation[248]. At the same time, Europe still lags in R&D spending in the critical sector of computer software and hardware production. Postponing R&D investments would slow down not just digitalisation, but it would challenge the green transition targets as their achievement is also heavily dependent on resources and investments in digital R&D and infrastructure. Since the outbreak of the pandemic, spending in the EU has been mostly focusing on healthcare and short-term measures, **while the need to support industrial sectors to innovate** is crucial as well. For this, it is imperative that **national and European R&D public investments are aligned with private investments, and to set the EU industry on a path of sustainable growth is crucial**.

Recommendation 2.2: Ensure sufficient investments in the recovery plans in digital and technical re/upskilling

The draft recovery plans of the Member States lack the necessary focus on the modernisation of the industrial sector and the requirements in terms of skills in the labour force. The lack of focus under the multiplicity of objectives risks reducing the impact of the Recovery and Resilience Facility and particularly in generating the right framework conditions for businesses to recover and adapt. The cross-sectoral analysis shows that sub-sectors and businesses that have had a high level of digital preparedness have suffered the least from the COVID-19 pandemic (e.g. digital sales of textile/food, streaming). Thus, **measures for digital re/upskilling are a way of increasing the resilience and competitiveness of EU businesses**. Digital as well as technical skills in Science, Technology, Engineering, and Mathematics (STEM) are also of importance in strategic value chains such as those for AI. The EU and Member States already recognised this in initiatives such as the recently started European Software Skills Alliance or the EU Digital Skills and Jobs Coalition and its national counterparts. It is not only crucial to follow-up on these initiatives and monitor their progress, but also to investigate how recovery measures can also contribute to these skills that will also be of importance for the green and digital transitions. Furthermore, the **pandemic has highlighted the need for smart health/telehealth adoption**, making sure that the EU is fit for the digital age and forthcoming global health challenges.

Recommendation 3: Support strategic value chains where Europe can have a competitive edge, rather than addressing potential short-term disruptions

The effects of the COVID-19 pandemic on value chains have so far not triggered a change in the functioning of the globalised economy, however, **they increased the awareness of vulnerabilities and dependencies**. Combined with the need for technological sovereignty in strategic areas, this leads to the recommendation that the European Parliament should encourage a **renewed discussion on strategic value chains and measures to support them**, also in light of the use of the recovery funding. Evidently, different value chains require different kinds of support, and as mentioned, the RRF guidelines do not give enough consideration to industrial value chains. In particular, the European Parliament should encourage the EU and Member States to **pool resources and jointly invest in strategic industries**. The option available to place up to 4% of the RRF to InvestEU could be explored as an avenue to mobilise such resources, using the options offered to Member States to allocate some

[248] Roper, S., and Turner, J., 2020, *R&D and innovation after COVID-19: What can we expect? A review of prior research and data trends after the great financial crisis*. International Small Business Journal. Volume: 38 issue: 6, page(s): 504-514, available at: https://journals.sagepub.com/doi/full/10.1177/0266242620947946.

of the funding to this instrument. This could be the right tool for more coherent cross border coordination. Examples such as semiconductors and batteries show how combined efforts can support European value chains. The increasing demand and reliance of many other sectors (e.g. automotive, consumer electronics), as well as their importance for the green and digital transition, make these value chains strategic for Europe. Joint investments can support such value chains and should therefore also be a consideration in the national recovery measures, along with other strategic value chains such as hydrogen, robotics, pharmaceutics. This requires, however, continuous support as well as monitoring that this benefits Europe as a whole.

Recommendation 4: To ensure resilience, national and EU measures should support the diversification of access to critical raw materials

European industries will continue to rely on partners in third countries. However, dependencies and risks can be reduced by **strengthening international partnerships, diversification of suppliers, innovation reducing the need for certain resources, and circular economy approaches encouraging the reuse of materials** (see below). For this purpose, the EU recently introduced its *Action Plan on Critical Raw Materials* and established a Raw Materials Alliance. In terms of international partnerships, the EU could support nearshoring in its trade policy with the EU Eastern and Southern Neighbourhood countries. The EU could support the investment climate and stability in these countries through the EU's external policies on regulatory approximation, and market access, so that European companies could diversify value chains. Furthermore, the EU initiatives on raw materials should be implemented without any delay and closely monitored. The contribution of the national recovery and resilience plans to diversification initiatives should be clarified in these plans. At the same time, even though 'lean business models' may not be resilient as unveiled by the pandemic, efficiency will remain a key factor for business success in the global economy. In this sense, to ensure the competitiveness of the EU industry, relocation decisions should remain business decisions.

Recommendation 5: Include circular economy investments in the national recovery plans and ensure the necessary regulatory changes to reduce pressures on value chains

Further to the above recommendation, **circular economy approaches and the reuse of materials can decrease dependencies in the EU**. This has also been acknowledged by the EU's *Action Plan on Critical Raw Materials.* Building on this action plan, the European Raw Materials Alliance has as one of its key actions to implement a Circular Economy for complex products like electric vehicles, cleantech, and hydrogen equipment. Furthermore, under the EU *Circular Economy Action Plan*[249], the EU presents 35 actions, 12 of which focus on key value chains aiming to strengthen EU value chains. For example, the one action that has been implemented so far is the proposal for a new modernised EU legislation on batteries, which aims that batteries on the EU market be collected, repurposed and recycled, thereby becoming a true source of valuable raw materials. The **European Parliament, together with the Council and the Commission, should work towards regulatory changes planned under the *Circular Economy Action Plan*** being implemented efficiently and effectively. Beyond this, **investments in the circular economy should be encouraged to strengthen the resilience of supply chains, avoiding disruptions from future crises**. Here Member States should consider in their national recovery plans to focus on circular economy solutions to strengthen intra-EU value chains by reducing the waste of resources.

[249] European Commission, 2020, *EU Circular Economy Action Plan*, available at: https://ec.europa.eu/environment/circular-economy/.

Recommendation 6: Address the multiplicity of targets in the national recovery and resilience plans through prioritisation

The regulation of the Recovery and Resilience Facility (RFF) and the guidelines place a large number of obligations on the Member States, requiring them to spend 37% of funding on green actions and 20% on digital expenditures, with a taxonomy that classifies percentages of different forms of investment as green or digital. In addition, funding has to be aligned with other EU objectives and flagships. Furthermore, Member States are required to introduce reforms in line with the Country Specific Recommendations to address structural problems.

The multiplicity of targets may lead to a search for actions that tick the eligibility boxes to ensure the percentages are fulfilled and the EU objectives mentioned. However, the core need is to recover and build resilience and to create the right framework conditions for the development of a more sustainable economy. The multiplicity of targets can lead to plans where the industrial sector implications may not be taken sufficiently into account. This in turn, can have implications on the socio-economic relevance and sustainability of the plans and the ability to avoid a public debt crisis. The national recovery and resilience plans should **find the balance between addressing diverse strategic objectives and providing targeted sector-specific support**. This will be a very difficult equation to solve.

Recommendation 7: Speed up the adoption of national recovery and resilience plans to avoid further opening the gap with other leading economies

The approval of the EU Recovery Plans of Member States entails a difficult and long process, which involves institutional actors at EU and national level. Considering the current pace, this process may be delayed. On top of this, the disbursement of the recovery and resilience funding will be linked to the achievements of milestones, which will be challenging in such a short period. Looking at the slow speed of recovery of the EU as compared to other leading economies (e.g. China and the US), **the speed of adoption of the plans is a crucial element of their success**. At the same time, the pressure to commit in time large sums of support and the fear not to reach milestones can lead Member States to be risk-averse and propose eligible, but less ambitious milestones. This compounds the challenge of the multiplicity of targets as there is a risk of weakening the impact by distributing the funding thinly over many areas of intervention. However, speed should not be at the expense of insufficient analysis and superficial prioritisation (as mentioned in the above recommendations).

Recommendation 8: Make sure that the national recovery and resilience plans have a truly European character and oversight

The leading EU objectives and the twin transition (green and digital) may create a burden of multiplicity of EU targets. However, too much focus on national priorities would be another risk for the national recovery and resilience plans. The detailed guidelines by the EC and the complex adoption process are mitigating this risk to a certain extent. However, it should be noted that initially the NextGenerationEU had a number of large programmes at EU level, which were decreased in the package adoption process. Nevertheless, **national plans should make sure to include critical EU level cross border / pan-European actions**. The COVID-19 pandemic affected EU sectors and value chains that are highly interconnected. However, the draft plans reviewed so far do not address value chains, particularly European and global ones. This is a weakness, which runs the risk of having an RFF captured by national, rather than EU-wide economic interests.

Furthermore, the **monitoring of the national plans should not be performed in a piecemeal (i.e. national) manner**, but rather in a holistic way. There should be a continuous assessment of the links between the results achieved by Member States, and how they jointly contribute to the overall European objectives.

REFERENCES

- Accenture, 2020, Commercial Aerospace Insight Report: In it for the Long Haul, available at: https://www.accenture.com/ie-en/insights/aerospace-defense/commercial-aerospace-report-lead-in-the-new.
- Accenture, 2020, Coronavirus automotive rapid response, available at: https://www.accenture.com/us-en/insights/automotive/coronavirus-automotive-rapid-response.
- Accenture, 2020, COVID-19: Impact on the Automotive Industry, available at: https://www.accenture.com/_acnmedia/PDF-121/Accenture-COVID-19-Impact-Automotive-Industry.pdf.
- ACEA, 2020, Passenger car registrations, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-28.8-nine-months-into-2020-3.1-in-september.
- ACEA, 2021, Passenger car registrations: -23.7% in 2020, -3.3% in December, available at: https://www.acea.be/press-releases/article/passenger-car-registrations-23.7-in-2020-3.3-in-december.
- ACEA, 2021, Truck makers gear up to go fossil-free by 2040, but EU and Member States need to step up their game, available at: https://www.acea.be/news/article/interactive-map-covid-19-impact-on-eu-automobile-production-up-until-septem.
- Aitken, M., 2016, Understanding the pharmaceutical value chain, Pharmaceuticals Policy and Law 18, 55–66, available at: https://content.iospress.com/articles/pharmaceuticals-policy-and-law/ppl432.
- Albers, S., and Volker, R., 2020, European airlines strategic responses to the COVID-19 pandemic, Journal of air transport management 87, available at: https://www.sciencedirect.com/science/article/abs/pii/S0969699720303410.
- Anderson, J. et al., 2020, The fiscal response to the economic fallout from the coronavirus, https://www.bruegel.org/publications/datasets/covid-national-dataset/.
- ASD, 2020, Aviation RoundTable Report on the Recovery of European Aviation, available at: https://www.asd-europe.org/eu-aviation-maps-a-sustainable-post-crisis-future-in-round-table-report.
- ASD, 2020, COVID-19: Proposals for EU Relief Measures for Aerospace, Defence and Security Industries, available at: https://www.asd-europe.org/covid-19-updates-resources.
- Atheneum Partners, 2020, Pharma Value Chain & COVID-19. Interview Transcript, available at: https://www.atheneum.ai/2020/04/20/pharma-value-chain-covid-19/.
- Ayati, N., Saiyarsarai, P., and Nikfar, S., 2020, Short and long-term impacts of COVID-19 on the pharmaceutical sector. DARU Journal of Pharmaceutical Sciences, 28(2), 799-805, available at: https://link.springer.com/article/10.1007/s40199-020-00358-5.
- Banks, M., 2020, The work of culture and C-19, European Journal of Cultural Studies, available at: https://journals.sagepub.com/doi/full/10.1177/1367549420924687.
- Bauer, M., and Erixon F., 2020, Europe's Quest for Technology Sovereignty: Opportunities and Pitfalls, ECIPE occasional paper, available at: https://ecipe.org/publications/europes-technology-sovereignty/.

- Böhme, K., and Toptsidou, M., 2020, Scenario snapshots of a post COVID-19 EU: Recovery strategies shaping new normals. Spatial Foresight Briefing, Luxembourg, available at: https://www.spatialforesight.eu/files/spatial_theme/spatial/publications/Brief_2020-14_201119.pdf.
- Bundesfinanzministeriums (BMF), 2021, Deutscher Aufbau- und Resilienzplan (DARP), available at: https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/2021-01-13-deutscher-aufbau-und-resilienzplan.pdf?__blob=publicationFile&v=9.
- Buvailo, A., 2020, Pharma R&D Outsourcing Is On The Rise, BiopharmaTrend, available at: https://www.biopharmatrend.com/post/30-pharma-rd-outsourcing-is-on-the-rise/.
- C&EN, 2021, World Chemical Outlook 2021, available at: https://cen.acs.org/business/CENs-World-Chemical-Outlook-2021/99/i2.
- Calone, J., 2020, Pandemic limits distributors' semiconductor sales, Electronics Sourcing, available at: https://electronics-sourcing.com/2020/12/17/pandemic-limits-distributors-semiconductor-sales/.
- Castro, D., and McLaughlin, M., 2021, Who Is Winning the AI Race: China, the EU, or the United States? – 2021 Update. Center for Data Innovation, available at: https://datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/.
- CCSA, 2020, How COVID-19 is changing the world: a statistical perspective, Volume II, September, available at: https://unstats.un.org/unsd/ccsa/documents/covid19-report-ccsa_vol2.pdf.
- CEFIC, 2020, Chemical Quarterly Report (CQR), available at: https://cefic.org/app/uploads/2020/09/Cefic-Chemicals-Quarterly-Report-CQR-September-2020.pdf.
- CEFIC, 2021, COVID-19 Helpdesk, available at: https://cefic.org/the-european-chemical-industry-covid19-help-desk/.
- CEFIC, 2020, The European chemical industry: a vital part of Europe's future, available at: https://cefic.org/our-industry/a-pillar-of-the-european-economy/facts-and-figures-of-the-european-chemical-industry/.
- Chakraborty, S., and Biswas, M.C., 2020, Impact of COVID-19 on the Textile, Apparel and Fashion Manufacturing Industry Supply Chain: Case Study on a Ready-Made Garment Manufacturing Industry, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3762220.
- Dachs, B., and Peters, B., 2020, Covid-19 Crisis and the Expected Effects on R&D in Businesses, ZEW policy brief No. 20-02, Mannheim, available at: https://www.zew.de/en/publications/covid-19-crisis-and-the-expected-effects-on-rd-in-businesses.
- Das, S., 2020, Coronavirus outbreak: Pharma market grows 9% in March due to panic buying, Business Standard, available at: https://www.business-standard.com/article/companies/panic-buying-amid-coronavirus-lockdown-helped-pharma-market-grow-9-120040801570_1.htm.
- Deloitte, 2020, Post Covid-19 Aerospace Industry: An opportunity to embrace the 4.0 Era?, available at: https://www2.deloitte.com/fr/fr/pages/covid-insights/articles/post-covid-19-aerospace-industry.html.

- Deloitte, 2020, Understanding Covid-19's impact on the technology sector, available at: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-covid-19-s-impact-on-the-technology-sector-.html.
- Deutsches Statistisches Bundesamt, 2021, Short-Term indicators Construction industry, available at: https://www.destatis.de/EN/Themes/Economy/Short-Term-Indicators/Construction-Industry/pgw211.html.
- Dyatkin, B., and Meng, Y. (ed.), 2020, COVID-19 disrupts battery materials and manufacture supply chains, but outlook remains strong, MRS Bulletin, 45(9), 700-702, available at: https://www.cambridge.org/core/journals/mrs-bulletin/article/covid19-disrupts-battery-materials-and-manufacture-supply-chains-but-outlook-remains-strong/158FE30E4868EE8D2952216B6CCB8B4F.
- ECBN, 2020, White paper: Breaking out of the COVID-19 Crisis: Restarting the Cultural Creative Industries is at the centre of an open, sustainable and democratic Europe, available at: https://www.ecbnetwork.eu/ccis-coronacrisis-update-15-white-paper-restarting-the-cultural-creative-industries-in-europe/.
- Ecorys, TRT Srl., and M-Five GmbH, 2020, Study on exploring the possible employment implications of connected and automated driving. Annexes, available at: https://www.ecorys.com/cad.
- EFPIA, 2020, EFPIA contribution to DG Trade Consultation on "A renewed trade policy for a stronger Europe" - November 2020, available at: https://www.efpia.eu/media/578016/efpia-input-to-trade-policy-review-consultation-final.pdf.
- EFPIA, 2020, The Pharmaceutical Industry in Figures, available at: https://efpia.eu/publications/downloads/efpia/2020-the-pharmaceutical-industry-in-figures/#:~:text=annual%20statistics%20leaflet-,The%20pharmaceutical%20industry%3A%20a%20key%20asset%20to,progress%20and%20the%20European%20economy&text=The%20industry%20contributes%20over%20%E2%82%AC,million%20in%20R%26D%20in%20Europe.
- EU Science Hub, 2020, PREDICT – Prospective Insights on R&D in ICT, available at: https://ec.europa.eu/jrc/en/predict/ict-sector-analysis-2020/data-metadata.
- Euler Hermes, 2020, Bruised but not beaten, Europe's textile industry is a perfect candidate for a greener and digital recovery, available at: https://www.eulerhermes.com/en_global/news-insights/economic-insights/Bruised-but-not-beaten-Europe-s-textile-industry-is-a-perfect-candidate-for-a-greener-and-digital-recovery.html
- EURATEX, 2020, A complete recovery is still uncertain, despite some positive signals – the latest economic data show, available at: https://EURATEX.eu/news/a-complete-recovery-is-still-uncertain-despite-some-positive-signals-the-latest-economic-data-show/.
- EURATEX, 2020, Autumn Report 2020, available at: https://euratex.eu/spring-and-autumn-reports/.
- EURATEX, 2020, Economic update, available at: https://EURATEX.eu/economic-update/.
- EURATEX, 2020, Facts and key figures of the European textile and clothing industry, available at: https://EURATEX.eu/wp-content/uploads/EURATEX-Facts-Key-Figures-2020-LQ.pdf.
- EURATEX, 2020, The European Textiles and Apparel Industry in the Post Corona Era: Proposals for Recovery, available at: https://EURATEX.eu/wp-content/uploads/Post-Corona-Strategy-Final.pdf.

- Euroconstruct, 2020, Briefing on European Construction August 2020, available at: https://euroconstruct.org/ec/blog/2020_08.
- EUROCONTROL, 2021, Comprehensive Assessment of COVID-19's Impact on European Air Traffic, available at: https://www.eurocontrol.int/publication/eurocontrol-comprehensive-assessment-covid-19s-impact-european-air-traffic.
- EUROCONTROL, 2021, COVID-19 impact on the European air traffic network, available at: https://www.eurocontrol.int/covid19.
- EUROCONTROL, 2020, What COVID-19 did to European Aviation in 2020, and Outlook 2021, Aviation Intelligence Unit, available at : https://www.eurocontrol.int/sites/default/files/2021-01/eurocontrol-think-paper-8-impact-of-covid-19-on-european-aviation-in-2020-and-outlook-2021.pdf.
- Eurofound, 2019, Reshoring in Europe: Overview 2015–2018, Publications Office of the European Union, Luxembourg, available at: https://www.eurofound.europa.eu/publications/report/2019/reshoring-in-europe-overview-2015-2018.
- European Central Bank, 2020, Macroeconomic projections for the euro area, available at: https://www.ecb.europa.eu/pub/projections/html/ecb.projections202012_eurosystemstaff~bf8254a10a.en.html.
- European Central Bank, 2021, Statistical Data Warehouse, available at: https://sdw.ecb.europa.eu/reports.do?node=1000004819.
- European Cluster Alliance, 2020, How COVID-19 is impacting the Aerospace sector, available at: https://clustercollaboration.eu/news/analysis-disruptions-aerospace-defence-ecosystem.
- European Commission, 2020, A New Industrial Strategy for Europe, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0102&from=EN.
- European Commission, 2020, A Pharmaceutical Strategy for Europe, COM/2020/761 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0761.
- European Commission, 2021, Action Plan on Synergies between Civil, Defence and Space Industries 2021, available at: https://ec.europa.eu/info/files/action-plan-synergies-between-civil-defence-and-space-industries_en.
- European Commission, 2020, Automotive industry, available at: https://ec.europa.eu/growth/sectors/automotive_en.
- European Commission, 2020, Chemicals strategy, available at: https://ec.europa.eu/environment/strategy/chemicals-strategy_en.
- European Commission, 2018, Communication enabling digital transformation health and care in the digital market, available at: https://ec.europa.eu/digital-single-market/en/news/communication-enabling-digital-transformation-health-and-care-digital-single-market-empowering.
- European Commission, 2021, Construction Industry, available at: https://ec.europa.eu/growth/sectors/construction_en#:~:text=The%20construction%20industry%20is%20very,social%2C%20climate%20and%20energy%20challenges.

- European Commission, 2020, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability, available at: https://ec.europa.eu/docsroom/documents/42849.
- European Commission, 2018, EC Key enabling technologies policy, available at: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies_en.
- European Commission, 2020, EU Industry Days, available at: https://ec.europa.eu/info/policies/business-and-industry/eu-industry-days_en.
- European Commission, 2021, EU4Health 2021-2027 – a vision for a healthier European Union, available at: https://ec.europa.eu/health/funding/eu4health_en.
- European Commission, 2020, European Commission narrows down export authorisation requirements to protective masks only and extends geographical and humanitarian exemptions, available at: https://trade.ec.europa.eu/doclib/press/index.cfm?id=2132.
- European Commission, 2021, European Economic Forecast: Winter 2021 (Interim), Institutional Paper 144, Luxembourg: Publications Office of the European Union, available at: https://ec.europa.eu/info/sites/info/files/economy-finance/ip144_en_1.pdf.
- European Commission, 2020, Farm to Fork Strategy – for a fair, healthy and environmentally-friendly food system, available at: https://ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategy-info_en.pdf.
- European Commission, 2021, Guidance to Member States Recovery and Resilience Plans – Part 1, available at: https://ec.europa.eu/info/files/guidance-member-states-recovery-and-resilience-plans_en.
- European Commission, 2021, Guidance to Member States Recovery and Resilience Plans - Part 2, available at: https://ec.europa.eu/info/sites/info/files/document_travail_service_part2_v3_en.pdf.
- European Commission, 2020, Identifying Europe's recovery needs, Commission Staff Working Document, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0098(01)&qid=1591607109918&from=IT.
- European Commission, 2021, Impact of COVID-19 crisis on construction, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Impact_of_Covid-19_crisis_on_construction.
- European Commission, 2020, Joint declaration on processors and semiconductor technologies, available at: https://ec.europa.eu/digital-single-market/en/news/joint-declaration-processors-and-semiconductor-technologies.
- European Commission, 2021, Lesson learnt from COVID crisis? Resilience through increasing Europe's strategic capacity, Plenary session at the EU Industry Days, available at: https://www.youtube.com/watch?v=G4en7Et6Kkw&feature=youtu.be.
- European Commission, 2009, Preparing for our future: Developing a common strategy for key enabling technologies in the EU, COM/2009/0512 final, available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52009DC0512.

- European Commission, 2020, Press release, Commission announces actions to make Europe's raw materials supply more secure and sustainable, available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1542.
- European Commission, 2020, Questions and answers: Commission presents next steps for €672.5 billion Recovery and Resilience Facility in 2021 Annual Sustainable Growth Strategy, available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1659.
- European Commission, 2020, Recovery and Resilience Facility, available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en#:~:text=term%20EU%20budget.-,National%20recovery%20and%20resilience%20plans,should%20be%20implemented%20by%202026.
- European Commission, 2021, Regulation 2021/241 establishing the Recovery and Resilience Facility, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0241.
- European Commission, 2020, Statistics Explained: Impact of Covid-19 crisis on short-term business statistics, available at: https://ec.europa.eu/eurostat/documents/4187653/10278432/Impact+of+Covid-19+crisis+on+short-term+business+statistics/18b8a72d-1aa0-bf69-e8a1-4e9e3e4c65db.
- European Commission, 2020, Strategy for textiles, available at: https://ec.europa.eu/growth/industry/sustainability/textiles_en.
- European Commission, 2019, Strengthening Strategic Value Chains for a future-ready EU Industry. Report of the Strategic Forum for Important Projects of Common European Interest, available at: https://ec.europa.eu/docsroom/documents/37824.
- European Commission, 2020, The European Digital Strategy, available at: https://ec.europa.eu/digital-single-market/en/content/european-digital-strategy; European Commission, Shaping Europe's digital future, 2020, available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en.
- European Council, 2020, Conclusions of the President of the European Council following the video conference of the members of the European Council, available at: https://www.consilium.europa.eu/en/press/press-releases/2020/04/23/conclusions-by-president-charles-michel-following-the-video-conference-with-members-of-the-european-council-on-23-april-2020/.
- European Council, 2020, European Council Conclusions 17, 18, 19, 20 and 21 July 2020, available at: https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf.
- European Court of Auditors, 2020, Review No 06/2020: Risks, challenges and opportunities in the EU's economic policy response to the COVID-19 crisis, https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=57497.
- European Parliament, 2021, Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf.

- European Parliament think tank, 2020, Research for REGI Committee – Cohesion Policy Measures in Response to the COVID-19 Pandemic, available at: https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2020)652216.
- European Parliament, 2019, Employment in the cultural and creative sectors, available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/642264/EPRS_BRI(2019)642264_EN.pdf.
- European Semiconductor Industry Association, 2021, Press release. Semiconductor market up 6.5% in 2020, available at: https://www.eusemiconductors.eu/sites/default/files/ESIA_WSTS_PR_2012.pdf.
- Eurostat, 2020, Culture statistics - cultural employment, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Culture_statistics_-_cultural_employment.
- Eurostat, 2021, EU-27 development of retail trade volume according to product groups, January to October 2020, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:EU-27,_development_of_retail_trade_volume_according_to_product_groups,_January_to_October_2020.png.
- Eurostat, 2020, Index of total actual hours worked in the main job in the EU, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Q3_Index_of_total_actual_hours_worked_in_the_main_job_in_the_EU.PNG.
- Eurostat, 2020, International trade in medicinal and pharmaceutical products, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_medicinal_and_pharmaceutical_products.
- Eurostat, 2021, Production in industry - monthly data, Online data code: STS_INPR_M, available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_inpr_m&lang=en.
- Eurostat, 2021, Production in Industry – quarterly data [sts_inpr_q], available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_inpr_q&lang=e.
- Eurostat, 2020, Statistics explained – Healthcare personnel statistics – nursing and caring professionals, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_personnel_statistics_-_nursing_and_caring_professionals#Healthcare_personnel.
- Eurostat, 2020, Unemployment by sex and age (monthly data) - online data code: une_rt_m, available at : https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en.
- EY, 2020, COVID-19: Technology sector perspectives, available at: https://assets.ey.com/content/dam/ey-sites/ey-com/en_ca/topics/technology-sector/pdf/ey-covid-19-technology-sector-perspectives-v7.pdf?download.
- EY, 2021, Rebuilding Europe The cultural and creative economy before and after the COVID-19 crisis, GESAC, available at: https://www.rebuilding-europe.eu/.
- FIEC, 2020, Statistical Report, available at: https://fiec-statistical-report.eu/european-union.

- Five Aero, 2020, Perspectives on Passenger Air Transport in a COVID-19 World, available at: https://665b30d6-afb6-4758-92a3-96543b32cf17.filesusr.com/ugd/6a99d4_2a5c03c48e484a03bd7e8ad14ac883a5.pdf.
- FoodDrinkEurope, 2020, Data & Trends of the European Food and Drink Industry 2020, available at: https://www.fooddrinkeurope.eu/publication/data-trends-of-the-european-food-and-drink-industry-2020/.
- FoodDrinkEurope, 2020, Economic Bulletin Q2 2020, available at: https://www.fooddrinkeurope.eu/uploads/publications_documents/FoodDrinkEurope_Economic_Bulletin_Q2_2020.pdf.
- FoodDrinkEurope, 2021, Economic Bulletin Q3 2020, available at: https://www.fooddrinkeurope.eu/uploads/publications_documents/FoodDrinkEurope_Economic_Bulletin_Q3_2020.pdf.
- Fortunato P., 2020, How COVID-19 is changing global value chains, UNCTAD, available at: https://unctad.org/news/how-covid-19-changing-global-value-chains.
- Gereffi, G., 2020, What does the COVID-19 pandemic teach us about global value chains? The case of medical supplies, Journal of International Business Policy: 3, 287–301, available at: https://link.springer.com/article/10.1057/s42214-020-00062-w.
- Gouvernement Français, 2020, France Relance, available at: https://www.tresor.economie.gouv.fr/Articles/926304d1-725d-460e-9341-539298a8dbba/files/1fb207b6-9c97-44ec-988e-cad25c27927d.
- Governo Italiano – Dipartimento per le Politiche Europee, 2020, Linee Guida per la Definizione del Piano Nazionale di Ripresa e Resilienza, available at: http://www.politicheeuropee.gov.it/it/comunicazione/notizie/linee-guida-pnrr/.
- Ibn-Mohammed, T., et al., 2021, A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies, Resources, Conservation and Recycling, Volume 164, 105169, ISSN 0921-3449, available at: https://doi.org/10.1016/j.resconrec.2020.105169.
- IDC, 2020, Despite COVID-19 IDC predicts stable 2020 European ICT spending, growing in 2021, available at: https://www.idc.com/getdoc.jsp?containerId=prEUR247087620.
- IMF, 2021, January database, available at: https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update.
- IMF, 2021, World Economic Outlook Update, available at: https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update.
- Infosys BPM, 2021, The Covid-19 era a new learning curve for global healthcare, available at: https://www.infosysbpm.com/blogs/healthcare/Pages/the-covid-19-era-a-new-learning-curve-for-global-healthcare.aspx.
- International Labour Organization, 2020, Briefing note, available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_767303.pdf.

- Just Auto, 2021, Electrified vehicle buck gloomy covid trend in Europe, available at: https://www.just-auto.com/news/electrified-vehicles-buck-gloomy-covid-trend-in-europe_id198976.aspx.
- Just Auto, 2021, Global pandemic sector recovery briefing, available at: https://www.just-auto.com/news/free-to-read-global-pandemic-sector-recovery-briefing_id197509.aspx.
- KEA, 2020, The impact of the COVID-19 pandemic on the Cultural and Creative Sector, available at: https://keanet.eu/publications/the-impact-of-the-covid-19-pandemic-on-the-cultural-and-creative-sector-november-2020/.
- KHL, 2020, Euroconstruct issues forecasts for 2021-2023, available at: https://www.khl.com/1147226.article.
- KPMG, Payments deals forge ahead despite COVID-19. available at: https://home.kpmg/xx/en/blogs/home/posts/2020/07/payments-deals-soar-despite-covid-19.html.
- Le Maire, B., 2020, Strengthening the EU's resilience and strategic autonomy, The European Files, available at: https://www.europeanfiles.eu/industry/strengthening-the-eus-resilience-and-strategic-autonomy.
- Lebedeva, N., Di Persio, and F., Boon-Brett, 2017, Lithium ion battery value chain and related opportunities for Europe, Publications Office of the European Union, Luxembourg, available at: https://core.ac.uk/download/pdf/154760177.pdf.
- LEVITATE, 2020, Automated vehicles and COVID-19 – what we can learn from it, available at: https://levitate-project.eu/2020/05/14/automated-vehicles-and-covid-19-what-we-can-learn-from-it/.
- Lowe, S., 2020, Securing Europe's Medical Supply Chains Against Future Shocks, Centre for European Reform, available at: https://www.cer.eu/publications/archive/bulletin-article/2020/securing-europes-medical-supply-chains-against-future.
- Mazzucato M., 2019, Governing Missions in the European Union. Independent Expert Report, European Commission, available at: https://ec.europa.eu/info/sites/info/files/research_and_innovation/contact/documents/ec_rtd_mazzucato-report-issue2_072019.pdf.
- McKinsey, 2020, From no mobility to future mobility: Where COVID-19 has accelerated change, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/from-no-mobility-to-future-mobility-where-covid-19-has-accelerated-change.
- McKinsey, 2020, The consumer-data opportunity and the privacy imperative, available at: https://www.mckinsey.com/business-functions/risk/our-insights/the-consumer-data-opportunity-and-the-privacy-imperative.
- McKinsey, 2020, Beyond coronavirus the road ahead for the automotive aftermarket, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/beyond-coronavirus-the-road-ahead-for-the-automotive-aftermarket.
- McKinsey, 2020, Europe's digital migration during Covid-19 getting past the broad trends and averages, available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/europes-digital-migration-during-covid-19-getting-past-the-broad-trends-and-averages.

- McKinsey, 2020, How European Shoppers Will buy groceries in the next normal, available at: https://www.mckinsey.com/industries/retail/our-insights/how-european-shoppers-will-buy-groceries-in-the-next-normal.
- McKinsey, 2020, Reimaginig the auto indsutry's future its now or never, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/reimagining-the-auto-industrys-future-its-now-or-never.
- McKinsey, 2020, The second COVID-19 lockdown in Europe: Implications for automotive retail, available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-second-covid-19-lockdown-in-europe-implications-for-automotive-retail.
- McKinsey, 2020, The State of Fashion 2021: In search of promise in perilous times, available at: https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.
- Medtech Europe, 2020, The European Medical Technology in Figures – Employment and Companies, available at: https://www.medtecheurope.org/datahub/employment-companies/.
- MedTech Europe, 2021, The European Medical Technology in Figures - Market, available at: https://www.medtecheurope.org/datahub/market/.
- Mock, P., Yang, Z and Tietge, U., 2020, The impact of COVID-19 on new car markets in China, Europe, and the United States, The International Council on Clean Transportation (ICCT), available at: https://theicct.org/blog/staff/impact-covid-19-new-car-markets-china-europe-and-united-states-v-u-w-or-l.
- Montalto, V., et al., 2018, Are capitals the leading cultural and creative cities in Europe?, available at: https://www.researchgate.net/profile/Valentina_Montalto4/publication/330933998_Socio-economic_regional_microscope_series_Are_capitals_the_leading_cultural_and_creative_cities_in_Europe/links/5c5c3e6e92851c48a9c16a53/Socio-economic-regional-microscope-series-Are-capitals-the-leading-cultural-and-creative-cities-in-Europe.pdf.
- Montalto, V., et al., 2020, European Cultural and Creative Cities in COVID-19 times: Jobs at risk and the policy response, available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120876/kjna30249enn_1.pdf.
- Moore, W. P., 2020, How Will COVID Affect the Future of Autonomous Vehicles, available at: https://www.walterpmoore.com/how-will-covid-affect-future-autonomous-vehicles.
- Morning Future, 2020, Face masks, sanitiser gel and ventilators – those Italian factories switching their production, available at. https://www.morningfuture.com/en/article/2020/05/04/masks-companies-production-covid-19/912/.
- Mullin, R., 2020, COVID-19 is reshaping the pharmaceutical supply chain, Chemical & Engineering News, available at: https://cen.acs.org/business/outsourcing/COVID-19-reshaping-pharmaceutical-supply/98/i16.
- Nienaber, M., 2021, Germany urges Taiwan to help ease auto chip shortage, Reuters, available at: https://www.reuters.com/article/us-taiwan-autos-chips-idUSKBN29T04V.
- O'Keane, S., 2020, Supervised self-driving shuttles are moving COVID-19 tests in Florida, The Verge, available at: https://www.theverge.com/2020/4/6/21209964/self-driving-shuttles-covid-19-tests-florida-beep-jacksonville-navya.

- OECD, 2020, Culture shock: COVID-19 and the cultural and creative sectors, available at: https://www.oecd.org/coronavirus/policy-responses/culture-shock-covid-19-and-the-cultural-and-creative-sectors-08da9e0e/.
- OECD, 2021, Economic Outlook, Volume 2020 Issue 2, No. 108, OECD Publishing, Paris, available at: https://www.politico.eu/wp-content/uploads/2020/12/01/EO108.PDFO .pdf.
- OECD, 2020, The face mask global value chain in the COVID-19 outbreak: Evidence and policy lessons, available at: http://www.oecd.org/coronavirus/policy-responses/the-face-mask-global-value-chain-in-the-covid-19-outbreak-evidence-and-policy-lessons-a4df866d/.
- Our World in Data, 2021, Statistics and Research: Coronavirus (COVID-19) Cases, available at: https://ourworldindata.org/covid-cases?country=IND~USA~GBR~CAN~DEU~FRA.
- Pagliaro, M., and Meneguzzo, F., 2019, Lithium battery reusing and recycling: A circular economy insight, Heliyon, Volume 5, Issue 6, available at: https://www.sciencedirect.com/science/article/pii/S2405844019347012.
- Park, CY., et al., 2020, Global Shortage of Personal Protective Equipment amid COVID-19: Supply Chains, Bottlenecks, and Policy Implications, Asian Development Bank Briefs, available at: http://dx.doi.org/10.22617/BRF200128-2.
- Presidency of the Government of Spain, 2020, España Puede: Plan de Recuperación, Transformación y Resiliencia, available at: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/espana-puede.aspx.
- Pressley A., 2019, GDPR is transforming consumer trust and data security in Europe, according to Check Point survey, Intelligent CIO, available at: https://www.intelligentcio.com/eu/2019/10/31/gdpr-is-transforming-consumer-trust-and-data-security-in-europe-according-to-check-point-survey/.
- Process Worldwide, 2020, Insight into the EU Chemical Industry, available at: https://www.process-worldwide.com/insight-into-the-eu-chemical-industry-a-962997/.
- PwC Strategy&, 2020, COVID-19: Consequences for the chemicals industry – preparing for 'the day after' the global pandemic, available at : https://www.strategyand.pwc.com/de/de/implications-of-covid-19/consequences-for-the-chemicals-industry.html.
- PwC Strategy&, 2020, The Impact of COVID-19 on the European Automotive Market, available at: https://www.strategyand.pwc.com/it/en/assets/pdf/S&-impact-of-covid-19-on-EU-automotive-market.pdf.
- Rao, A., 2020, 3 ways COVID-19 is transforming advanced analytics and AI, World Economic Forum, available at: https://www.weforum.org/agenda/2020/07/3-ways-covid-19-is-transforming-advanced-analytics-and-ai/.
- Ribeiro H., 2020, Deglobalization trend gains pace in lithium battery supply chain, S&P Global, available at: https://www.spglobal.com/en/research-insights/articles/deglobalization-trend-gains-pace-in-lithium-battery-supply-chain.
- Roper, S., and Turner, J., 2020, R&D and innovation after COVID-19: What can we expect? A review of prior research and data trends after the great financial crisis, International Small Business Journal. Volume: 38 issue: 6, pp. 504-514, available at: https://journals.sagepub.com/doi/full/10.1177/0266242620947946.

- Salvador, E., Navarrete, T., and Srakar, A., 2020, Creative Industries and the COVID-19 Pandemic, available at: https://euram.academy/content/contributions/20200918-182614_X3pI4bRs.pdf.
- Semiconductor Industry Association, 2020. State of the U.S. Semiconductor Industry, available at: https://www.semiconductors.org/wp-content/uploads/2020/06/2020-SIA-State-of-the-Industry-Report.pdf.
- Smart Energy International, 2020, Europe to record a 33% increase in AI spending despite 2020 budget cuts, available at: https://www.smart-energy.com/regional-news/europe-uk/europe-to-record-a-33-increase-in-ai-spending-despite-2020-budget-cuts/.
- Soendermann, M., 2020, Zur Arbeitslosigkeit im Kultur-/Kreativsektor, Nr. 03, available at: https://kulturwirtschaft.de/zur-arbeitslosigkeit-im-kultur-kreativsektor-nr-03/.
- SPGlobal, Covid-19 the road ahead is bumpy as the European health sector recovers, 2020, available at: https://www.spglobal.com/ratings/en/research/articles/200519-covid-19-the-road-ahead-is-bumpy-as-the-european-health-care-sector-recovers-11482475.
- Tesche, T., 2020, The European Union's response to the coronavirus emergency: an early assessment. LSE 'Europe in Question', Discussion Paper Series, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3624730.
- Trading Economics, 2020, European Union Construction Output, available at: https://tradingeconomics.com/european-union/construction-output.
- UNCTAD, 2020, Global Trade Update: Global trade: a frail recovery in the second half of 2020, available at: https://unctad.org/system/files/official-document/ditcinf2020d4_en.pdf.
- Van Hove, J., 2020, Impact of state aid on competition and competitiveness during the COVID-19 pandemic: an early assessment, available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2020/658214/IPOL_STU(2020)658214_EN.pdf.
- Von der Leyen, U., 2020, State of the Union Address by President von der Leyen at the European Parliament Plenary, European Commission, available at: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1655.
- World Bank, 2021, Global Economic Prospects, available at: https://www.worldbank.org/en/publication/global-economic-prospects.
- Wynants, L. et al., 2020, Prediction models for diagnosis and prognosis of covid-19: systematic review and critical appraisal, available at: https://doi.org/10.1136/bmj.m1328.

ANNEX A: LIST OF INTERVIEWEES

The present Annex includes a list of organisations whose representatives were interviewed in the context of this study between the months of December 2020 and February 2021.

- AeroSpace and Defence Industries Association of Europe (ASD);
- BCG Hendersson Institute;
- Bruegel;
- Compendium of Cultural Policies & Trends;
- DigitalEurope;
- EIT InnoEnergy;
- European Apparel and Textile Confederation (EURATEX);
- European Association of the Machine Tool Industries and related Manufacturing Technologies (CECIMO);
- European Automobile Manufacturers' Association (EAMA);
- European Federation of Pharmaceutical Industries and Associations (EFPIA);
- FoodDrinkEurope;
- Jacques Delors Institute; and
- The European Chemical Industry Council (CEFIC).

ANNEX B: LIST OF ATTENDEES TO THE FOCUS GROUPS

The present Annex includes a list of organisations whose representatives participated in the focus groups held in the context of this study in February 2021.

- AeroSpace and Defence Industries Association of Europe (ASD);
- Austrian Institute of Economic Research (WIFO);
- BCG Hendersson Institute;
- Berlin School of Economic and Law;
- DigitalEurope;
- EIT InnoEnergy;
- European Apparel and Textile Confederation (EURATEX);
- European Federation of Pharmaceutical Industries and Associations (EFPIA);
- European Grouping of Societies of Authors and Composers (GESAC);
- European Policy Centre (EPC);
- FoodDrinkEurope;
- Jacques Delors Institute; and
- The European Chemical Industry Council (CEFIC).

The COVID-19 crisis has had a substantial impact on the EU27 economy and triggered unprecedented policy responses across Europe and the globe. With evidence on the effects on the EU industry manifested until the beginning of 2021, this report aims to address the following key issues: (1) impact of COVID-19 on the EU economy as a whole and across sectors; (2) impact on strategic value chains; and (3) necessary recovery measures to meet the needs of the EU industry.

This document was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Industry, Research and Energy (ITRE)

PE 662.903
IP/A/ITRE/2020-11

Print ISBN 978-92-846-7938-6 | 10.2861/764008 | QA-05-21-069-EN-C
PDF ISBN 978-92-846-7937-9 | 10.2861/052356 | QA-05-21-069-EN-N