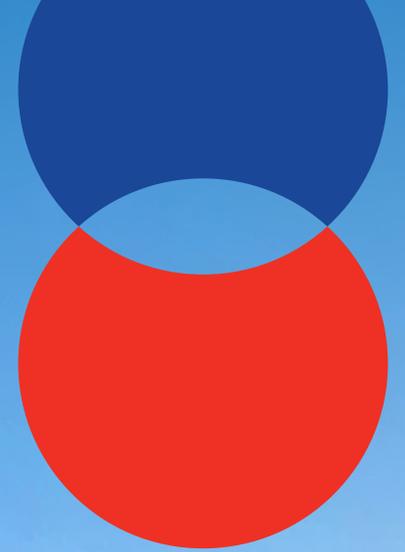


The Conference  
Board of Canada

# COVID-19 Global Supply Chain Disruptions

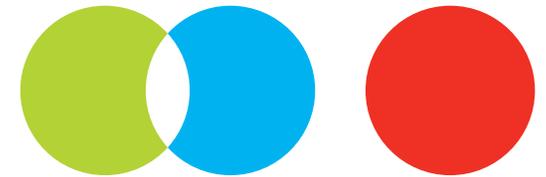
A Catalyst for Long-Term Changes?

Issue Briefing | April 2020



# Contents

- 3** Key findings
- 5** COVID-19 disrupting global value chains
- 6** COVID-19 disruptions: Pressing fast-forward to the future
- 10** COVID-19 will have a mixed impact on GVCs
- 13** Conclusion
- 15** Methodology
- 16** Appendix A  
Bibliography



# Key findings

- Even after the number of COVID-19 cases starts to fall, containment measures—and the associated supply chain disruptions that come with them, such as travel restrictions—could persist as governments work to avoid a reintroduction of the virus and new outbreaks. As such, global supply chain operations will likely be slow to return to pre-outbreak levels.
- The severity and length of COVID-19 disruptions in global supply chains could prompt businesses to rethink the way they operate at home and abroad, accelerating trends that were already under way prior to the COVID-19 outbreak.
- We expect consumers and businesses to rely more on digital solutions after the crisis than they did before. Businesses that can take advantage of online platforms and other digital technologies will be in a better position to handle supply chain disruptions, both now and in the future, and to grow production and sales over the longer run.
- Export restrictions introduced by several countries are escalating the global trade protectionism trend that was already under way before the outbreak. But, as a global health and economic crisis, defeating the COVID-19 pandemic requires a cooperative approach rather than a protectionist one. Global cooperation is needed not only to tackle the health crisis, but also to restore trust in global supply chains and maintain the benefits that the growth in global trade has brought over the last two decades.
- Containment measures imposed to stop the spread of COVID-19 have compelled businesses to lay off or significantly reduce the working hours of many workers. This is an opportunity to reskill workers so they are in a better position to tackle the new business, employment, and technological realities that will be more mainstream once the crisis is over.



**The coronavirus pandemic (COVID-19) is claiming human lives and creating economic turmoil around the world. The pandemic is disrupting supply chains, deterring business investment, and stymying consumer spending.**



The plunge in global exports will likely be the largest in modern times—larger than those resulting from any recent trade war or natural disaster.<sup>1,2</sup> Exports from North America and Asia are expected to be the hardest hit.<sup>3</sup>

Even once the number of cases starts to fall, containment measures—and the associated supply chain disruptions, such as travel bans and restrictions, and bottlenecks at borders—are likely to persist as governments work to avoid a reintroduction of the virus and prevent new outbreaks. We can see this in China and Singapore where, having brought the number of cases within their borders under control, the authorities recently retightened their containment measures following an uptick in the spread of the virus. This suggests that global supply chains operations will be slow to return to their pre-outbreak levels.<sup>4</sup>

This period of heightened disruptions in global supply chains could be the catalyst prompting businesses to completely rethink the way they operate, interact with suppliers and buyers at home and abroad, and make long-lasting changes. In turn, these disruptions could accelerate trends that were already under way prior to the COVID-19 outbreak.

1 World Trade Organization, “Trade Set to Plunge.”

2 Donnan and others, “A Covid-19 Supply Chain Shock.”

3 World Trade Organization, “Trade Set to Plunge.”

4 Rich, “Why Asia’s New Wave of Virus Cases Should Worry the World.”

# COVID-19 disrupting global value chains

Wuhan, the capital of the Chinese province of Hubei, is a major manufacturing hub and home to the largest inland port in China. And it was here that the COVID-19 outbreak was first identified. From the start of the outbreak in December 2019, factory closures and other containment measures in Wuhan<sup>5</sup> began to have an impact on the economies of Europe, the United States, and many other countries, including Canada. The effects of production stoppages rippled through value chains. The coronavirus quickly spread from China and its neighbouring countries (Singapore, Japan, South Korea) to Europe (with Italy and Spain getting hit the soonest and hardest). Within weeks, it hit the U.S., where by early April the number of individuals infected exceeded the number in China, Italy, and Spain combined.<sup>6</sup>

In the weeks before the COVID-19 pandemic erupted in the United States, U.S. domestic production was already suffering because firms that rely on supply chain links with China and other Asian countries found themselves facing input shortages. In turn, these shortages dampened exports, profitability, and investment in the United States. State-level measures were introduced in different parts of the United States to contain the virus, further interrupting production and disrupting supply chains.

For example, many automotive companies, including Ford, General Motors, Toyota, Honda, and Fiat Chrysler, stopped production and closed factories across North America, including many in Canada.<sup>7</sup>

Overall, the demand and supply shocks to Canada's key trading partners—the United States, China, the EU, and the U.K.—are severely disrupting global supply chains and battering Canada's export sector. The depressed economic activity in the United States, in particular, will have a profound impact on Canada's export sector, with raw materials (such as crude oil) and durable goods (such as motor vehicles and machinery and equipment) taking the biggest hits on the goods side. On the service side, exports of travel and transportation services will be hit the hardest.

There is still uncertainty about the duration of the COVID-19 impacts and their broader implications. Health experts suggest the virus could stick around and become endemic in the human population, much like influenza.<sup>8</sup> The severity of reappearances of the virus will be based on several factors, including the length of a person's immunity period after being infected by the virus and the mutation rate of the virus, both of which are still unknown.

<sup>5</sup> Kilpatrick and Barter, *COVID-19: Managing Supply Chain Risk and Disruption*.

<sup>6</sup> As of April 21, 2020, there were 814,587 total confirmed cases and 43,796 total deaths in the United States. See Johns Hopkins University & Medicine, "Johns Hopkins Coronavirus Resource Center" for updated numbers.

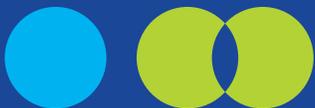
<sup>7</sup> Castaldo, "Big Four Car Companies Closing All North American Factories."

<sup>8</sup> Scharping, "Could We Be Living With COVID-19 Forever?"

Experts also suggest that vaccines will be an important part of the long-term strategy against COVID-19.<sup>9</sup> Yet, it could take 12 to 18 months for a vaccine to be developed, tested, and approved, and it would take more time after that to implement a global immunization program.<sup>10</sup>

Given the many challenges and unknowns, we can expect containment measures and the disruptions to production and supply chains to persist as countries attempt to limit the reintroduction of the virus and prevent renewed outbreaks. China's experience shows how production can be slow to resume. Several factors have delayed the country's efforts to restart its economy, including the need for new sanitation procedures and protective gear, the persistence and introduction of containment measures to avoid further spread of the virus, and the slow recovery of the transportation network.<sup>11</sup> Given the scope of disruptions around the world, it will take a while for global value chains (GVCs) to recover and for production in some COVID-19-affected countries to return to their pre-outbreak levels.

This has negative implications for Canada's economy and trade prospects, but it could also be a wake-up call for businesses to implement positive changes in their operations.



<sup>9</sup> Ibid.

<sup>10</sup> Spinney, "When Will a Coronavirus Vaccine Be Ready?"

<sup>11</sup> Betti and Ni, "How China Can Rebuild Global Supply Chain Resilience."

## COVID-19 disruptions: Pressing fast-forward to the future

The supply chain and economic disruptions caused by COVID-19 highlight the need to improve and, in some instances, transform the operations of many businesses engaged (or seeking to engage) in global trade. The disruptions also highlight the important role that digital technologies could play in helping businesses to survive the current disruptions and build resiliency for future unforeseen events.

### **Moving away from linear supply-chain planning and toward digital supply-network maps**

Up until recently, many businesses had been able to hone their demand forecasts and coordinate just-in-time production of components from factories abroad that were then delivered to the next location along the value chain as needed.<sup>12</sup> These traditional supply chains link suppliers to customers in a linear manner, with instructions flowing from supplier, to producer, to distributor, to consumer, and back.<sup>13</sup> But, because of these highly integrated value chains and the reliance on just-in-time production of specialized components, production losses due to a lack of inputs have mounted quickly.

<sup>12</sup> Wainwright, "Six Ways Business Will Stay Changed."

<sup>13</sup> World Trade Organization, *Technological Innovation, Supply Chain Trade, and Workers*.

A lack of vital information on shortages and disruptions along supply chains has caused many businesses to respond to the COVID-19 disruptions with uncoordinated actions. However, businesses that had invested in digital supply-chain mapping systems were able to make more strategic and pre-emptive decisions. These systems allow businesses to see the entire supply chain and identify exactly which suppliers, sites, parts, and products are at risk and then make the appropriate corrective actions.<sup>14</sup> Thanks to such systems, businesses are able to foster collaboration, agility, and optimization with their suppliers and secure the required inventory and capacity at alternate sites.<sup>15,16</sup>

The severity and length of the current disruptions could prompt businesses to develop and adopt more agile ways of modelling supply and demand and sourcing components. This would allow them to respond more effectively to future disruptions—whether caused by a pandemic, a trade war, a natural disaster, or something else.



14 Choi, Rogers, and Vakil, "Coronavirus Is a Wake-Up Call."

15 Ibid.

16 Kilpatrick and Barter, *COVID-19: Managing Supply Chain Risk and Disruption*.

## Adopting more flexible production methods, such as 3D printing

Disruptions caused by COVID-19 could also prompt businesses to develop more flexible production methods—for example, three-dimensional (3D) printing.<sup>17</sup>

3D printing allows for the creation of complex shapes and structures that are not possible with traditional production processes. In turn, it reduces input costs, saves time, and improves operational efficiency while accelerating innovation by validating ideas or concepts faster through prototyping.<sup>18</sup> For now, 3D printing has typically been used to produce prototype parts and small manufactured parts that would usually be shipped from distant locations (thereby avoiding transportation costs). These include parts for aerospace products, motor vehicles, industrial machines, and small consumer products, as well as small medical and dental products.

In times of emergency and supply chain disruptions, there is greater need to make up for shortages of specific parts in a timely manner. This is currently the case for medical equipment, such as respirators and ventilators, around the world. In these cases, the benefits of using 3D printers become increasingly valuable. Recently, organizations around the world have used 3D printing to respond to the surge in demand for medical supplies. For example, the Italian engineering firm Isinnova used 3D printing to meet a sudden surge in demand for respiratory valves that the original supplier was unable to deliver.<sup>19</sup>

17 Wainwright, "Six Ways Business Will Stay Changed."

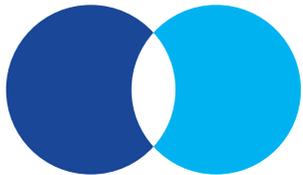
18 Institut de développement de produits, "Dossier Impression 3D."

19 Carlota V., "In Italy, 3D Printing Saved the Lives of COVID-19 Patients."

Similarly, a team of researchers at the Leitai Technological Center in Spain created ventilators<sup>20</sup> that can easily be manufactured using 3D printers.<sup>21</sup>

### **Accelerating adoption of other digital technologies and use of e-commerce platforms**

COVID-19 disruptions could also accelerate the adoption of other digital tools.<sup>22</sup> Research has shown that digital technologies can reduce costs for businesses.<sup>23</sup> Adopting digital technologies reduces information search costs, facilitates exchanges, and provides businesses with new marketing, finance, and networking opportunities. Furthermore, thanks to e-commerce platforms, smaller firms can more easily access global markets, both for buying and selling products.<sup>24</sup> Research shows that small and medium-sized enterprises (SMEs) that participate in e-commerce remain exporters longer than those operating solely in traditional markets.<sup>25</sup>



20 A mechanical bag valve mask that can be used for short-term emergency ventilation.

21 Kety S., "COVID-19: Spain Approves First Medical 3D Printed Ventilator."

22 Boorsma, "The Digital Lessons From COVID-19."

23 World Trade Organization, *Technological Innovation, Supply Chain Trade, and Workers*.

24 Ibid.

25 International Trade Centre, *Bringing SMEs Onto the E-Commerce Highway*.

With governments and organizations enforcing social distancing to curb the spread of COVID-19, businesses and consumers are relying more on digital solutions for economic and social activities. Online conferencing, e-commerce, social media, entertainment streaming, and other online service companies are facing unprecedented demand. Microsoft announced that the number of users of its Teams collaboration software rose 37 per cent in the second week of March.<sup>26</sup> Amazon is hiring more workers to keep up with its higher volume of orders.<sup>27</sup> Chinese retailer JD.com reported that online grocery sales were up 215 per cent year-over-year over 10 days between late January and early February.<sup>28</sup> And Jumio, an online mobile payments and identity verification company based in California, has seen significant upticks in its customer base in banking, financial services, and online gaming since the pandemic erupted.<sup>29</sup> Overall, the outbreak is leading to increased demand for goods and services that are available through online platforms.

As such, the ongoing disruptions may be a wake-up call for organizations to invest in digitalizing their operations and introduce online customer platforms. We expect COVID-19 to have long-lasting effects, with consumers and businesses continuing to rely more on digital solutions even after the crisis has passed. Businesses that can take advantage of online platforms will be in a better position to mitigate the impact of the outbreak by keeping their companies running more smoothly during the current crisis and over the long term.<sup>30</sup>

26 Spataro, "Microsoft Teams at 3."

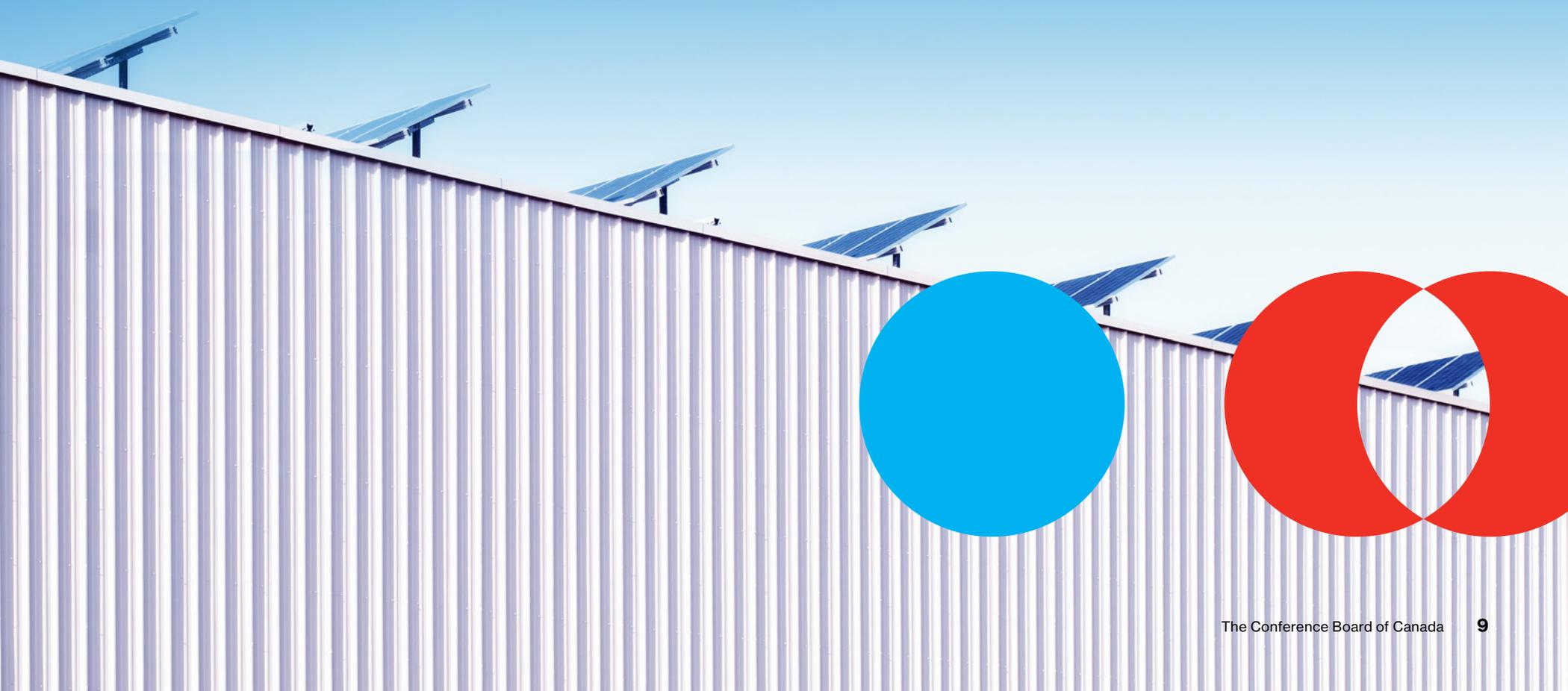
27 Clark, "Amazon Ramps Hiring."

28 UNCTAD, *The COVID-19 Crisis*.

29 Nicolls, "COVID-19: A Call for Digital Transformation."

30 Ibid.

**Increased trade protectionism would add to inefficiencies and erode some of the benefits that the growth in global trade has brought over the last two decades.**



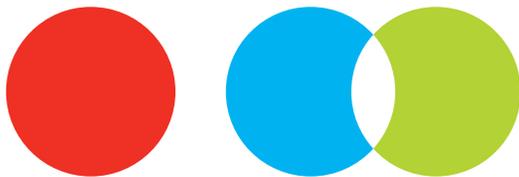
# COVID-19 will have a mixed impact on GVCs

Global value chains expanded significantly in the 1990s and 2000s, but the rate of expansion has slowed since the financial crisis of 2008. This slowdown is due to several factors, including lower global economic growth and investment and the lack of major trade liberalization initiatives.<sup>31</sup> Furthermore, the adoption of digital technologies in global supply chains across many industries has been causing a shift toward intangibles, which means that international production and cross-border operations require fewer physical assets.<sup>32</sup> More widespread adoption of digital technologies due to COVID-19 disruptions and new protectionist trade measures will be key trends influencing the development of GVCs in the near term—and, potentially, over the long term, as well.<sup>33</sup>

## Faster adoption of digital technologies: Mixed impact on GVCs

The digitalization of the economy, which will likely be accelerated by the COVID-19 disruptions, is expected to affect GVCs, global trade and investment. For example, modelling by the Center for European Governance and Economic Development Research suggests that investment in 3D printing technology could replace an increasing share of foreign direct investment and lead to a decline in cross-border trade as firms become more self-reliant.<sup>34,35</sup>

However, some evidence suggests that, overall, digital technologies could boost trade and expand GVCs.<sup>36</sup> For example, new supply management techniques and developments in technologies—including the Internet of Things, big data, and cloud computing—could strengthen the current structure of GVCs by reducing the cost of tracking and monitoring components of production over the long run.<sup>37</sup> Also, technologies such as automation and 3D printing have been shown to contribute to higher productivity and larger scales of production.<sup>38</sup>



<sup>31</sup> World Bank, *World Development Report 2020*.

<sup>32</sup> UNCTAD, *World Investment Report 2017*.

<sup>33</sup> A global value chain (GVC) is the series of stages in the production of a product or service for sale to consumers. Each stage adds value, and at least two stages are in different countries. See World Bank, *World Development Report 2020*.

<sup>34</sup> Abeliansky, Martinez-Zarzoso, and Prettnner, *The Impact of 3D Printing on Trade and FDI*.

<sup>35</sup> Since there are still limitations to the use of 3D printing (due to factors such as the size of components that can be printed, the printing time, and the material that can be used as ink), the short-term impact on GVCs remains unclear.

<sup>36</sup> World Bank, *World Development Report 2020*.

<sup>37</sup> World Trade Organization, *Technological Innovation, Supply Chain Trade, and Workers*.

<sup>38</sup> World Bank, *World Development Report 2020*.

Furthermore, cross-border e-commerce platforms, mobile payment systems, and online financial services are reducing the costs of trade and adding accessible markets, allowing SMEs to buy and sell goods and services globally.<sup>39</sup> Still, a report published by the World Trade Organization warns that, despite the opportunities offered by e-commerce platforms, “complex customs procedures, regulatory uncertainty, and barriers to services trade” can hinder small and medium-sized businesses from participating in global value chains.<sup>40</sup> Given these considerations, the impact of faster adoption of digital technologies on GVCs remains unclear.

### **Export bans on medical supplies are escalating the global trend toward protectionism**

While the impact of using more digital technologies on GVCs is mixed, the impact of recent trade measures, including export bans on medical supplies, is clear.

Between January 1 and March 21 of this year, 54 governments limited exports of medical supplies used to fight COVID-19.<sup>41</sup> The intention behind these actions was to protect their own populations in the short term. But these export bans erode trust between trading partners, jeopardize cooperation between governments, and often lead to retaliatory measures. These retaliations could even go beyond medical supplies. Some analysts are warning that such actions could hurt economic relations between trading partners well beyond the COVID-19 crisis.<sup>42</sup>

Furthermore, since value chains are highly integrated, restrictions on exports by one country can jeopardize another country’s imports of inputs that are used to produce goods to export around the world. Unfortunately, this is happening in the production of medical supplies. Hamilton Medical, a major Swiss manufacturer of hospital ventilators, had to slow its production because Romania banned exports of a critical input used in Hamilton’s production.<sup>43</sup>

As a small, open economy, Canada depends on both exports and imports to support economic growth. More than 20 per cent of the value of its gross exports originates from other countries.<sup>44</sup> During the COVID-19 pandemic, Canada has relied on imports of medical supplies and many other products. At the same time, other countries depend on exports from Canada. While it is tempting to impose protectionist measures in times of crisis, increased trade protectionism would add to inefficiencies, lift costs, and erode some of the benefits that the growth in global trade has brought over the last two decades.

Instead of following a more protectionist route, governments around the world could introduce measures to help companies be more resilient when shocks occur. These measures would help companies modernize their operations and offerings and adopt new technologies that would enable more nimble operations. The pandemic is a global health and economic crisis and thus must be addressed by taking a global cooperative approach rather than a protectionist one.

39 Ibid.

40 World Trade Organization, *Technological Innovation, Supply Chain Trade, and Workers*.

41 Evenett, *Tackling COVID-19 Together*.

42 Evenett, “Sickening Thy Neighbour.”

43 Bown, “EU Limits on Medical Gear Exports.”

44 Based on OECD data. See Organisation for Economic Co-operation and Development, *Trade in Value Added*.

One proposed avenue to stop the escalating trade war is a joint reporting mechanism on medical supplies.<sup>45</sup> Governments (such as those of the EU, China, and the members of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership) would report on the availability of medical supplies and production facilities and commit to expanding production through clear mutual trade agreements.<sup>46</sup>

Overall, the rise of global trade protectionism over the past few years has increased trade uncertainty,<sup>47</sup> lowered business confidence, and prompted companies to re-evaluate their supply chains.<sup>48</sup> Recent restrictions on exports—first on medical supplies and then on food—are further adding to protectionist sentiments. These conditions, along with today’s highly unpredictable policy environment, will limit the development of global value chains, at least in the near term.



45 Posen, “Containing the Economic Nationalist Virus.”

46 Ibid.

47 The rise of protectionism in recent years has manifested in the form of hostile trade negotiations, most notably in the ongoing trade war between the United States and China.

48 For example, Apple is expected to start trial production of its wireless earbuds (Air Pods) in Vietnam and is encouraging its contractors to shift about 15 to 30 per cent of its iPhone production out of China and into other countries, such as India. See Hoshi, Nakafuji, and Cho, “China Scrambles to Stem Manufacturing Exodus.”

# Conclusion

Operational changes—such as developing a map of supply chains, adopting digital supply networks, or using 3D printing—usually take time to gain traction.

But this period of limited flow in global supply chains provides an opportunity for businesses to test new ways to improve their operational and production flexibility. Opportunities in the current crisis for businesses include:

- Where possible, businesses can adjust their operations to meet the needs of the current health crisis, as many have already begun to do. Distilleries and cosmetic and oil companies have converted their facilities to produce hand sanitizers,<sup>49</sup> car makers are producing respirators and ventilators, and specialized clothing companies are now making scrubs, gowns, and medical masks.<sup>50,51,52</sup> By March 31, 2020, more than 3,200 companies had responded to a call by the Canadian government two weeks earlier to help produce medical equipment.<sup>53</sup>
- Businesses can rethink their operations and seek ways to mitigate global supply chain risks by better managing supply and demand—for example, through digital supply networks.<sup>54</sup>

- Testing 3D printing in the production processes could help make up for immediate shortages of certain products and help manage future supply chain disruptions due to pandemics, natural disasters, or other unforeseen events, as well as save time and input costs.
- Businesses can adopt digital technologies and use digital information to transform their business model and operations. This may include producing digital offerings or using online platforms to gain efficiencies and create customer value.
- Since the start of the outbreak, businesses across different sectors have been forced to lay off many workers or significantly reduce their working hours due to containment measures imposed to stop the spread of COVID-19. The interruptions or reductions in production may be an opportunity for businesses to reskill their workers so they are in a better position to tackle the new business, employment, and technological realities that will be more mainstream by the end of the crisis.

Governments can also play a role. Like many governments around the world, Canada has taken extraordinary steps to free up liquidity for firms and has introduced a wage subsidy program to cushion the shock and avoid layoffs. This will put businesses in a better position to resume production and reintroduce supply chains once the impacts of the COVID-19 pandemic fade.

49 Including Pure Vodka, Bacardi, L’Oreal, Irving Oil, and Fluid Energy Group Ltd.

50 For example, Canada Goose, Vêtements S.P., and 3B Hockey.

51 Jackson, “Ottawa Orders Made-in-Canada Ventilators.”

52 Arsenault, “La diversification d’entreprises québécoises peut-elle perdurer après la pandémie?”

53 Jackson, “Ottawa Orders Made-in-Canada Ventilators.”

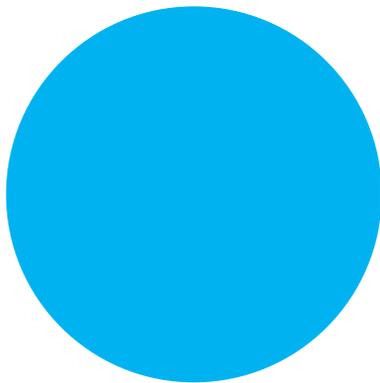
54 Kilpatrick and Barter, *COVID-19: Managing Supply Chain Risk and Disruption*.

But, without the required technical digital skills, firms, especially SMEs, can be left behind. As such, policy-makers should consider introducing measures that encourage the reskilling of businesses and workers as part of the longer-term COVID-19 response plans.

We've already seen such programs introduced in other countries. For example, the Philippines has implemented a Technical Education and Skills Development Authority Scholarship Program to help upskill and reskill workers through free online courses.<sup>55</sup> In Canada, the Future Skills Centre is establishing a program in partnership with the Ontario Tourism Education Corporation to retrain workers who have been displaced in the hospitality sector.

Furthermore, since the pandemic is a global health and economic crisis, governments around the world must cooperate to address it, rather than take a protectionist approach. This is of prime importance in the short term as the world struggles to solve the health crisis. In the long term, cooperation could help restore trust in global supply chain networks, avoid the adverse effects of escalating protectionist measures, and maintain the benefits that the growth in global trade has brought over the last two decades.

Today's priority should be on addressing the immediate needs of the health crisis to protect people. But our response plans to the crisis today can also help us to ensure the sustainability and well-being of our economy and population over the long run.



<sup>55</sup> International Labour Organization, *Social Protection Responses to Covid-19 Crisis*.

# Methodology

This briefing was written to shed light on the impact of COVID-19 on global supply chains. It explores the challenges businesses are facing and the emerging opportunities so they can be in a more solid position to face the new economic, business, and technological realities once the crisis is over. How Canada and Canadian businesses respond to the crisis today can affect the sustainability and the well-being of our economy and population over the long term.

The analysis was based on a range of qualitative and quantitative sources. These sources focused on COVID-19's disruptions to global supply chains, global value chains development, global trade, the use and benefits of digital technologies and their impact on global value chains, the probability of COVID-19 becoming endemic, measures introduced around the world to respond to COVID-19, recent experiences of Canada and other countries, and The Conference Board of Canada's trade outlook.



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## Acknowledgements

The authors would like to thank Pedro Antunes, Kip Beckman, and Michael Burt for their thoughtful and valuable comments on an earlier draft. The authors would also like to thank Doris Chu and Monika Slovinec D'Angelo for their valuable comments on specific segments of the briefing (the trade forecast and health-focused paragraphs, respectively).

This briefing was funded by The Global Commerce Centre (<http://www.conferenceboard.ca/gcc>), which helps business and government leaders respond effectively to dramatic changes in the global economy through original, innovative, and evidence-based research, webinars, meetings/conferences, and ongoing contact with its stakeholders.

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Julie Adès and Elise Nelson

To cite this research: Adès, Julie, and Elise Nelson. *COVID-19 Global Supply Chain Disruptions: A Catalyst for Long-Term Changes?* Ottawa: The Conference Board of Canada, 2020.

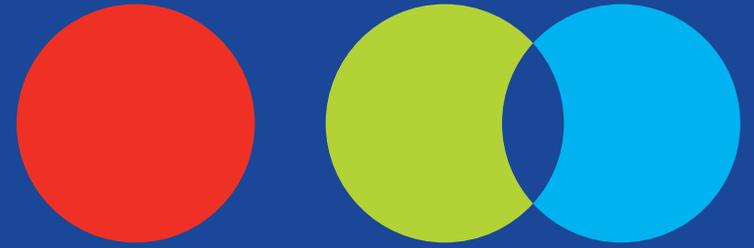
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