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**Value Chain Resilience  
during the COVID-19 Pandemic:  
Lessons Learned in the Food  
and Natural Cosmetics Sectors**

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Value Chain Resilience during the COVID-19 Pandemic:  
**Lessons Learned in the Food and Natural Cosmetics Sectors**

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# 01

## Introduction

With the rise of the Delta variant of Covid-19 at the beginning of 2021, a study was conducted on value chain resilience. The value chains in question were food, natural cosmetics and natural pharmaceuticals with the focus on companies from regions being Baden-Württemberg and Slovenia. The Covid-19 pandemic has exposed vulnerabilities in production and supply chains throughout the EU and wider world. Various studies imply that re-organizing value chains is imperative to making them more resilient. However, the level of exposure to pandemics differed among industries. Companies had multiple options for building resilience, and the major resilience strategies vary by industry. For some, it is essential to increase the inventory of critical products<sup>1</sup>. For others, diversifying value chains ensures less dependency

on external production and, where they are dependent on external producers, ensures that such dependence is spread amongst more trading partners.<sup>2</sup>

The objective of the current study was to gain insights and lessons learned on measures and strategies that firms from the food, natural cosmetics and natural pharmaceuticals industries apply to mitigate the adverse impacts of the Covid-19 pandemic and ensure their value chains' resilience in times of crises and high uncertainty. While there are several theoretical concepts on value chain resilience, this study provides empirical examples of twenty companies from Baden-Württemberg and Slovenia, who shared their latest experiences with the effects of Covid-19 in the interviews.

<sup>1</sup>McKinsey Institute: Risk, resilience, and rebalancing in global value chains <https://www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains>, August 2020

<sup>2</sup><https://www.institutmontaigne.org/en/blog/imperative-diversify-value-chains-post-covid-19>

# 02

## Key Findings

Around 25 firms participated in the survey through individual expert interviews during the period of February and March 2021. 43 percent of companies estimated that Covid-19 harmed their business. An additional 17 percent also claimed that this impact was very negative. Especially natural cosmetic firms saw an increased demand for their services because of the widespread use of aggressive disinfectants, which had detrimental effects on human skin. On the contrary, companies operating in the cosmetics and food sectors experienced more harmful effects because their products can have a very limited shelf life. Covid-19 significantly impacted specific sales channels of the companies. 60 percent of these firms estimated that Covid-19 had a neutral impact on the industry. A third of companies estimated this impact to be negative.

Companies from the pharmaceuticals industry estimated the effects of the Covid-19 on their companies and the industry to be similar. Micro-companies from the food and cosmetic sector, on the contrary, believed their companies were more negatively impacted than other companies from the industry. Smaller and micro companies tended to experience more negative impacts from Covid-19 than medium and large companies, especially from Baden-Württemberg.

Participating companies from Baden-Württemberg estimated that their business experienced a neutral to negative impact. In contrast, participating Slovenian companies seemed to be more pessimistic and estimated that the overall effect was negative to very negative. The current study found seven major findings, which are summarized below.

How firms consider the impact on Covid-19 on their business development (March 2021)



Negative impact



No impact



Very negative impact



Positive impact

## **Finding 1: Covid-19 negatively impacted approximately 60 percent of the participating companies**

The majority of the firms that participated in the survey reported being negatively impacted by the Covid-19 pandemic. However, the kind and extent of the impact varied significantly. Larger companies have faced less harmful effects than the smaller ones. In particular, micro companies from Slovenia reported experiencing the most severely adverse effects of the pandemic. As they represented most of the Slovenian sample, companies from Slovenia reported more negative effects than

those from Baden-Württemberg. Observations from the industry perspective showed that participating companies from the cosmetic and food industries were more seriously affected than the ones from the pharma industry. The latter estimated the effects of the Covid-19 on their companies and the industry to be similar. On the contrary, micro-companies from the food and cosmetic sector believed that their companies were more negatively impacted than other companies from the industry.



	SUPPLY AND LOGISTICS	PRODUCTION	MARKET
CHALLENGES	<p> <b>Broken supply chains</b> suppliers scattered worldwide</p> <ul style="list-style-type: none"> <li>- very expensive and fragile</li> <li>- challenges ensuring supply</li> <li>- difficult to find alternative suppliers</li> </ul> <p> <b>Transport disruptions</b></p>	<p> <b>Lack of qualified and certified laborers</b></p> <p> <b>Perishable inventory</b></p>	<p> <b>Breakdown of traditional sales channels</b></p> <p> <b>Shrinking market</b></p>
SOLUTIONS	<p> <b>Strengthening VCs</b></p> <ul style="list-style-type: none"> <li>- Strengthening relationships with supplies</li> <li>- Multi-sourcing</li> <li>- Reshoring closer to home</li> <li>- Sourcing from more reliable (less JIT)</li> <li>- Shortening VCs</li> <li>- Supply chain mapping &amp; stress testing</li> <li>- Digital solutions for better transparency and traceability</li> </ul> <p> <b>Higher stock levels</b></p> <p> <b>Moving operations in-house</b></p>	<p> <b>Governmental compensation policies</b></p> <p> <b>Implementation of new technologies</b></p>	<p> <b>e-sales channels (for B2C)</b></p> <p> <b>New (B2B) market segments</b></p> <p> <b>Change of portfolio</b></p> <p> <b>New innovative products</b></p> <p> <b>Marketing innovations</b></p>

The main challenges and solutions for VCs resilience

## **Finding 2: Covid-19 impacted both ends of the value chains – demand and supply**

Participating companies have faced different problems in various parts of their value chains, and we observed different mitigation strategies depending on the countries, industries, and companies' sizes. Most issues on the supply were broken supply chains. Especially in cases when raw material was sourced from outside Europe.

On the demand side, the key issue was that due to tough lock-down regulations, traditional sales channels did not work anymore.

However, many firms are able to respond in a proper way, by multi-sourcing approaches or higher stock levels to assure sustainable the supply.

Other firms established e-sales channels in order to better reach out to their customers. Some adopted measures have already brought positive results after a short period. However, there is still a significant number of companies that are still looking for solutions to issues caused or accelerated by the pandemic.

## **Finding 3: Companies faced two major market-related problems – lower demand and breakdown of traditional sales channels**

Most participating companies were not prepared, especially those that rely almost exclusively on traditional sales channels, such as pharmaceutical companies. The companies that primarily sell to the HoReCa sector<sup>3</sup> tried to find new market segments but were only partially successful since finding new B2B customers requires time. Companies that sell directly to the end consumers (B2C) went online or strengthened their online channels in both countries, regardless of their size or industry. For the majority, the strategy proved successful but could not fully compensate for all the lost offline sales. The study observed that some cosmetic and pharma companies from Baden-Württemberg still needed to fine-tune their strategies to mitigate the market-related challenges. They faced additional problems where their sales

depended on advice (i.e., cosmetic sector), doctors' recommendations, or other face-to-face situations. For some, reducing the product portfolio and focusing on the best-selling products helped cut the costs, retain key personnel, and was a successful short-term measure. Companies reported that direct sales to consumers online also required intensified communication with them and continuous marketing and product innovation to attract their attention. For example, a Slovenian micro company launched a new, highly customizable product suitable for selling online. They introduced 3D printing technology and offered a personalized gingerbread product for special occasions (i.e., Valentine's Day, Mother's Day, etc.) that has already become a sales hit.

<sup>3</sup>hotel, restaurant and catering sector





## **Finding 4: The majority of companies in the study did not face significant production Covid-19 related challenges**

Production difficulties were mainly temporary and related to lockdown measures that created specific resource bottlenecks, primarily due to the lack of qualified workers because of lockdown measures or sick leave absences. Individual companies faced issues with perishable inventory. Therefore, the main lessons learned were to consider implementing new technologies to compensate for the absence of a workforce and that they needed to strengthen their supply chains. Governmental support significantly varied between Baden-Württemberg and Slovenia. Whereas many companies in Baden-Württemberg used different governmental aid packages (on the regional and national level) for retaining their employees, this was rarely the case

in Slovenia. Participating companies from Slovenia revealed that they did not expect governmental help or were not eligible for receiving governmental support. This could explain why some Slovenian companies also expressed overall dissatisfaction with poor policies that could be vulnerable to abuse. It can be observed that for German companies, mainly those active in the phytopharmaceutical sector, bottom-up approaches such as exchanging ideas and networking with other companies were a common solution. This helped to learn how to best deal with Covid-19 related challenges. The well matured network and cluster landscape in Baden-Württemberg helped these companies to connect and to respond to the Covid-19 challenge.

## **Finding 5:** The majority of companies have combined and implemented multiple strategies to increase their resilience and stability

Some participating companies faced problems related to broken supply chains and transport disruptions during the pandemic and needed to find short-term solutions. For others, Covid-19 raised the importance of working on preventive measures to strengthen their supply chains and make them more resilient and efficient. Though planned for some time, they had not been fully implemented due to a lack of resources. The majority of participating companies in both countries already had short value chains. Nevertheless suppliers scattered worldwide proved to be very fragile during the pandemic due to transport and logistics problems. This issue represented the biggest problems for companies sourcing from non-EU sources (e.g., Asia and Africa). This was more commonly reported in Baden-Württemberg. The Slovenian micro-companies faced fewer problems as they either sourced locally or from the EU or worked with a few reliable (big) distributors from the EU. The latter took responsibility for sourcing ingredients from across the world. The most commonly mentioned strategies were: strengthening the relationships with suppliers, multi-sourcing, sourcing from more reliable suppliers, reshoring closer to home, and shortening value chains.

Implemented mitigation strategies differed to some extent among regions and industries. Companies from Baden-Württemberg even **strengthened the relationships with suppliers** in already short supply chains. In some cases, they also provided financial support (e.g., extended contracts with farmers to give them access to funds) to ensure suppliers could deliver, even under Covid-19 restrictions as they had no alternative sourcing options. Good relationships also proved to be fruitful in cases where a traditional supplier of one ingredient supplied the food company with a missing ingredient usually provided by other suppliers.

We observed this strategy combined with sourcing from more reliable suppliers rather than the cheapest suppliers in the food sector. A German company activated their excess warehouse capacity to stock up for the unpredictable future, proving that a trend toward holding more inventory is already underway. Some companies considered moving some of their operations in-house or offering only products with substantial resources at their location, making them less dependent on external supply. Participating companies from Slovenia

mentioned multi-sourcing more often, while companies from Baden-Württemberg, primarily relying on imports from outside the EU, have been trying to reshore closer to home. As it is difficult to find reliable suppliers in the short run, this strategy is ongoing. More often, companies in Slovenia mentioned that they would like to shorten their value chains further, mainly if they use intermediaries. Despite general trends in the manufacturing industry, only three participating companies considered stress testing their supply chains, and only two of them had actually implemented this measure. Both companies were large and from the food sector. Smaller companies lack the resources to implement such solutions.



	STIMULI	AREAS	CHALLENGES
MARKET	<ul style="list-style-type: none"> <li> Sales through <b>new channels</b></li> <li> Improved <b>communication</b></li> <li> Better <b>transparency</b> and <b>traceability</b></li> </ul>	<ul style="list-style-type: none"> <li> <b>e-commerce</b></li> <li> <b>Communication</b> with clients / customers / suppliers</li> </ul>	<ul style="list-style-type: none"> <li> <b>High costs</b></li> <li> Lack of <b>digital skills, problem attracting skilled employees</b></li> <li> Company <b>not ready</b></li> <li> Lack of <b>digital infrastructure</b></li> <li> Lack of <b>digital solutions on the market</b></li> <li> <b>Incompatibility</b> issues</li> </ul>
COMPANY	<ul style="list-style-type: none"> <li> <b>Optimization</b> and <b>efficiency</b></li> <li> <b>Ensuring smooth operations</b></li> <li> Improved <b>communication</b></li> </ul>	<ul style="list-style-type: none"> <li> <b>Production</b> and <b>internal processes</b></li> <li> <b>Testing</b> and <b>quality assurance</b></li> <li> <b>Big data</b> (for R&amp;D)</li> </ul>	

Areas where Digitalization impacted and related key challenges

## **Finding 6:** Digitalization is perceived as very important for business in general and not only for solving Covid-19 related problems

Especially micro-companies from the food and the cosmetic sector, both from Slovenia and Baden-Württemberg, stressed that digitalization has been essential during the pandemic. This was primarily for reaching their end-consumers through e-commerce and digital channels. Simultaneously, it can be observed that Covid-19 accelerated ongoing digitalization activities in participating companies from Baden-Württemberg operating in the cosmetic and phytopharmaceuticals sectors.

In general, participating German companies paid more attention to digitalization than Slovenian companies. Early adopters could be found among large German companies that usually develop their own digital solutions. Slovenian companies mainly classify themselves as followers and use digital solutions provided by third parties. Almost all respondents from Baden-Württemberg said that digitalization has been essential for their businesses in general. Consequently, they also

experienced more challenges brought by digitalization, mainly high costs (and long return on investment), lack of digital skills, and difficulty attracting skilled employees. Often the companies were not fully ready and faced incompatibility problems (e.g., with different internal departments of suppliers, and some from less developed countries are not digitalized at all). The lack of appropriate digital tools on the market seems to be a problem in the pharmaceutical sector.

Companies found it hard to adopt ready-made digital solutions for some of their business processes, such as R&D and clinical studies and quality assurance systems. Smaller companies found it challenging to find digitalization experts.

Digitalization is essential in general, and Covid-19 only accelerated it. However, for the majority of firms it was not crucial for addressing pandemic-related challenges.

## **Finding 7: Digitalization is vital for market-related uses as well as for improving internal processes and operations**

On the market side, strengthening **e-commerce** with end-consumers prevails in both countries as it added complementary sales channels to traditional ones. Additional primary stimuli for implementing digital tools are **improved marketing communications** and **transparency**, which the consumers requested. The micro food and cosmetics companies from Slovenia mentioned better company and product visibility, brand awareness building, and improved competitive position on the market. The introduction of digital tools also helped their business operations to be smoother. However, their processes and organization are less complex, so simple solutions such as Excel can often be sufficient.

Participating companies from Baden-Württemberg experienced **optimization of production and internal processes**. This could be mainly observed with medium and large companies operating within the phythopharmaceuticals and cosmetics sectors. Digitalization in this area has already brought some positive effects. For example, digital tools improved and stabilized production and testing processes and they also improved the efficiency of quality assurance systems. They provided big data for R&D. They could also see positive effects of digitalized communication and documentation with suppliers, which improved traceability and transparency. Additionally, companies from Baden-Württemberg emphasized **easier and more efficient internal communication** as an essential stimulus for increased digitalization. Slovenian companies mentioned time and financial savings by lowering travel costs.



# 03

## Covid-19 Impact Mitigation Strategies

Companies have adapted differently to the challenges caused by Covid-19. The majority of companies have combined and implemented multiple strategies to increase their resilience and stability. While some have tackled these challenges with successful strategic adjustments, like introducing new products or innovative risk management inside their value chains, some have not had adequate financial resources or time to mitigate all the challenges. In addition to individual companies' mitigation strategies, networking and learning from other companies how best to deal with the impact of Covid-19 has been very important. It was mostly seen as a popular approach in Baden-Württemberg and in the phytpharmaceuticals

sector in particular. Most of the participating companies did not request/need additional governmental help. Only a handful of companies used governmental support for their employees (paid sick leave or aid to retain the employees).

Companies used different mitigation strategies to cope with each of the value chains' problems and ensure better value chains' resilience. Some of these were already present before Covid-19, and the pandemic only accelerated them. For some challenges, mitigation strategies still need to be developed. The Covid-19 problems that required mitigation challenges were market, production or sourcing and logistics-related.



Companies used **different mitigation strategies** to cope with each of the value chains' problems and ensure better value chains' resilience.

# 3.1

## Market-related challenges mitigation applied by the firms

### Increasing sales through e-sales channels.

This strategy was mainly used by companies selling directly to end-consumers (B2C), principally in the food and cosmetics sector. Some firms increased their activities in this area, and some started with online sales to overcome the problem of unreachable traditional sales channels. For the majority, this strategy proved successful. However, for many participating companies, e-commerce sales could not fully compensate for the overall sales loss. This was especially notable in the pharmaceuticals sector and, to a limited extent, in the cosmetics industry. They considered e-sales channels to be inferior because they failed to provide their customers advice on the best product due to the break down of traditional sales channels. They are still exploring the most appropriate mitigation strategies.

### Increased sales to other market segments.

Covid-19 severely negatively impacted one company from Slovenia that managed to enter new B2B segments to compensate for their lost revenue. Due to lower demand in their traditional HoReCa segments, they partnered with the cruise sector to mitigate Covid-19 impacts. Some firms that faced lower demand made a shift from B2C to B2B customers, utilizing their excess warehouse capacities to stock up and successfully fulfill the shifting market demand.

### Temporary change of product portfolio.

To cut costs, some of the participating companies made temporary changes in their product portfolios. They mainly reduced their product portfolio, focusing on products for which they produced resources at their location. This made them less dependent on external supplies or the best-selling products only. A company that focused on its best-selling products only considered this mitigation measure successful since it reduced the costs, and the firm could retain its key personnel.

### Launching new products.

A smaller company in the food sector used Covid-19 as an opportunity to launch a new product that is highly customizable and suitable for online sales and is already a great success with record sales. They introduced 3D printing technology and offered a personalized gingerbread product for special occasions (e.g., Valentine's Day, Mothers' Day, etc.).

### Marketing innovations.

Some companies are aware of the importance of e-commerce. However, they have not yet used any solutions in this area, partly due to specific policy barriers (e.g., mandatory prescriptions for some products within pharmaceutical markets). The company admitted they did not pay enough attention to this issue before Covid-19 because they relied on their traditional sales channels i.e., functioning healthcare systems. In general, the participating companies also reported that direct sales to consumers online also require intensified communication with them and continuous marketing and product innovation to attract their attention.

### Implementation of new technologies.

One of the main lessons learned was considering implementing new technologies to compensate for the workforce's absence. For example, a smaller company in the cosmetic sector claimed that they implemented new technology in their internal processes to help cope with Covid-19 related issues.

# 3.2

## Mitigation of supply and logistics-related challenges

### Strengthening relationships with existing supplies.

Some companies from Baden-Württemberg intensified well-established relationships and provided financial support to ensure suppliers could deliver even under Covid-19 restrictions (e.g., extended contracts with farmers to provide them with access to funds). Suppliers of some products helped companies to find the missing ingredients from other suppliers.

### Diversifying supply chain targets multi sourcing, reshoring closer to home and higher stock levels.

**Multi-sourcing** is difficult since it is hard to find reliable suppliers, particularly in the short run. Such changes are also challenging for some niche ingredients. There are a limited number of suitable suppliers, and sometimes they also lack negotiation power because they do not need large amounts of supplies. Participating companies from Slovenia were more likely to mention multi-sourcing. **Reshoring closer to home addresses the same problem** as it is difficult to find reliable suppliers in the short run. Some companies expressed that this mitigation strategy worked well for the challenges related to Covid-19. For example, one company faced an issue with missing ingredients but, they found a substitute supplier within the EU with their laboratory's help. Some micro companies were successful in doing this as they only need a limited quantity of raw materials. Participating companies from Baden-Württemberg, primarily relying on imports from outside the EU, were more likely to mention reshoring closer to home. Higher stock level seems appealing but only one company from Baden-Württemberg used its excess warehouse capacity to stock up for the unpredictable future. They claimed this strategy saved the company's business during Covid-19 related uncertainty.

### Moving operations in-house.

Some companies implemented in-house operations and found this strategy to be successful in addressing Covid-19 related challenges. Some companies are still considering this mitigation strategy but couldn't implement it yet, as they lack resources (financial and labor). They also mentioned lack of time as being one of the contributing issues.

### Shortening supply chains.

In general, the majority of participating companies already described their value chains as short. Participating companies from Slovenia mentioned that they would like to shorten their value chains further, especially if they use intermediaries.

### Strategic supply management.

One large company had a **separate division** that could react promptly in the event of supply chain issues. This became an asset during Covid-19 since the team were able to shift raw material supply from one region to another.

### Using digital solutions.

A larger company used digital solutions to organize air cargo supply to solve shifting supply sources.

# 3.3

## Mitigation Through Improved of Digitalization

Digitalization has been of the **utmost importance for business operations before and during the Covid-19 pandemic**. With digitalization and digital solutions, companies have tackled many challenges that emerged due to the pandemic. Simultaneously, the increased digitalization level means more traps and unprecedented barriers, especially when implementing and financing digital solutions. In this section of the study, we examined the latest trends in digitalization among the participating companies. We outlined challenges that expanding business digitalization poses to the participating companies in the bio-based industry.

The vast majority of the participating companies believed that **digitalization was very important for them**, particularly for companies from Baden-Württemberg. However, the majority of companies estimated that digitalization **was not an essential factor in addressing Covid-19 related challenges**. Micro-companies from study focus regions claimed digitalization helped them cope with challenges posed by Covid-19, primarily

for reaching their end-consumers through e-commerce and digital channels.

In general, there is a different approach to digitalization depending on company size. Larger companies from Baden-Württemberg are much more likely to have their digital solutions developed in-house. Smaller Slovenian companies predominantly used solutions offered by external providers. Companies with developed digital solutions were more likely to claim that Covid-19 accelerated their digitalization. Companies in Baden-Württemberg also considered digitalization to be more important than companies in Slovenia.

Around one-fifth of the participating companies estimated that Covid-19 **accelerated their digitalization**. In participating companies from both the cosmetics and pharmaceuticals sectors in Baden-Württemberg, there is a noticeable trend that Covid-19 accelerated digitalization. However Covid-19 played only a minor role in accelerating digitalization in the bio-based food sector.

In terms of the adoption of digitalization, some differences can be noticed regarding the size of the companies as well as their country of origin.



The **majority** of participating bio-based companies in both countries are followers in the area of **digitalization**.



All of the companies that said they were **early adopters** of digital tools were **large companies** based in Baden-Württemberg and Switzerland.



All of the **fast followers** are **micro-companies** from Slovenia. They were present in the cosmetics and food sectors.

## Stimuli for digitalization

In general, participating companies from Baden-Württemberg paid more attention to digitalization than the Slovenian companies. Participating companies stated different stimuli for their digitalization.

**New online sales channels** – vital for all companies selling to the end consumers (B2C), prevalent in food and cosmetics sectors in both regions. Related to the optimization of internal processes, it was mainly mentioned by participating companies from Baden-Württemberg. It was very important for ensuring smooth business operations, digitalization for more efficiency on all levels, digitalization for better communication and transparency within the company. Related to this was better market communication and position which was mainly mentioned by the micro food and cosmetic companies from Slovenia. This ensured they could meet the demand for more transparency, general awareness in the company, better competitive position and keep up with trends (especially for micro-companies)

**Better supply chain management** is more important for larger companies. **R&D and quality assurance** was mainly mentioned by participating companies from Baden-Württemberg who said

digitalization for data collection for improvements in R&D and digitalized processes helped with quality assurance

The participating companies increased their digitalization in internal processes and marketing and sales operations. Particular areas with increased digitalization are e-commerce in companies selling directly to the end consumers and digitalization of



internal processes and production process, followed by digitalization of testing processes, use of big data and better communication with clients and customers. Digitalization of communication and documentation with suppliers emerged as a growing demand, especially by larger companies from Baden-Württemberg. The fully digitalized quality assurance process became a viable option for larger companies from Baden-Württemberg

Increased digitalization has already brought some positive effects to the participating companies. The most important effects for the majority are **improved internal processes** and **increased sales through e-commerce**. Other positive effects also included stability of production processes, and higher efficiency of quality assurance systems, improved communication throughout the value chain, transparency and traceability.

Despite these positive effects, digitalization has also brought many challenges. Most participating companies in Baden-Württemberg tended to experience issues with the high costs of digitalization. Two-thirds of all interviewed companies from Baden-Württemberg complained that high costs were a significant issue impacting companies across sectors, regardless of their size. Some companies also expressed concerns about problematic return on investment, indicating that the costs are recuperated too slowly. The majority of participating companies in Slovenia did not mention issues regarding costs of digitalization. However, individual companies complained that they had difficulties finding suitable financing options for digitalization and were disappointed that there was a lack of governmental support.

# Barriers for digitalization



## Lack of digital skills

Two-thirds of firms in Baden-Württemberg expressed concerns over a lack of digital skills of their employees. It is an issue that is present in every sector. Some companies from Baden-Württemberg complained that their employees did not have sufficient digital skills and that it is challenging to find skilled workers on the market. Some companies, especially in the pharmaceutical sector, complained that IT personnel's motivation is an issue. It is also challenging to attract workers with relevant competencies and this makes digitalization processes more difficult. Some smaller companies expressed concerns that their staff needed additional training and that it is difficult to find appropriate digitalization experts. Small and micro firms expressed limited resources due to their size. Consequently, they have limited abilities to provide the necessary in-house IT support. However, not a single company experienced issues with an external lack of digital skills (i.e., external providers unable to fulfill their needs).



## The company was not ready for digitalization

Some of the respondents mentioned that digitalization was challenging to achieve in such a relatively short period due to the complexity of their operations. This caught the company by surprise. Some companies said they were not yet ready for complete digitalization because they had a highly specialized production process. Micro firms say that they do not need fully digitalized business and therefore use ad-hoc digital solutions such as in-house developed Excel spreadsheets for tracking inventory, orders, invoicing, etc.

Larger firms that used digitalization for multiple purposes (R&D, production, etc.) faced some difficulties in incompatibilities that emerge from using different software within various firm departments. Many suppliers cannot adapt their systems to the firm's digital approach. Firms found it hard to adopt ready-made digital solutions for business processes, such as R&D and clinical studies, and quality assurance systems. It seems to particularly true in the pharmaceuticals sector.

# 04

## Conclusion and Future Challenges

The deep dive into the resilience of value chains during the pandemic revealed that firms active in food, natural cosmetics, and natural pharmaceuticals sectors found new business models and approaches.

Manufacturers worldwide are going to be under greater political and competitive pressures to increase their domestic production, grow employment in their home countries, reduce or even eliminate their dependence on sources that are perceived as risky, and rethink their use of lean manufacturing strategies that involve minimizing the amount of inventory held in their global supply chains. Consumers will continue to demand low prices and manufacturers will not be able to charge more just because

they produce in higher-cost home markets. In addition, the pressure to operate efficiently and use capital and manufacturing capacity frugally will be unrelenting. Increased digitalization and automation might be one of several ways to help firms mitigate these challenges. The challenging tasks of the post-pandemic period are those which might seem less important during a crisis but are critical for resilience in the long run. That is, prioritizing sustainability, digitalization, and talents.

Covid-19 influenced both ends of the value chain, demand and supply, as well as production. The three main categories were market, production and supply and logistics-related challenges which are presented here.



MARKET



PRODUCTION



SUPPLY



## Market

Market-related challenges included **a shrinking market**. Lower demand and shrinking a market were mainly related to the breakdown of traditional sales channels. This issue was especially notable for companies operating in close cooperation with hotels, restaurants catering, etc. (the HoReCa sector), which had to limit or even halt their business operations entirely. Breakdown **of traditional sales channels** significantly impacted participating companies operating in market sectors heavily dependent on specific sales channels to reach their customers. In Baden-Württemberg, issues emerged in the pharmaceutical and cosmetics sectors because companies lost their traditional sales channels. Many patients lost their doctors' access (especially notable during the long second wave). Consequently, participating pharmaceutical companies had

an unexpected drop in demand for prescription drugs. Due to regulatory limitations, it was difficult for them to switch to online channels. In the cosmetics sector, participating companies from Baden-Württemberg did manage to shift their sales to e-channels. However, they could not compensate for the overall sales losses. Some companies in this sector also complained that their customers could not receive consultant advice on the best product for their issues because their traditional offline sales channels broke down. All participating Slovenian companies that experienced very negative impacts of Covid-19 operated in the food industry. The companies primarily reliant on the HoReCa market segment reported lockdown measures and uncertainty in the tourist industry severely impacted their business. They are still searching for long-term solutions.





## Production

The majority of participating companies did not experience significant problems with production. Those who faced them had issues with a lack of qualified and certified laborers because of lockdown restrictions or absences due to sick leave. This caused them some bottlenecks but fortunately did not significantly impact their operations.

Firms in the food sector faced a unique challenge of perishable inventory due to lower demand. A company that mentioned this issue could not yet find a solution, as its customers mainly came from the HoReCa sector, and it is complicated to substitute them in the short run.





## Supply

Supply and logistics-related challenges mainly related to broken supply chains. Several issues existed even before Covid-19 and escalated during the pandemic. Larger firms have many suppliers scattered worldwide, which proved to be very expensive and fragile. Firms from Baden-Württemberg were more likely to experience difficulties with broken supply chains than Slovenian firms. The main reason was that they were more likely to be sourced from outside the EU (e.g. Asia, Africa). Most affected companies could find a positive solution for their broken supply chains by combining different mitigation strategies. The Slovenian micro-companies faced fewer problems as they either sourced locally or from the few reliable (big) distributors from the EU. The latter take responsibility for sourcing ingredients from worldwide. Firms expressed that it is difficult to find alternative suppliers in a short

timeframe, and therefore they have not yet resolved the issue of broken supply chains. One micro company even had to cease their operations for extended periods (2 months) because they could not obtain raw materials from their suppliers in Germany, who in turn faced difficulties obtaining raw materials from Africa.

Several large and small companies stated that they faced logistical issues with overseas supplies (e.g., with Africa /Asia as main sourcing markets). In some cases, suppliers' prior warnings about potential logistic difficulties enabled a company to react appropriately and avoid unnecessary issues. One larger company faced a significant challenge with its logistics. In one case, the company said that it had experienced issues with outbound logistics due to significantly lower market demand. They handle fruit and vegetables, which are difficult to store, and have short expiration dates, and had not yet found a solution to this issue.



# 05

## Literature and Sources

Accenture. Resilient Supply Chain. Accessible via: [https://www.accenture.com/us-en/services/supply-chain-operations/resilient-supply-chain?c=acn\\_glb\\_supplychainresimediarelations\\_11636094&n=mrl\\_1020](https://www.accenture.com/us-en/services/supply-chain-operations/resilient-supply-chain?c=acn_glb_supplychainresimediarelations_11636094&n=mrl_1020)

Bio-based Industries Consortium. The bio-based industries – key to the EU's green recovery, June 2020. Accessible via: <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKFwjK-j6SwqZbuAhWMCOWKHLBC60QFjAAegQI-ARAC&url=https%3A%2F%2Fbiconsortium.eu%2Ffile%2F2142%2Fdownload%3Ftoken%3DIEr-B76Xp&usq=AOvVaw18iYXXEh9381ycsqjOhKlx>

Clingendael. COVID-19 impact on the Value Chain – Conceptual paper, June 2020. Accessible via: [https://www.clingendael.org/sites/default/files/2020-06/Conceptual\\_paper\\_COVID-19\\_impact\\_on\\_the\\_Value\\_Chain\\_June\\_2020.pdf](https://www.clingendael.org/sites/default/files/2020-06/Conceptual_paper_COVID-19_impact_on_the_Value_Chain_June_2020.pdf)

Deloitte. It's time to optimize supply chains for a post-COVID-19 future, March 2021. Accessible via: <https://www2.deloitte.com/nz/en/blog/consulting/2021/it-s-time-to-optimise-supply-chains-for-a-post-covid-19-future.html>

Deloitte. Looking beyond the horizon. Preparing today's supply chains to thrive in uncertainty, December 2020. Accessible via: <https://www2.deloitte.com/us/en/insights/focus/industry-4-0/supply-chain-future-post-pandemic.html>

Deloitte. COVID-19 Impacts on Supply Chains, Sustainability and Climate Change, June 2020. Accessible via: <https://www2.deloitte.com/global/en/blog/responsible-business-blog/2020/covid-19-impacts-on-supply-chains-sustainability-and-climate-change.html>

Foley. Global Supply Chain Disruption and Future Strategies Survey Report, September 2020. Accessible via: <https://www.foley.com/-/media/files/insights/publications/2020/09/foley-2020-supply-chain-survey-report-1.pdf>

Foley. Global Supply Chain Disruption and Future Strategies, 29. September 2020. Accessible via: <https://www.foley.com/en/insights/publications/2020/09/global-supply-chain-disruption-future-strategies>

Institut Montaigne. The Imperative to Diversify Value Chains Post-Covid-19, 23. June 2020. Accessible via: <https://www.institutmontaigne.org/en/blog/imperative-diversify-value-chains-post-covid-19>

International Advisory Council on Global Bioeconomy. Expanding the sustainable Bioeconomy – Vision, and Way Forward. Communiqué of the Global Bioeconomy Summit 2020, November 2020. Accessible via: [https://gbs2020.net/wp-content/uploads/2020/11/GBS2020\\_IACGB-Communique.pdf](https://gbs2020.net/wp-content/uploads/2020/11/GBS2020_IACGB-Communique.pdf)

McKinsey Risk, resilience, and rebalancing in global value chains, August 2020. Accessible via: <https://www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains>

[www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains](https://www.mckinsey.com/business-functions/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains)

MDPI. Developments of Economic Growth and Employment in Bioeconomy Sectors across the EU, 2. June 2020. Accessible via: <https://doi.org/10.3390/su12114507>

MDPI. Digital Innovation Hubs as a Tool for Boosting Biomass Valorisation in Regional Bioeconomies: Andalusian and South-East Irish Case Studies, 14. October 2020. Accessible via: <https://doi.org/10.3390/joitmc6040115>

MDPI. Understanding Business Environments and SuccessFactors for Emerging Bioeconomy Enterprises through a Comprehensive Analytical Framework, 30. October 2020. Accessible via: <https://doi.org/10.3390/su12219018>

MIT. Amid shutdowns, supply chains pivot, and global demand for specialized talent intensifies, 13. April 2020. Accessible via: <https://news.mit.edu/2020/amid-shutdowns-supply-chains-pivot-demand-for-specialized-talent-intensifies-mitx-micromasters-0413>

OECD. Shocks, risks, and global value chains: insights from the OECD METRO mode, June 2020. Accessible via: <http://www.oecd.org/trade/documents/shocks-risks-gvc-insights-oecd-metro-model.pdf>

RINA. Best practice for the digitalization of the wood and agrifood supply chains of SMEs – draft report, August 2020. Accessible via: <https://alpine-region.eu/publications/report-best-practice-digitization-wood-and-agrifood-supply-chains-smes>

SupplyChain. Accenture and MIT: Stress Testing Supply Chain Resilience, 27. October 2020. Accessible via: <https://www.supplychaindigital.com/supply-chain-2/accenture-and-mit-stress-testing-supply-chain-resilience>

SupplyChain. Procurement Risk Management: Supply Chains Under Attack, 10. January 2020. Accessible via: <https://www.supplychaindigital.com/supply-chain-risk-management/procurement-risk-management-supply-chains-under-attack>

Transnational Corporations, Volume 27, Issue 2. Digital transformation of global value chains and sustainable post-pandemic recovery, 21. September 2020. <https://doi.org/10.18356/d30d9088-en>

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