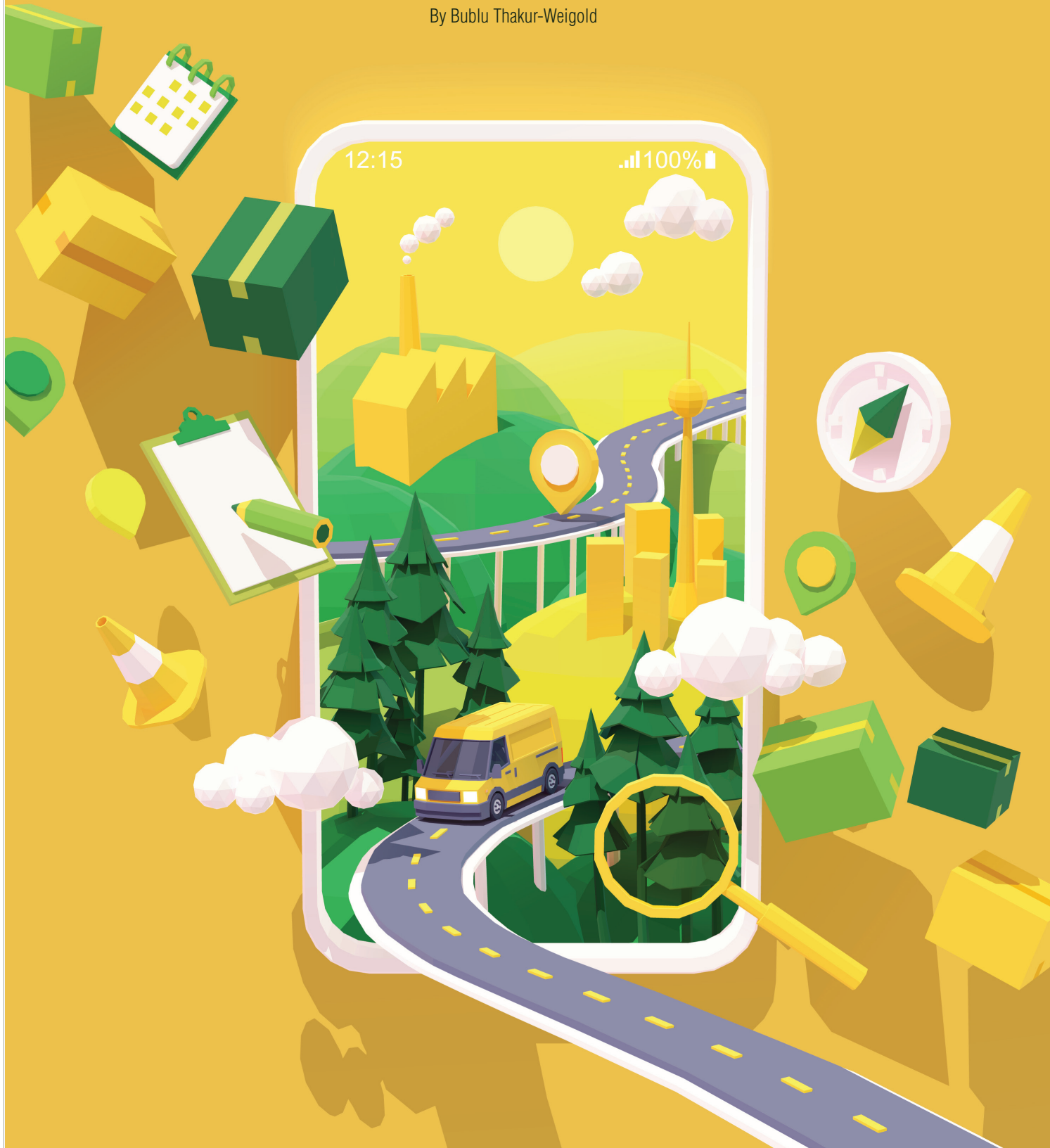


Supply chain myths – and why Lean was not the culprit

Concepts blamed by some during pandemic actually led to solutions

By Bublú Thakur-Weigold



As countries recently began suspending COVID-19 restrictions, we should reflect on the lessons of this global crisis before returning to business as “usual.” By “we,” I mean the supply chain managers and researchers whose work came under unaccustomed public scrutiny. The past two years have exposed profound misunderstandings of what we do, not only among the public and regulators but among ourselves as a community of experts.

During the pandemic, I collected press reports on supply chain failures. Writers from serious newspapers, medical journals and even literary and celebrity gossip magazines were suddenly talking about our work. The effect was both amusing and appalling. “Supply chain” eventually earned a place in Lake Superior University’s annual list of banished words for 2021. The press release stated the term had “become automatically included in reporting of consumer goods shortages or perceived shortages. In other words, a buzzword ... Supply chain issues have become *the scapegoat of everything that doesn’t happen or arrive on time and of every shortage*” (emphasis added; see the list at Issu.edu/traditions/banishedwords).

It was not surprising a literary magazine like *The Atlantic* declared “Americans Have No Idea What the Supply Chain Really Is” (Sept. 21, 2021). The *New Yorker* also spoke of a “The Supply-Chain Mystery” while acknowledging the effect of pandemic-induced labor shortages (Sept. 26, 2021). *The New York Times* then came to the rescue with its magisterial “How the Supply Chain Broke, and Why It Won’t Be Fixed Anytime Soon,” which flagged conspiratorial “Monopolistic tendencies (to) explain shortages.” (Oct. 31, 2021). *The Guardian* agreed that “The consolidation of power into the hands of private equity financiers and monopolists over the last four decades has left us uniquely unprepared to manage a supply shock.” (Oct. 1, 2021).

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The comparison of the pandemic to the contagion of the 2008 financial crisis – the reigning benchmark of transnational corporate greed and undercapitalized transactions – was plausible to the anxious reader. The broken supply chain reached celebrity gossip status when *Vanity Fair* published “Inside the supply chain SNAFU that could wreck your holi-

More on Lean and supply chains

You can hear Bublú Thakur-Weigold discuss the topic in a September 2021 episode of *Problem Solved: The IISE Podcast*, “The Global Pandemic: Supply Chain’s Finest Hour” at link.iise.org/podcast_s3e5.

In addition, the IISE Annual Conference & Expo 2022 May 21-24 in Seattle will include two related presentation tracks. The Lean Six Sigma Track, presented by the Operational Excellence Division, will include a focus on collaborative industry applications, research, and emerging and innovation solutions.

The Logistics & Supply Chain track presented by the Logistics & Supply Chain Division will highlight such topics as logistics network design and optimization, network simulation, inventory optimization and control, supply chain modeling and simulation, transportation systems, analysis and design, green or sustainable practices, demand planning, supply chain reliability and resilience and more.

For program details, visit iise.org/Annual.

day plans.” (Nov. 21, 2021), an essay on a meme of a container megaship grounded in the Suez Canal. According to that report, the fact that goods move internationally make us vulnerable so global trade is riskier than domestic production. Let’s not dwell on why putting all your eggs in a domestic basket might fail to reduce risk.

The culprit most frequently cited in this storm of publicity was Lean. In an article published in *Harvard Business Review* in April 2020, professor David Simchi-Levi of MIT made this declaration: “A major reason for the shortages that have occurred during the pandemic is the Lean global supply chains that have been deployed widely in order to reduce costs through efficient allocation of production to low-cost regions; just-in-time (JIT) methodologies in manufacturing; and holding lower levels of inventory throughout the supply chain.” The logic diffused quickly among journalists who repeated it like a mantra, and through repetition it took on the appearance of fact.

Beware of conclusions without analyses or of eyeballing empty shelves (or memes) to make snap diagnoses of complex systems. As industrial engineers, we should take the time to debunk some of the myths currently in circulation.

Lean myths from the pandemic

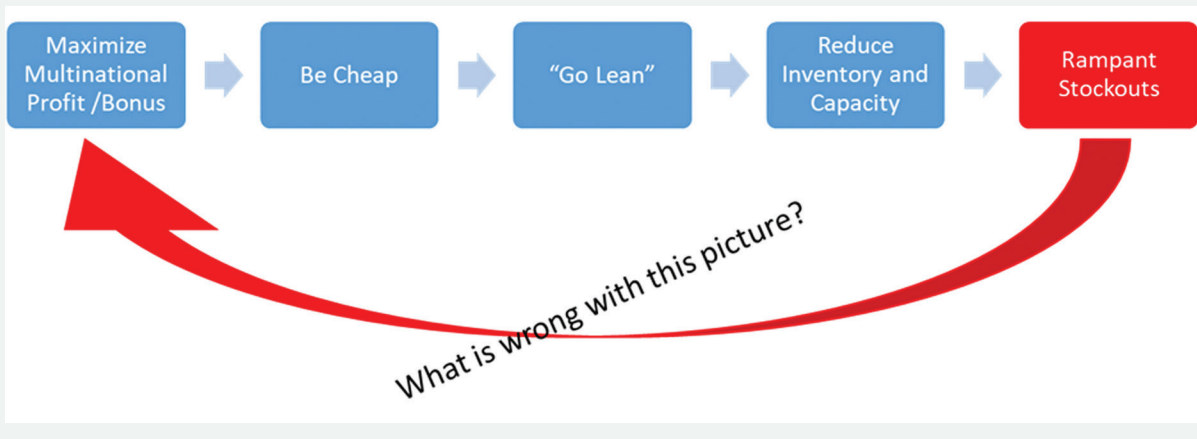
Myth No. 1: *Lean does not mean little or no inventory in a supply chain.* Nor does it imply a flow-through “just-in-time” pipeline which maintains no safety stock.

Although scholars argue over whether it is a theory, a socio-technical system or a business phenomenon, the industrial engineers who practice it know that Lean improves the per-

FIGURE 1

The case for Lean

Even before the pandemic, businesses were inclined to keep some inventory to generate sales, dispelling the myth that Lean means reducing stock to the bare bones. And that strategy varies among businesses and industries.



formance of an industrial system by reducing waste through continuous improvement. Individual techniques like kanban, gembu walks or even just-in-time replenishments necessarily vary from firm to firm, and are customized for every business case. If systematically implemented over time, these incremental improvements transform the organizational culture and add up to dramatic increases in productivity and competitiveness.

According to the research, the Toyota Production System (the ur-Lean system) enabled a small maker of industrial looms in a war-ravaged economy to challenge mighty incumbents like the Ford Motor Co. to become one of the world's most profitable carmakers.

Myth No. 2: *Not all supply chains have the same goal.* The scapegoating chorus insists that all of the world's supply chains pursue low costs by becoming "Lean," as seen in Myth No. 1. Few, if any, researchers possess the data which could prove this. Every firm has a natural inclination to accumulate inventory because it enables the sales that generate revenue. The level of service that a firm ultimately delivers is a calculated trade-off, in which their costs must balance the degree of frustration customers are willing to tolerate (see Figure 1).

Contrary to the claims that all supply chains collectively adopted the same erroneous operating strategy, service level varies from organization to organization, from business case to business case and, not least, from product to product. Long before the pandemic, we knew that one size does not fit all.

Supply chain managers thus set up operations to support a defined business strategy, which is best illustrated by examples. Consider these four different industries in rich countries: Pharmaceutical supply chains typically maintain very large and expensive stockpiles because society doesn't tolerate

shortages of life-saving goods. Luxury goods, in contrast, often deliberately maintain stockouts because scarcity ensures the exclusivity of brands. Hemes' customers gladly wait for their coveted handbags.

The makers of electronic gadgets, however, set their inventory strategy somewhere between luxury goods and oncology drugs. The mature technologies which have become interchangeable commodities, like inkjet printers, will tend to have lower inventories and cost structures than a new iPhone, which has high margins, but even these can stock out.

And finally, the fact that rich societies rarely run out of milk is a good reason to study the supply chains of supermarkets.

The moral of the story? Design matters. We must take the time to analyze different business cases to discover whether their stock-keeping strategies are "Lean," "fat" or something entirely different. Better yet, let's abandon reductive metaphors altogether, as their value is limited.

What actually happened to supply chains

Over the course of the pandemic, many products were affected by disruptions at a global scale. Disruptions by themselves, however, are not evidence of a collective design error or poor forecasting techniques. The global pandemic triggered simultaneous exogenous shocks that would have affected operations, no matter how they were originally designed. Anxiety caused irrational hoarding, so consumer demand for certain products, like toilet paper, spiked beyond what ordinary safety stocks could cover.

In a 2021 meeting of the Organization for Economic Cooperation and Development's trade ministers, an executive at Johnson & Johnson stated that demand increased overnight by more than 800%, an anomaly that would deplete the routine stockpiles any company would maintain in an economical way. These demand spikes had multiple causes that were,

again, independent of the supply chain design.

As offices closed down, there was an unprecedented shift of demand overnight from channels like HORECA (hotels, restaurants, cafeterias) to private food purchasing. To a consumer, food may be food. Yet agricultural products, which are bulk, processed items with generic labels, are not easily repackaged and shifted from cafeteria and restaurant supply pipelines to supermarkets that sell individual servings with nutritional information on the label. And they did exactly that, at high speed, behind the scenes.

There are other explanations for why material might have been in the system but could not make it to the right place in time. Goods could not move when the staff that operate the transport or manufacturing machines fell ill or were locked out of the workplaces that could not be shifted to home. The freight that normally moved in passenger aircraft was grounded for weeks. Cargo in trucks waited as borders closed. It is unlikely that fatter stockpiles or redundant capacity could have overcome these obstacles.

To their credit, Lean guru Jeffrey Liker and professors Torbjorn Netland of ETH and Yossi Sheffi of MIT all spoke up to emphasize that Lean was not the culprit behind all supply chain disruptions. If anything, by promoting vigilance and continuous improvement, Lean remains a solution. Observing how people across companies and borders pulled together to respond to dramatic changes, Sheffi even declared the pandemic to be supply chains' "finest hour."

These insights must reach a wider audience. The empty shelves we saw in the news were often replenished overnight, and the developed world did not experience weeks of shortages of critical goods like food or cancer drugs. A reduction of the usual choice between cuts of meat is not the same as the disappearance of meat from a supermarket.

Of course, there is work to do to ensure preparedness, especially of medical supplies (which deserve a chapter of their own). Public health authorities should verify the design of their national systems and know in advance whether they are set up to optimize health outcomes and protect caregivers on the front lines, or to maximize the number of procedures. Private healthcare facilities usually do not participate in risk pooling across organizational boundaries. They plan independently in pursuit of individual business objectives, which will tend to fragment the total medical supply available to a larger population.

Professor Stephan Wagner of ETH reminded us that supply chain disruptions have been well-studied and that managers and regulators would do well to apply the principles of risk management rather than discredit entire systems of global trade or industrial management.

The global pandemic did not prove the failure of Lean or JIT techniques. It demonstrated that supply chain management is a profession that needs more advocacy. If we don't

take the time to explain the nonintuitive aspects of our work, myths like these will be uncritically diffused with potentially dire consequences. Under pressure from populist sentiment, regulators will be tempted to micromanage supply chains, a task for which they are dangerously unqualified.

Industrial engineers who practice it know that Lean improves the performance of an industrial system by reducing waste through continuous improvement. Individual techniques like kanban, gemba walks or even just-in-time replenishments necessarily vary from firm to firm, and are customized for every business case. If systematically implemented over time, these incremental improvements transform the organizational culture and add up to dramatic increases in productivity and competitiveness.

For this reason, at the 2021 OECD global forum on trade, I argued against the proposal to stress-test critical supply chains. Not only will the burden of reporting overwhelm all parties, but who has the time and expertise to make the right decisions on behalf of all firms and sectors? Instead, we should focus our limited resources on creating the boundary conditions for industrial engineers to get on with their jobs. Keep our borders open so that if one of our local suppliers cannot deliver, an alternative in Asia or Europe can add shifts to pick up the slack.

Individual and isolated firms and nations are never as resilient as a network whose members work together to cope with unplanned events. The crisis showed just how heroic that professional response can be. ❖

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