

The digital transformation use cases for tomorrow's transportation and logistics will depend upon robust 5G networks.

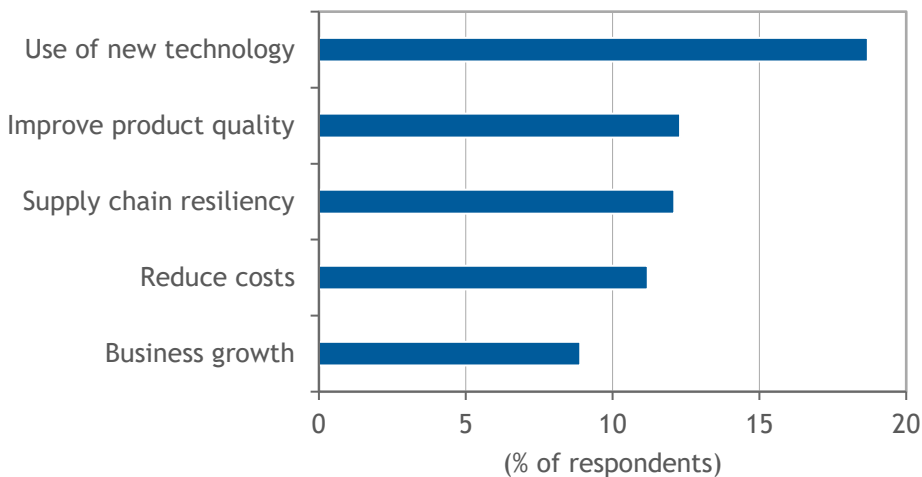
The Role for 5G in Transportation and Logistics

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FIGURE 1: *Drivers of Change in the Supply Chain*

Q What are the drivers of change in your supply chain?



N = 500

Source: IDC 2020 Supply Chain Survey

Trends and Disruption in Transportation and Logistics

The past year was highly disruptive for the global supply chain and 2021 is shaping up to be similarly challenging. From the "polar vortex" shutting down much of Texas early in the year and creating supply shortages of everything from vaccines to chicken wings, to the week-long blockage of the Suez Canal by the Ever Given cargo ship, this year's headline-making disruptions have exacerbated a supply chain already struggling with supply and demand issues created by the pandemic. The good news is that the past year provided excellent insight into supply chain vulnerabilities and resiliencies and how we might better manage and optimize the planning and movement of goods around the world. One might hope that 2021 will prove to be a better year for the supply chain, with the availability and administering of vaccines offering the most promising path to some semblance of normalcy. Ironically, the COVID-19 vaccine will be both good news for the supply chain and a source of challenge in terms of timely distribution and inventory visibility.

Demand declines were the single largest impact on the supply chain in 2020. By the end of the year, factory closures had proven difficult, but not to the degree that we had initially thought, whereas transportation shortages ended up somewhat unexpectedly rivaling factory closures. In retrospect, this trend makes a lot of sense given the significant shift in 2020 away from traditional brick-and-mortar retail to e-commerce. While online retailing was a growing trend leading up to the pandemic, it was significantly accelerated by COVID-19 in 2020, putting a strain on transportation resources. For a while last year, Amazon Prime's 2-day delivery was "maybe next week."

Transportation disruption proved to be significant in 2020 and is persisting into 2021. Last year, only 10% of manufacturers said they experienced zero disruption; the remaining 90% saw either rate increases or capacity limitations. While rate shifts are mostly about the supply/demand dynamic, capacity shortages are more significant, in part because they are not new. We have seen capacity problems around the holiday season for some time, for example. And while COVID-19 affected the availability of drivers, the trucking industry in particular has been struggling with labor resource limitations for a while now.

It is fair to ask, then, what does 2021 and beyond, i.e., the "next" normal, look like for the supply chain and for transportation and logistics specifically? Los Angeles and Long Beach have recently been unable to dock and offload container ships fast enough to meet need, with long lines of dozens of cargo ships anchored just outside their ports, their cargo thwarted from achieving a speedy trip to its end destination. Meanwhile, many industries that are seeing significant upward trajectories in sales — automobiles, boats, bikes, building materials, and much more — are experiencing delays because the parts suppliers of core components such as computer chips have not been able to ramp up production to levels needed. This is a result of the reverse bullwhip effect, named for the curve it creates when small decisions at one end of the supply chain have amplified effects on inventory as they move toward the other.

As a consequence of COVID-19 and both the scale and frequency of the disruptions it spawned, manufacturers have largely zeroed in on two things to address risk and become resilient: improving supply chain visibility (70%) and being more agile (80%), according to IDC's Supply Chain Survey. Indeed, it has long been IDC's view that in order to have a resilient supply chain, you must be able to see what is happening in real time and then be in a position to do something about it. Interestingly, in a supply chain survey fielded by IDC in December of 2020, "transportation and logistics" was the top area of focus for risk management.

The Role for 5G in Transportation and Logistics

As illustrated in Figure 1 above, there are a number of factors impacting the supply chain, with new technology identified as the top driver of change in a recent supply chain survey. At IDC, we have been seeing the growing influence of technology on the supply chain generally, and transportation specifically. In the same survey, when asked about important capability gaps to be closed, manufacturers and retailers overwhelmingly cite the lack of digital competencies in the supply chain to be able to react to business model threats and take advantage of opportunities. Technology has a major role to play in both the present and the future of the supply chain with newer technologies — some more mature than others — poised to effect significant changes in the near future. Two are particularly prominent for transportation and logistics: 5G and artificial intelligence (AI). This brief focuses on 5G.

Based on extensive conversations with manufacturers and retailers, IDC has identified a number of digital transformation (DX) use cases for transportation and logistics. While some are possible today with existing technologies, a number of the more intriguing examples are dependent upon robust 5G networks. Three examples include:

- 1. Real-time digital dashboards and metrics.** Most organizations monitor suppliers with point-in-time historical performance information. This is an inefficient, time-consuming process requiring that disparate data sources be manually integrated and viewed; historical data also reflects static information that does not provide a real-time view. Additionally, point-in-time information requires a means of capturing an increasing amount of data created far from the central office. 5G can support the creation, capture and delivery of data no matter where company assets are located. Real-time digital dashboards and metrics that take into account internal and external data feeds allow the business to see all KPIs for suppliers, helping the enterprise understand its supply base. Real-time insights delivered via 5G also create an opportunity to automate operational responses through the organization and allow a business to start to project future performance, enabling improved supplier relationships and supplier source selection.
- 2. Predictive vehicle tracking and maintenance.** Today's vehicle tracking combines online searches of shipments with manual calls to carrier dispatch and customer service. This causes costly delays, ties up resources, and affects timely decision making. Live vehicle tracking through onboard devices gives location of assets in real time and estimates the probability that pickup/delivery commitments will be met. Beyond initial route planning, in a fully realized 5G world, efficient route planning will be further enabled by connected vehicles that "talk" to surrounding infrastructure, taking into account other traffic inputs and environmental conditions to adjust and optimize the route. Additionally, it is estimated that some autonomous vehicles can generate 5TB of data per hour of operation, or more than 40 terabytes of data in an 8-hour shift. Monitoring that data in real-time, and putting it to use, is far beyond the capabilities of legacy connectivity, setting up a prime opportunity for 5G.
- 3. Dynamic fleet optimization.** Today, fleet optimization is a very manual process performed by planners and fleet managers. This process takes additional time and requires additional cost while introducing significant bias (e.g., preferred carriers). By contrast, machine learning algorithms build an accurate model of private fleet capacity, including physical asset constraints as well as driver availability, hours of service, and fleet maintenance. This allows planners and fleet managers to dynamically optimize fleet capacity.

Benefits of 5G in Transportation

Although the term "big data" has largely fallen into disuse, the challenges inherent in growing and diversifying data sets have not. Manufacturers and retailers are dealing with rapidly growing data volumes, and velocity and connectivity are ongoing challenges. Data is of no value if it cannot be routed to the right places in the supply chain so that it can be analyzed for insights and actions. The significant growth in e-commerce and direct-to-consumer shipments (drop ship volumes for some product categories doubled in 2020) as a consequence of COVID-19 shows no sign of reverting to pre-pandemic levels and shippers are challenged to move large amounts of data across networks with poor bandwidth and high latency. Thus, the emergence of 5G capabilities and networks comes at just the right time. 5G will allow manufacturers and retailers to support the massive increase in connections (IoT) for tracking and security, anywhere and at any time. 5G + edge computing will bring the necessary bandwidth and low latency for real-time data analytics, mobile AI, and transportation automation. It will also provide shippers with the support infrastructure necessary for next-generation data intensive activities, such as aligning live transportation networks with their digital twins or linking to transportation provider networks in real time.

In the near-term, 5G extends connectivity's reach, leaving fewer blind spots as products move through the supply chain. Tracking assets in real-time beyond the four walls of a business is considerably more challenging than tracking within a fixed, four-wall structure. 5G — and cellular service in general, including on-premise, SD-WAN, 600mhz spectrum, and so forth — provides greater coverage for monitoring location and performance of assets on the move, enabling an anywhere-anytime information access model, which is essential for decision-making and optimizing business operations.

Importantly, 5G's role in the DX journey of transportation and logistics companies goes hand in hand with the maturation of complementary technologies, such as AI, visual analytics, and mobile edge computing. As these technologies are integrated into cohesive solutions, their ability to drive automation and efficiencies in operations will become more tangible. As noted above, fleet optimization today is a manual process driven primarily by cargo and customer location considerations.

Considerations

Many of the supply chain and logistics professionals whom IDC speaks with regularly express frustration over the murkiness of "technology soup," i.e., discussions with technology vendors wherein each extols the virtues of what they offer as the "best in the industry." Consequently, we do see some level of technology fatigue in the supply chain. Two things are critical to overcome this. First, vendors should be focusing on solving business problems versus selling technology for technology's sake. Second, vendors should focus on real-world use cases. There is no more powerful argument for technology than articulating how it can be combined with people and business process to offer a better alternative to the challenges companies face with their current setups.

5G's impact in transportation and logistics is ultimately a dual exercise in education and expectation management. While 5G has come to be generally associated with 1 Gbps speeds, not all 5G is the same. Faster speeds will exist in dense urban cores, with slower speeds in suburban and rural areas, where the technology must cover a greater geographic area. This is also true for international use, due to the variety of different spectra deployed to support 5G. This is just one nuance that, more often than not, requires considerable discussion up front, before debating actual solutions and the need for 5G. For transportation and logistics companies, bandwidth may not be as important as 5G's low-latency and connection-density attributes. While these features are not yet available commercially in today's 5G networks, they will improve as 5G continues to evolve.

Conclusion

The past year was a good wake up call for supply chains. Having been forced to focus on vulnerabilities exposed in 2020, we are in a better position to address them. It's worth noting that the COVID-19 pandemic was not a single, large disruption but rather a series of hundreds, if not thousands, of sequential disruptions; nor, as 2021 has shown, was COVID-19 the last of the causes of supply chain disruptions. Organizations will not be able to eliminate disruption, but through more advanced technology and better processes and planning, they can be more resilient and better able to respond effectively to it, keeping product moving, maintaining profitability, and ultimately satisfying the end consumer.

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Based on our shared experiences of 2020, and the insights gleaned from the two cited IDC surveys, IDC suggests the following actions:

1. The time is now to build infrastructure that will support a resilient supply chain. Whether it's the next virus outbreak, a war, a trade conflict, a weather event, or a stuck ship, your supply chain will be affected. Don't just work on alternative plans, though that is a good start; develop the structural capabilities to support a resilient supply chain.

2. Be clear and dispassionate about what went wrong, or right, in the past. Where were the cracks – was it a supply problem, a demand problem, an inventory problem, or something else?
3. Consider driving better resiliency in your supply chain. Risk and resiliency are two sides of the same coin; a resilient supply chain is able to monitor for and manage risk while maintaining momentum, which is only made possible by having visibility into your supply chain. If you have not yet pursued end-to-end visibility, now is the time to start. If you have been working on visibility into parts of your supply chain, now is the time to connect those efforts. Assess the agility of your supply chain. Are you overly dependent on one part of the world or on one key supplier?
4. Revisit, modernize, and create local as well as global supply chain contingency plans by leveraging the full span of digitized tools, which includes modern robotics, drones, and automated vehicles integrated to intelligent operational systems as part of flexible and dynamic workflows.
5. Transportation and logistics companies need to consider 5G as a digital transformation journey rather than a destination. Targeting early use of 5G for base connectivity provides a platform for future innovation as additional technologies, use cases, and solutions come online, as well as spreads the costs associated with adoption over a longer period of time.

About the Analysts

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