The Takeaway
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The Call of the Pandemic: Rethinking Global Value Chains

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The effect of the COVID-19 pandemic on global value chains has been pervasive. An all-time-high demand for ventilators, personal protective equipment such as masks and gowns, medicines, and other essential health supplies collided with supply shortages.[1] Stringent lockdowns enforced by different countries at different times led to severe consequences for industrial supply chains.

As the pandemic spread, few countries have been resilient enough to cope well with the pace of transformed supply and demand requirements. Many who aligned themselves to outsourced manufacturing became dependent on other countries for medical supplies. The pandemic reopens key questions:

- How should firms outsource?
- How important are costs?
- How should national-level policies guide firm-level outsourcing?

WHAT'S THE TAKEAWAY?

The COVID-19 pandemic has led to severe supply shortages in many areas.

These demands could not be met by outsourced supply sources outside the United States that were originally meant to lower costs.

The United States must develop resilient manufacturing capabilities in areas critical to national interest.

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In this policy brief, I explain how firms and countries need to critically evaluate their upstream supply chains and how public policy should support creating domestic core manufacturing capabilities that can help mitigate the effects of disasters.

WHY DO FIRMS OUTSOURCE?

The rationale for outsourcing is rooted in access to raw materials, manpower, production capacity, and capabilities (like specialized product development, design, and innovation). Outsourcing may happen when a firm lacks manufacturing capability (e.g., knowledge of how to produce an input) or capacity (e.g., scale necessary to meet rising demand). Outsourcing is also useful when products are widely available. It does not make sense for an automobile firm to make its own nuts and bolts, even if it can do so. Overall, outsourcing can help leverage the capabilities of suppliers to provide an enhanced offering to the market—fast and at low cost.

The nature of outsourcing, however, changes over time. Suppliers need to customize designs and products to specific buyer's requirements, and this often requires suppliers to develop new capabilities. Often, buyers participate in the development process of these capabilities, working closely with suppliers, providing technical support, and helping produce products with better quality at lesser cost. Over time, suppliers learn to make the product better—reducing defects and improving process efficiency.[2] As more time goes by and as competitive pressures continue, buyers and suppliers seek to reduce costs further. For this, suppliers move to control product design and inputs—selecting the suppliers of components and raw materials—to lower production costs and increase manufacturing reliability. This transition usually results in suppliers becoming even better than the buyer was (at one time) at making the product. Meanwhile, the buyer forgets their former capabilities, in many cases losing control over the entire operation.

My work with an automotive firm in France is instructive. Thirty years ago the Knorr Bremse (KB) plant was a vertically integrated entity. The component design, foundry operations, machining operations, and assembly of the final product were all done in house. The designers had direct access to foundry operations and were in close touch with the raw material suppliers, so they knew about the raw material and the way it interacted with the performance of the final product. The sourcing department had less knowledge about how the foundry, machining, or assembly operated, since most of the work was done in house. As time went by, KB focused on its design and assembly competencies. Foundry and machining operations were outsourced. Currently, operations at KB include only design and assembly. The sourcing department developed competencies in developing and using machining suppliers. The design department outsourced a lot of design work related to foundry and machining to suppliers who were doing the same work for other buyers.

A problem arose when the foundry operations of some major castings were going to be shifted to China to reduce cost. KB discovered that they no longer understood the intricacies of the foundry operations. Those competencies had been eroded over time as KB acquired machined components from suppliers, who in turn sourced components from established foundries. KB found it extremely difficult to certify the foundry operations in China. KB had to transfer an experienced individual (an old tim-

er) from its R&D division to purchasing and send him to China to establish the new foundry!

RETHINKING OUTSOURCING

In the case of COVID-19, unprecedented requirements in many areas could not be met by outsourced manufacturing systems. Many industries, including pharmaceuticals (pharma), machinery, automation,[3] and automotive,[4] experienced demand and supply shocks. Many of these firms had limited insight into what occurs at their vendors, and specifically what happens beyond their direct vendors. If an upstream vendor's operations were compromised, firms had no readily-available alternative.

To understand the public policy linkages of outsourcing in global value chains, let us look at pharma. The United States produces very few drugs, and by a rough estimate over 80 percent of the active pharmaceutical ingredients (APIs), even for these drugs, are outsourced (mostly from China).[5] The problem of having little insight into pharma supply chains is critical and widespread. Even the FDA does not know how the sourcing of APIs stands.[6] Countries like India that produce many generic drugs, also use APIs from China.[7]

We have seen reactions on some fronts: the United States ramped up production of masks, ventilators, and test-kits in the wake of the pandemic. GM and Ford developed new ventilator manufacturing capabilities. Similarly, in India national PPE production capacity has increased from practically nothing to more than 500,000 per day.

Public policy needs to support resilience in global value chains. There are three steps to this. First, it is important to identify critical areas where a loss of capabilities due to outsourcing could occur. Pharma, defense, medical supplies, machine tools, automation, and communication may be some of these areas. Criticality refers to the risks involved in losing control and being ill-equipped for disasters such as COVID-19 or other natural and political disasters. Second, there should be plans deployed for creating core capabilities in these selected areas, focusing on creating flexibility through multiple local and offshore manufacturing bases. Capability refers to quickly responding to disruptions by either in-house manufacturing or by leveraging alternate suppliers. Third, it is important to assess how new technologies such as robotics and automation can help reduce the cost-differentials in manufacturing by combining resources such as labor and capital to produce high-quality products at lower costs.

Firms need to realize that organizational subsystems and processes related to suppliers are usually focused on the firm and its immediate boundary. Firms should try to establish *sourcing hubs*[8] and map the material flow within a firm's supply network to identify critical components, understand the technologies involved, map lead times for supply of these components, and evaluate inventory levels. The supply network needs to be mapped right up to the raw material suppliers to have transparency on supplies. Once mapped, the supply network can be analyzed to develop more flexible sourcing by using multiple levers: having geographically uncorrelated supply sources (local as well as offshore), having a mix of fast versus slow suppliers, and having parallel sources (multiple suppliers with the same or very similar capabilities).

The idea is not to develop huge, vertically integrated firms. However, black-box outsourcing

where the parent firm loses all control (and more critically, all knowledge) of the outsourced activity and related products in its value chain, may not be an optimal policy. Black-box outsourcing may, over time, erode the capabilities of the parent firms—capabilities that may be extremely valuable at the national level, like the ability to deliver high quality healthcare to the citizens. Our work suggests that supply chain managers and policy makers have systematically underestimated the value that they can add by establishing a minimum level of control over outsourced activities in global supply chains. Such control, where R&D scientists, engineers and production workers can work together with local inputs can also help drive innovation in manufacturing.

FINAL REMARK

The global value chain related lesson learned from the COVID-19 episode is important: pandemics can affect manufacturing in several geographical locations simultaneously worldwide and can affect an individual nation's surge capacity to deliver essential supplies to its population. Going forward, this lesson should critically affect thoughts on manufacturing strategy and low-cost based outsourcing. We should see a sustained push towards development of resilient national manufacturing capabilities in areas critical to national interests.

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Notes:

[1] Optimizing supply of PPE and other equipment during shortages. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html

[2] Muthulingam, S. & Agrawal, A. (2016). Does quality knowledge spillover at shared suppliers? An empirical investigation. *Manufacturing & Service Operations Management, 18*(4), 525-44. doi: 10.1287/msom.2016.0585

[3] https://www.mckinsey.com/industries/advanced-electronics/our-insights/beyond-covid-19-rapid-steps-that-can-help-machinery-and-industrial-automation-companies-recover

[4] https://www.foley.com/en/insights/publications/2020/06/covid-19-automotive-industry-just-how-bad-is-it

[5] Sutter, K.M., Schwarzenberg A.B. and Sutherland M.D. (2020). COVID-19: Chinese medical supply chains and broader trade issues. *CRS Report*, Congressional Research Service.

[6] Woodcock, J. (2019, Oct.) Congressional Testimony USFDA: Safeguarding pharmaceutical supply chains in a global economy. https://www.fda.gov/news-events/congressional-testimony/safeguarding-pharmaceutical-supply-chains-global-economy-10302019

[7] Chatterjee, P. (2020). Indian pharma threatened by COVID-19 shutdowns in China. *The Lancet*, *395*(10225), 675. doi: 10.1016/S0140-6736(20)30459-1

[8] Agrawal, A., De Meyer, A., Wassenhove, L. (2014). Managing value in supply chain: Case studies on the sourcing hub concept. *California Management Review*, *56*(2), 23-54. doi: 10.2139/ssrn.1888756