Scarcity

By: Jeffrey Voas and Nir Kshetri

Abstract:

Here, the authors examine the scarcity of PCs during the COVID-19 pandemic. How likely is it to reoccur? They reinforce and highlight the fragility of global computing supply chains and the impact that a lack of computing resources can have on countries and individuals. Could the confluence of these factors or others lead to long-term scarcity and not just the scarcity of computers? It is an open question.

Keywords: COVID-19 pandemic | global computing supply chains | long-term scarcity | computing resources

Article:

If you had bet a willing oddsmaker on 1 January 2020 that Americans, living in the richest country, would be hoarding toilet paper in mid-March, you would have made a lot of money. The pandemic was totally unforeseen. Scarcity is an economic principle that creates fear and modifies rationale human behavior.

Because of recent laptop shortages in the United States, this seems like a good time to bring up the topic of scarcity. Why? Well, for one reason, we are curious as to whether this problem could repeat itself. Further, it is not only a U.S. problem—it has wider global influences, causes, and impacts.

Supply chains of any commodity are complex, particularly those involving international transport. Companies' multitiered supply chains rely on multiple suppliers. Manufacturing and logistics activities are susceptible to various risks, including those associated with employee emergencies, economic events such as a recession, and politics. Supply chain disruptions can lead to product shortages. The United States faced a shortage of roughly 5 million laptops as of August 2020.[1]

In Table 1, we see that COVID-19 caused different effects on the demand for computers. First, pandemic-led remote working and remote education increased the demand for additional computers. According to market research company NPD Group, during the week that ended on

23 May 2020, the demand for Windows notebooks and Chromebooks increased by 45% compared to the same period in 2019.[2] Many U.S. school districts' decision to conduct their fall 2020 classes online led to an even steeper increase in demand, especially for lower-cost models. Lenovo alone reported a backlog of orders for more than 3 million Chromebooks. Second, the pandemic disrupted production in China due to the health concerns of its workers.

Table 1. The effects of COVID-19 on the demand for computers.

Manufacturer	Measurements of supply performance	Challenges
Lenovo	PC shipments in 2020 quarter one (Q1) were 4.4% lower than in 2019 Q1 (https://tinyurl.com/ugqe4co) but in 2020 Q2, they were 4.2% higher than in 2019 Q2.[7] In August 2020, there was a backlog of more than 3 million Chromebooks.[8]	Disruption in the Chinese supply chains in early 2020 forced sourcing of parts from locations such as Brazil, Mexico, the United States, and Japan.[13] Some suppliers were added to the U.S. Entity List.
Hewlett-Packard	PC shipments in 2020 Q1 were more than 10% lower than in 2019 Q1,[9] but in 2020 Q2, they were 17.1% higher than in 2019 Q2. A shortage of 1.7 million laptops was reported in August 2020.[10]	The pandemic had an impact on the production of Chinese-made components.[10] Some suppliers were added to the U.S. Entity List.
Dell	PC shipment in 2020 Q2 were 1.1% higher than 2019 Q2,[9] they were 0.3% lower than in 2019 Q2.[7] Orders in 2020 Q2 were up 16 and 24% from the government sector and from consumers, respectively, compared to 2019 Q2.[11]	There were longer-than-normal lead times for low-end Chromebooks and Windows laptops due to the shortage of key components, especially displays and microprocessors.[11]
Apple	Mac shipments dropped by 20% in 2020 Q1 compared to 2019 Q1,[12] but in 2020 Q2, they were 5.1% higher than in 2019 Q2.[7]	There were supply chain disruption and a resulting lack of inventory. At least one supplier was added to the U.S. Entity List.

Third, the U.S. computing industry's supply chains were affected by U.S. sanctions on specific Chinese companies that are in the upstream of the supply chain.[3] As two examples, 1) Hefei Bitland Information Technology makes graphics cards and lighting control modules, whose main clients include Lenovo and Hewlett-Packard (HP),[4 and 2]) Nanchang O-Film Tech supplies parts to Lenovo, Apple, HP, and other computer manufacturers.[5] Its products include cameras, touch screens, and fingerprint sensors.[6]

We mention all of this to reinforce and highlight the fragility of global computing supply chains and the impact that a lack of computing resources can have on countries and individuals. Could the confluence of these factors or others lead to long-term scarcity and not just the scarcity of computers? It is an open question.

And finally, this segues nicely into a more positive theme. The year 2021 is the 75th anniversary of the IEEE Computer Society. To celebrate this, *Computer* will include four special articles throughout 2021. The articles will be

- "Computing and Socio-Economic Transformations"
- "Major Computing Technologies of the Past 75 Years"
- "The Inception of the IRE Technical Committee on Electronic Computers"

- "The IEEE Computer Society's History/Connections Between the Society and India."

Please be on the lookout for these special articles. And other titles within IEEE Computer Society magazine and journal portfolios will include special articles celebrating the 75th anniversary throughout 2021.

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