

A photograph of two warehouse workers, a man and a woman, wearing hard hats and high-visibility vests. They are standing in a large warehouse aisle, surrounded by tall stacks of cardboard boxes on metal shelving units. The woman is holding a tablet and looking at it, while the man points towards the boxes. The background shows more shelving units and boxes, creating a sense of depth. The lighting is bright, typical of a warehouse environment.

Supply Chain and Inventory Management Trends 2020-2021

A Grainger Report

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Introduction

Businesses faced a variety of unprecedented inventory hurdles and supply chain challenges throughout 2020, from the inability to replenish critical stock and the lack of safety and protective gear reserves to cleaning and everyday item shortages. For many supply chain leaders, the pandemic has stretched their global operations in previously unforeseen ways and exposed how global supply chains were unprepared to cope with a crisis of this magnitude.

This report draws on November and December 2020 online customer survey findings as well as interviews with leaders in logistics, warehousing, supply chain management, and academia. The purpose is to explore the leading inventory management strategies and key technology and trends that are helping to drive greater supply chain resilience in the years ahead.

Grainger research uncovered five key trends transforming supply chains in 2020 and beyond:

- 1 COVID-19 Impact and Ongoing Recovery
- 2 Digitization of the Supply Chain
- 3 Evolution of Lean Management and Just-In-Time (JIT) Inventory Management
- 4 Risk Management and Building Supply Chain Resilience
- 5 The Human Side of the Digital Supply Chain



*Each section of this report explores a **key trend** and offers **insights and advice** from supply chain and logistics experts on the suggested ways companies can use different inventory management strategies and emerging technology to help combat pandemic-related challenges and build greater supply chain resilience.*

Methodology

To get a pulse on how customers and industries in general have managed inventory management challenges and supply chain disruptions, Grainger conducted a two-part research study consisting of an online customer survey and expert panel interviews from November to December 2020.

Phase 1: Over 110 Grainger customers of varying industries and sizes engaged in an online email survey from Nov. 9 to Dec. 9, 2020.

WHY GRAINGER CUSTOMERS?

As a leading distributor of industrial and safety supplies, Grainger serves a diverse group of public and private sector customers. Grainger chose to survey our customers for this report because they represent a wide sampling of businesses across various industries including education, government, warehousing, metalworking, food and beverage, hospitality, public safety, property management, retail and many more. The responses from this unique cross-section of business operations provide a revealing look at how managing inventory impacted business of all kinds in 2020.



Methodology

Phase 2: In cooperation with a research partner, Grainger recruited and assembled a panel of experts in logistics, warehousing, and academia with knowledge of inventory management tools and technologies and supply chain data analytics. Qualitative one-on-one interviews were conducted via telephone between Nov. 2-11, 2020.

PANEL PARTICIPANTS

Panel participants gave informed consent at the beginning of the study and were promised anonymity for their participation. For this reason, our report does not disclose the names and company affiliations of the panel participants.

- **Former Transportation Supervisor** at a large package delivery and supply chain management company, Former Operations Supervisor at a major transportation company
- **VP of Customer Relations and Development** at a major transportation company, Former VP of Transportation at a large logistics company
- **Professor of Management Executive Education, Blockchain Program Expert Advisor:** Logistics, Defense, and Aerospace
- **Portfolio Operations Director** at a major transportation and logistics company, Former Material Director
- **Associate Professor of Information Systems** Former Assistant Professor of Information Systems and Management



Respondents were asked a variety of questions first to get a sense of how their businesses have been affected by and how they responded to the pandemic. We also wanted their help to identify trends in emerging technologies in inventory management. This report focuses on the following key questions from our research:

1. *What are today's technological developments that are changing inventory management? How do these tools help to address key challenges?*
2. *How has the Internet of Things (IoT) changed the way inventory is tracked and managed both in the immediate and near future?*
3. *How has the COVID-19 pandemic impacted the supply chain and what challenges has it created for inventory management specifically?*
4. *In different industries, does emerging technology change the types of skills, accreditation, and/or continuing education needed by successful employees?*

COVID-19 Impact and Ongoing Recovery

Supply chain disruptions due to the coronavirus pandemic have significantly impacted inventory strategy and supply chain management. In particular, the pandemic has highlighted three primary stress points within global supply chains, including inventory management, supply chain transparency and risk management.

In late 2020, Grainger conducted a two-phase research study to better understand how the pandemic has impacted not only our customers but the economy as a whole, and to learn how emerging technology is helping businesses meet supply chain challenges.

Grainger also surveyed supply chain experts from a variety of industries and academia to glean advice on how leaders can manage and prioritize key technology trends throughout 2021 and beyond.

While 84% of the respondents Grainger surveyed reported being essential and never shut down, many have felt an impact from the pandemic on their day-to-day roles. Among the most common challenges, a majority of respondents reported they are now spending more time sourcing new COVID-related items, such as hand sanitizer, face shields and masks, and cleaning supplies and managing through delivery delays.

Outside of sourcing issues and safety concerns, **55% of survey respondents pointed mainly to lead time, followed by inventory, as having the biggest impacts from the pandemic.**

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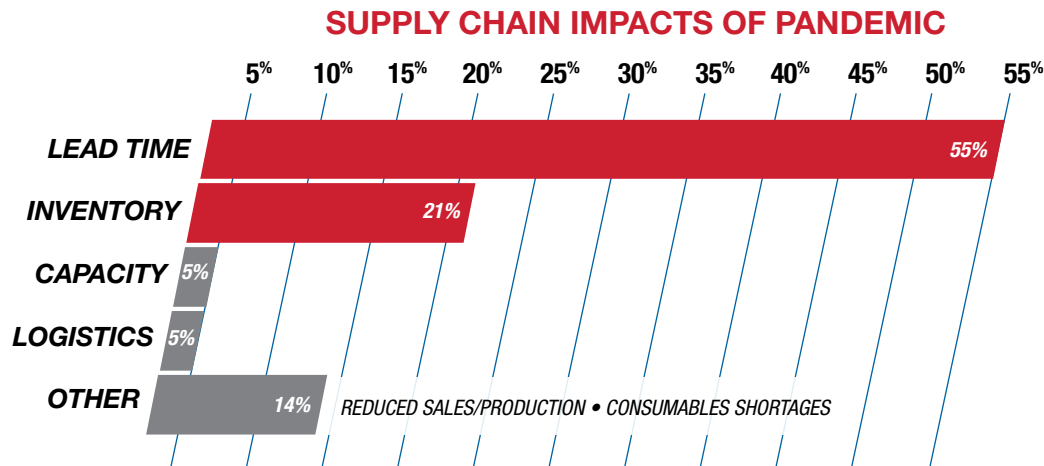
“What we learned out of that is as a supply chain started to collapse, specifically around PPE, ad hoc supply chains stood up. And while they looked like a saving grace in the beginning, they turned out to really highlight what the problem is with ad hoc supply chains—one being no quality control and two being no way to verify counterfeit materials and so on.”

— *Professor of Executive Management Education and Blockchain Expert*

”

COVID-19 Impact and Ongoing Recovery

As customers point mainly to lead time, followed by inventory, as taking the biggest impacts from the pandemic, subject matter experts discussed changes in inventory management strategy to manage through these unprecedented times.



Q5. n=78: In what area has the COVID-19 pandemic most impacted your supply chain?

A majority of respondents indicated that the pandemic has also shifted their companies' focus to the importance of safety and hygiene within their organizations, particularly around equipment sharing. One respondent specializing in supply chain operations noted, "What COVID has added is how important hygiene plays into that role, and things that we took for granted with the sharing of equipment, seating arrangements, all of those have been challenged."

“ We have more of a buffer or a safety stock waiting until this passes, whenever that is. ”

“ The major impact is from the supply chain and staffing issues throughout the network. ”

“ Everybody at the beginning was competing for the same items, and our strategy was to centralize that, as opposed to have individual sites try to manage it themselves. ”

COVID-19 Impact and Ongoing Recovery

Companies have felt the impact of the pandemic as they now must spend time searching for unavailable items, finding new items to address the virus, and managing through delivery delays.

ITEMS UNAVAILABLE (31%)

"Facing regular challenges for purchasing PPE for our site. Many of these items were just for our normal production, NOT for COVID-19 issues."

"Prolonged delivery times, deliveries have nearly doubled, and many items backordered or not available."

"Unfulfilled requests and slowed productivity."

DELIVERY DELAYS (23%)

"Cannot get supplies. Lead time issues"

"Slowed delivery of normal everyday items. Lead times have increased by months."

NEW COVID ITEMS NEEDED (14%)

"Making sure we have the covid supplies on the mill site to cover over 300 employees."

"Needed almost 3 times the amount of cleaning supplies"

"It is becoming increasingly hard to get a hold of products like gloves and cleaning sanitizers"

Q2, n=86: How has the COVID-19 pandemic impacted your role and day-to-day life in supply chain?

Many respondents reported the biggest impact of the pandemic was in their day-to-day roles as they now must spend additional time sourcing safety and other cleaning items to help address the coronavirus, as well as work on managing delivery delays.

COVID-19 Impact and Ongoing Recovery

KEY INSIGHTS FROM THE SURVEY



How has the pandemic due to COVID-19 impacted the supply chain and what challenges has it created for inventory management specifically?

SOURCING DIFFICULTIES

The pressure on global supply chain surfaced problems that were common across many respondents:

“Due to lack of availability of PPE, I spend more time searching for suppliers.”

“Prolonged delivery times, deliveries have nearly doubled, and many items backordered or not available.”

“Continuously searching for disinfectant, bleach and safety items.”

“It is becoming increasingly hard to get a hold of products like gloves and cleaning sanitizers.”

Source: Online Grainger.com Poll Data



Digitization of the Supply Chain

The coronavirus pandemic, shifting consumer demand, and emerging technology are rapidly transforming the supply chain landscape. More and more, warehouses, cargo ships, containers, production sites, retailers, and customers that make up the supply chain are becoming interconnected and digitized. Supply chain operations have become both global and local at once. Managers need to monitor global trends, patterns, and requirements and zoom in when and where needed. To stay ahead of potential shutdowns and stockouts, companies must focus on the most important buying behaviors, the plants, the workforce, and the environmental concerns in a specific region.

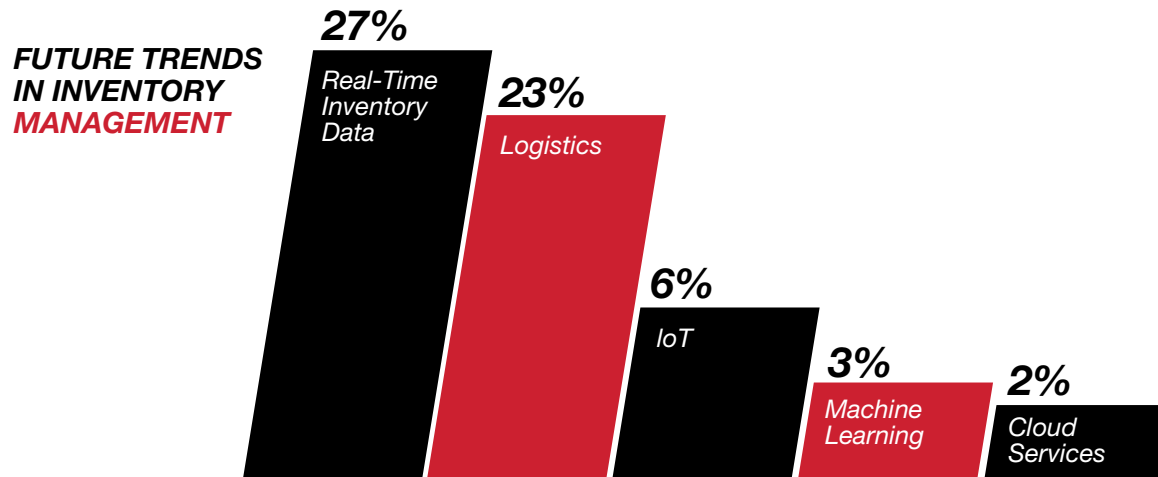
However, as traditional supply chain practices are being disrupted due to ongoing global pandemic recovery efforts, leaders are being forced to seek new technologies and solutions to overcome the challenges of an increasingly complex environment.

Grainger research revealed three key trends leading the [digital transformation](#) of the supply chain: Shifting consumer behaviors; real-time data and evolving technologies (IoT, automation, robotics and blockchain).

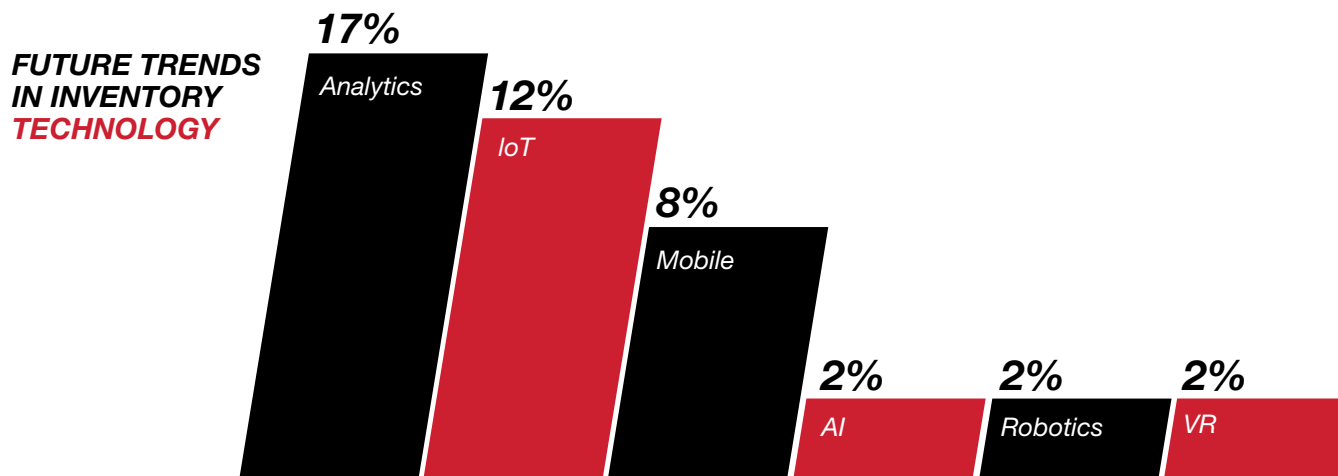


Digitization of the Supply Chain

About a quarter of customers see future trends in real-time inventory data and logistics with technology such as analytics and IoT impacting their company most in the near future.



Q6. n=66: Which of the following trends do you see impacting your company the most in the next 12 months?



Q7. n=66: If you had to predict, what specific inventory management technology do you think will be most important to your company in the next two years?

“

There is a lot more digitization - different types of sensors, IoT, RFID, GPS tracking for example on trucks to figure out where things are. And they are using that to sort of drive intelligence, intelligent decision making in the supply chains.

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Digitization of the Supply Chain

SHIFTING CONSUMER BEHAVIORS

Consumers are shifting from traditional brick and mortar retailers to buying more products and goods online. The global pandemic in 2020 rapidly accelerated the digital transformation of the supply chain. According to a [McKinsey Global Survey](#) of executives, companies have accelerated the digitization of customer and supply-chain interactions and their internal operations by three to four years, and the share of digital assets in their portfolios has accelerated by seven years.

A majority of supply chain experts Grainger interviewed also confirm this industry shift indicating that the COVID-19 pandemic has sped up the adoption of digital technologies and channels by several years and many believe these changes could be here for the long haul.



“

We're at an inflection point. We happened to get there a little bit quicker because of COVID. At that inflection point, you're starting to see a change in value structure. Value used to be a product, whatever you're buying or selling, but now value's turning to data generated by that product.

— *Professor of Executive Management Education and Blockchain Expert*

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Digitization of the Supply Chain

EVOLVING TECHNOLOGY: REAL-TIME DATA, AUTOMATION AND IoT

Supply chain digitization is now helping companies participate in the entire value chain, keeping tabs on goods and products throughout their lifecycle. As a way to de-risk supply chains during the ongoing pandemic recovery efforts, businesses are moving toward production at the point of need.

Evolving technology and supply chain management tools are helping supply chain managers respond faster to customers, environmental concerns, and operational risks.

Many respondents reported their companies are also starting to move a bit more quickly on connectivity and systems integration via the Internet of Things (IoT). Legacy systems tend to be the main barrier to moving quickly with this emerging technology in today's market.

Several respondents to our survey reported their companies are starting to focus more on connectivity, real-time data, automation, and legacy systems' integration through the [Internet of Things \(IoT\)](#). This is a big shift within the industry. The first step many companies are taking toward automation is focusing on digitizing their internal processes to help make their supply chain networks more transparent and agile. Respondents that had already been managing more digital supply chain networks before the pandemic reported their companies are now taking further leaps in development by incorporating things like Artificial Intelligence (AI) and machine learning into their operational planning and risk management.

“Supply chains are still very pen-and-paper-based. Before you can start applying your artificial intelligence, you need to start capturing the right data, so the first phase towards automation is going to be how do you digitize these businesses? That's where I think a lot of action is happening right now. Even though people might be saying AI, I think in reality what is happening is they're trying to make the processes a lot more digital.”

— Associate Professor of Information Systems

Digitization of the Supply Chain

A majority of respondents reported more access to real-time data is helping improve workflow processes and supply chain efficiencies. As digital supply networks rapidly evolve from traditional models to more complex, interconnected systems, managers now require more precise location-based information for critical processes such as real-time inventory tracking/tracing and service delivery alerts.

“We are doing much more visual scorecards, informational boards, metrics that are measuring efficiency by the job cycle. Instead of looking at the end of the day and say we only did 80 percent of what we were supposed to do, we’ve put some processes in place that are tied to the system, that are shared with everybody from the team member, to the supervisor, to the leader, and to the customer, so that everybody can see in real time what we’re executing, if we’re to plan, if we’re not to plan.”

— **Portfolio Operations Director at a Major Transportation and Logistics Company**



Digitization of the Supply Chain

KEY INSIGHTS FROM OUR EXPERT PANEL



How has the IoT changed the way inventory is tracked and managed both in the immediate and near future?

“The concept that supply is driven basically by the customers is really what IoT can allow you to do. So, the end consumer can essentially really dictate the supply as opposed to trying to keep back up with it. That visibility, especially when it comes in a retail setting, and enabling that, is really the game changer when it comes to using IoT.”

**— VP of Customer Relations and Development,
Major Transportation Company**

“Real-time data is the benefit of using the IoT technology because A, you’re not having somebody manually scan everything in. If I have a pallet with 20 different things on the pallet and it’s coming off of an inbound truck, if I have an RFID technology on the product, then the moment that it hits the dock, there’s a scanner up top of the dock that can inventory that product in. The alternative is you have associates manually scan and then update the warehouse management system. From a staffing perspective, I have real-time visibility within the network, and I know for a fact that I have X amount of product coming in on this truck that just got dispatched, then I can plan accordingly with who I’m going to staff at that next building in real time, as it’s happening, so I don’t have anybody sitting there.”

**— Former Transportation Supervisor at a Large Package
Delivery and Supply Chain Management Company**



Evolution of Lean Management and Just-in-Time (JIT) Inventory Management

Global and local disruptions in the supply chain due to the coronavirus pandemic have had a major impact on inventory strategy. Businesses are now at a crossroads in the evolution of global supply chains that pits [just-in-time \(JIT\)](#) systems focused on improving operational efficiency against just-in-case plans that emphasize planning for a range of possible scenarios.

As a result of the pandemic, Grainger's research found some companies are shifting to just-in-time inventory to keep the carrying cost of inventory off of their company financials, while other companies are carrying a greater stock of key pandemic-related items that have been difficult to source as a buffer.

Many businesses now rank balancing stock flow versus stockpiling as the biggest supply chain challenge following the pandemic. According to one panel expert, "The major impact is from the supply chain because of the staffing issues throughout the network, of getting supplies on time or supplies getting delayed has caused an issue with some of the equipment if there are facility breakdowns. How we've planned, we've kept additional inventory. We've been using around a 35 percent increase of our normal inventory for the safety, the PPE, hand sanitizers so if there's a shortfall, it's almost like a four-month supply."

Prior to the pandemic, a traditional approach to inventory management emphasized the need [to balance supply chain efficiency and resiliency](#). However, within recent decades, as companies began integrating supply chains with many different systems, smaller profit margins have driven supply chain managers to focus on cost reduction and just-in-time (JIT) inventory management.

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Just-in-time requires technology that allows you to be able to track in real time to cover your inventory because most large production is a synchronous event that requires that part A arrive before part B to arrive before part C in order to start doing assembly and so on. So, if you're going to try to take the downdraft of maintaining a large inventory off of your balance sheet, which everybody is trying to do right now, it then requires a lot of information to do near real time or real-time supply chain management.

— *Professor of Executive Management Education*

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Evolution of Lean Management and Just-in-Time (JIT) Inventory Management

To combat ongoing supply chain disruptions, many companies are moving towards production at the point of need. However, the pandemic highlighted one of [JIT inventory management's biggest risks](#) — its reliance on accuracy and precision. For JIT inventory management to work successfully, demand must be precisely monitored at all times. A small miscalculation can have a substantial adverse impact on business operations. Underestimating demand can lead to empty shelves, lost sales, and lower profits.

Overall, Grainger research found the pandemic and ongoing recovery efforts are causing many companies to rethink how to manage inventory and create supply chains. Many supply chain experts Grainger surveyed reported their key inventory management strategy throughout the pandemic has been primarily risk management. As one of our panel experts specializing in logistics explained, “People are trying to make their supply chains small and agile. They’re not sort of moving away from just-in-time so much as they’re trying to figure out how can they reduce the risk in the supply chains. [For example] let’s say I had a local manufacturer sitting in China, can I now have a few manufacturers or suppliers sitting in the U.S.? Maybe they are at a higher cost, but they can supply stuff to me if my supply chain from China is disrupted.”

Many companies are also focusing on diversifying their supplier base and reshoring their manufacturing to help combat supply chain disruptions. Another panel expert noted, “From a cost benefit analysis, companies might want to have closer suppliers in case there are disruptions to supply chains. No one could have imagined something like COVID hitting the entire world all at once, but I think in that reality, people are thinking of moving their supplies closer, so that their supply chains don’t get disrupted.”



Evolution of Lean Management and Just-in-Time (JIT) Inventory Management

KEY INSIGHTS FROM OUR EXPERT PANEL



How has the COVID-19 pandemic impacted the supply chain and what challenges has it created for inventory management specifically?

From a strategic overall planning of the supply chain, ensuring we were still maintaining throughput at the same levels in each one of our facilities was a challenge. We probably had the worst time that I've seen just because we were so overwhelmed in different areas. To be honest, a lot of it had to be solved with strategic meetings and planning on a regular basis and then also changing different capacity and also basically opening up other buildings, which we had to open up multiple buildings just for overflow purposes throughout the network.

— VP of Customer Relations and Development, Major Transportation Company

Obviously, everybody at the beginning was competing for the same items, and our strategy was to centralize that, as opposed to have individual sites try to manage it themselves. We set up the logistics and did a lot of data analytics so that we understood across the corporation what the demand was, the forecast, and ensuring that we had it. This took us everywhere from being able to get it within a state that we might be working in, to go over to Asia Pacific to get items, to ensure that we were able to run the operations and to ensure we have the proper equipment to do the job safely. We have more of a buffer or a safety stock waiting until this passes, whenever that is.

— Portfolio Operations Director, Major Transportation and Logistics Company)

Risk Management and Building Supply Chain Resilience

Accurate demand forecasting and sales projections are critical to effective supply chain management. But in periods of sudden demand, there may be an increased risk of inaccurate forecasts due to incomplete information. These inaccuracies can quickly amplify availability issues further down the supply chain.

For many industries, consumer demand is rarely completely stable, so supply chain managers make demand forecasts and projections to maintain appropriate inventory levels. However, because projections are largely based on historical data, they are not always accurate. To help plan for uncertainty, companies often try to buffer their inventory with “safety stock.” When demand surges, suppliers may respond by reactively increasing their safety stock. But carrying too much safety stock can snowball, [causing the bullwhip effect](#), as the initial demand continues to inflate as it moves down the supply chain.

Unified, [dynamic operations and financial planning](#) are essential for achieving supply chain resilience as consumer behavior and demand continue to shift rapidly due to the global pandemic. Many respondents noted how supply chain planning can no longer remain isolated within organizations. Successful production planning must consider supply, demand, and production capacity.

A majority of survey respondents (67%) have seen a moderate to high impact from the pandemic on their inventory planning, however, only about a third have shifted to rely more on real-time data to manage their inventory and supply chain.

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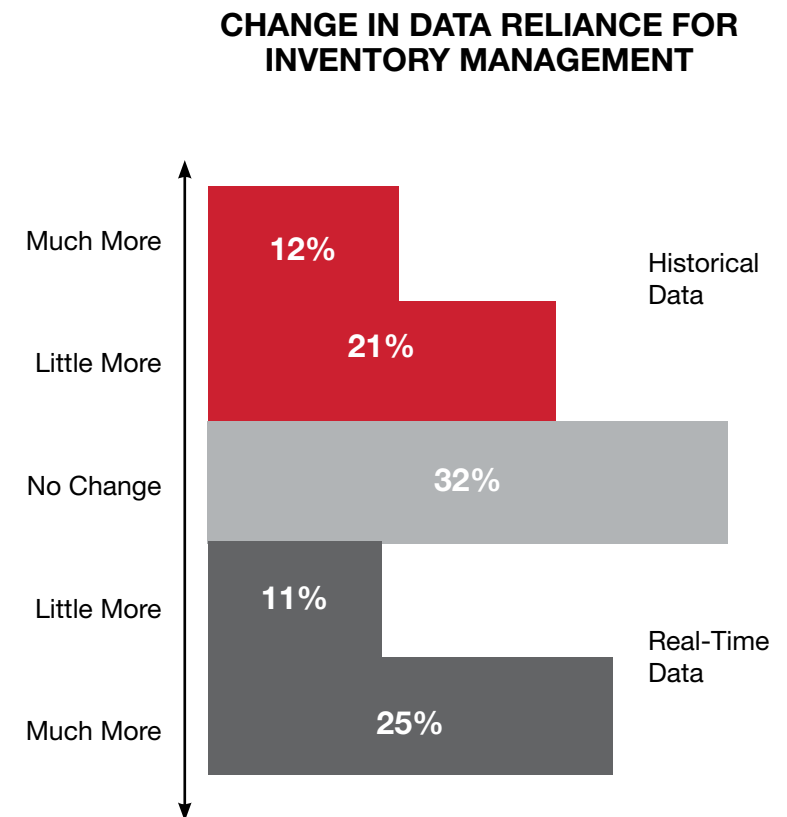
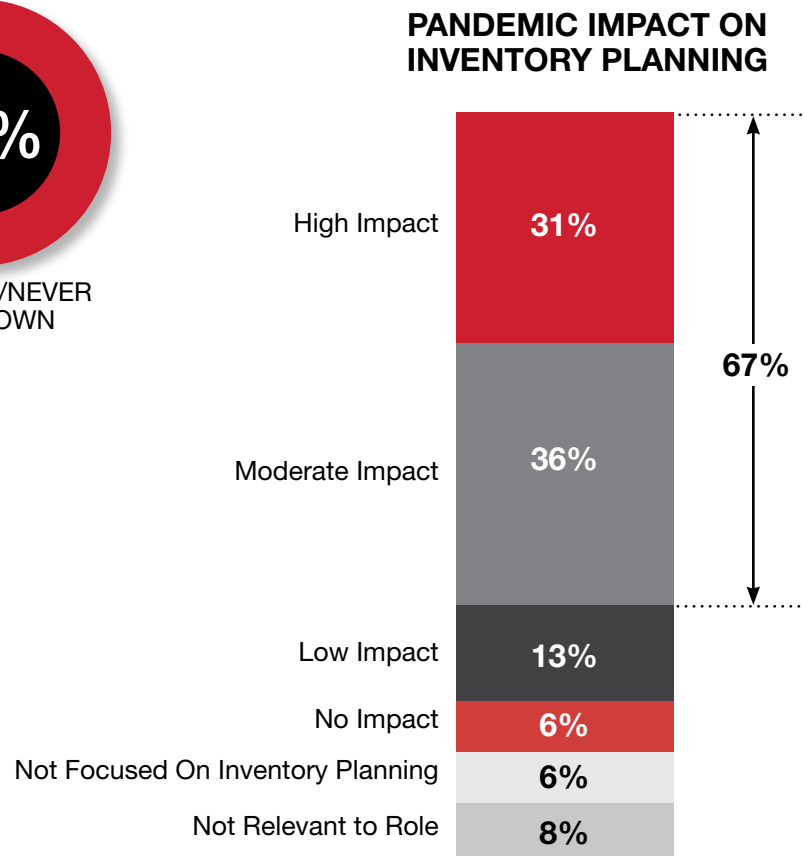
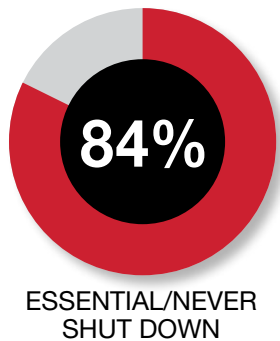
There is regular planning. However, when you're talking, on a day-to-day basis, fluctuations in volume between 100,000 to 300,000 pieces, you're talking about huge swings, which is one of the issues with our particular industry. It's all based off of orders online. So, you're only able to process, capacity-wise, 100,000 pieces in a given day. And you're getting 200,000 pieces after two or three days, that's a huge logjam that then needs to be shifted accordingly.

— VP of Customer Relations and Development at a Major Transportation Company

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Risk Management and Building Supply Chain Resilience

While a majority of respondents have seen a moderate to high impact from the pandemic on their inventory planning, only about a third have shifted to rely more on real-time data.



Q1. n=113: How would you describe your current business operational status?

Q3. n=85: What kind of impact has the COVID-19 pandemic had on your company's inventory planning?

Q4. n=78: Which of the following best describes any change in your company's reliance on historical data for inventory management during the COVID-19 pandemic?

Risk Management and Building Supply Chain Resilience

As more vulnerabilities within global supply chains are exposed due to the pandemic, many of the supply chain experts we spoke to noted the importance of risk management strategies to focus on developing the ability to quickly create optionality within global supply chains in terms of supplier diversification, manufacturing locations and modes of transportation. Historic supply chain disruptions are now causing companies to change their supply methods. As a supply chain respondent explained, “Instead of relying on one supplier to drive standardization, many companies are thinking about how they can diversify their supplier network to reduce their risk in the supply chain.”

KEY INSIGHTS FROM OUR EXPERT PANEL



What are today's technological developments that are changing inventory management? How do these tools help to address key challenges?

There is a lot of push into digital supply chain, and the reason is if you have a manufacturer in China and it's shut down, nobody can get in and out because of a pandemic. But in a digital supply chain, you may have a supplier now over in Mexico that you can now pass that digital asset and have it manufactured in Mexico. That's really where the physical supply chain will start changing. You will not need to move stuff from location A to location B, but you share your IP in some kind of a secure manner, and then it gets 3D printed wherever it is supposed to be delivered.

— **Associate Professor of Information Systems**

You start creating the supply action at the point of discovery as opposed to having to go back at the end of the day, pull out your notebook, and say I need to order this part. This helps eliminate dirty data because it happens right at the point of discovery. And it accelerates the repair and the supply action because you're not waiting to come in and do a report. You can start moving these digital schemas in the virtual world. You're trying to create efficiency to compress lead time. That's really where you end up with in the virtual world.

— **Professor of Executive Management Education and Blockchain Expert**

The Human Side of the Digital Supply Chain

Before the pandemic, workforce planning and skillsets were beginning to shift. Data-driven tasks and responsibilities started suddenly emerging based on new technology—outdating traditional supply chain roles and responsibilities. Now, increased technology usage and labor trends driven by COVID-19, including remote work, gig work, and the rapid digital transformation of the supply chain, are all exacerbating these shifts.

The pandemic challenged many companies to rethink organizational policies ranging from safety and sanitation to staffing and more remote or work-from-home options. Thanks to broader technology adoption and new collaboration tools, companies can work more efficiently, directly communicating with their supplier base in real time, at both on- and off-site locations.

Grainger's research found many companies are now moving more quickly on integrating technology such as [automation and robotics](#) into their supply chains due to inventory management and labor issues created by the pandemic. Other trends helping to combat labor shortages and supply chain disruptions are digital commerce and additive manufacturing, machine learning and 3D printing.



THE RISE OF THE KNOWLEDGE WORKER

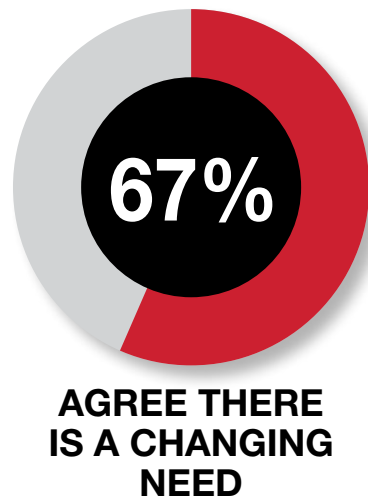
Knowledge workers are often described as people who think for a living. Examples of knowledge workers include designers, architects, software engineers and consultants. Despite the rapid integration of automation and AI throughout the workforce, industry data suggests that knowledge work is more important than ever.

According to a 2020 Gartner estimate, there are now over [1 billion knowledge workers](#) in the world. As [technology continues to replace](#) the roles of workers completing repetitive tasks, many supply chain experts foresee a greater portion of the global population will become engaged in more specialized knowledge work.

The Human Side of the Digital Supply Chain

As for the types of skills, accreditation, and education needed as the supply chain becomes increasingly digitized, 67% of survey respondents agreed there is a changing need for new skills/workforce education due to emerging technology.

While most agree that emerging technology changes the types of skills/education for success, customers are unable to articulate how and companies seem to be focusing on building those new skills on the job at this point in time.



“There are organizations that offer certification. But when you run into an issue too is a lot of it's on the job because every system is different.”

“I don't think it'll make or break if you have the actual experience with it. But there are certain terminology and things that, if you're able to understand, even just the principles with Lean Six Sigma, then you're going to be able to integrate with a team a lot better that all have some fundamental understanding of it to ultimately optimize the supply chain. I feel a lot of the times right now, we are just getting through day by day.”

“There's marketing union agreements that if new technology comes in you've got to give the employees an opportunity to learn that technology if there are other jobs to bid on.”

“There are certificate programs that teach you all the tools and give you sort of an overview of the different elements you should be thinking about in the supply chain.”

The Human Side of the Digital Supply Chain

While emerging technology impacts the types of skills and education for success, many survey respondents reported their companies are now focusing on building those new skills on the job, tailored to specific systems or as an additional “nice to have” certification. Many of the supply chain experts Grainger interviewed believe the rise in supply chain and inventory management degree programs will naturally bring new education levels to the field over time.

One panel respondent noted that shorter certificate programs like those offered by the Association for Supply Chain Management (ASCM) can help enhance employees’ technical skills. According to this supply chain expert, “the Certified Supply Chain Professional (CSCP) certification is a good part-time certification to get because it provides a great overview of the different supply chain elements and teaches all the professional tools.”

However, several respondents noted high investment costs and legacy warehouse management systems have been significant barriers to moving quickly to adopt emerging supply chain technology in today’s market. As one respondent explains, “It’s all about looking at that technology from the perspective of how can you get a return on investment from efficiency, from service, reliability, and also the human factor from the cost of health and welfare and worker’s compensation.”

KEY INSIGHTS FROM OUR EXPERT PANEL



In different industries, does emerging technology change the types of skills, accreditation, and/or continuing education needed by successful employees?

“Most companies right now might have a small, big-data section, but pretty soon, you go a couple layers down from the C suite, and people are going to be dealing with big data in order to generate solution applications. So, it’s not an education requirement as much as it is a new skill set that people must start to appreciate.”

— Professor of Executive Management Education and Blockchain Expert

“Understanding and knowing things like Lean Six Sigma and Lean principles goes a long way. And if you’re looking at hiring somebody who’s really helping with optimization of your supply chain network, there is a push towards having a Lean Six Sigma or some type of certification. If you’re able to understand certain terminology and the principles with Lean Six Sigma, then you’re going to be able to integrate with a team a lot better if all have some fundamental understanding of how to ultimately optimize the supply chain.”

— Transportation Supervisor, Large Delivery and Supply Chain Management Company

Inventory Management in an Age of Disruption

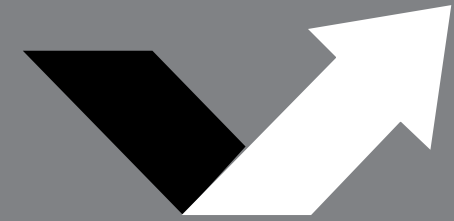
For many companies, the coronavirus pandemic exposed significant supply chain vulnerabilities. Without an [inventory plan](#) already in place, organizations can face productivity and cashflow challenges, with more time spent tracking down inventory and stocking shelves with duplicates and waste, which prevents companies from focusing on more value-add tasks.

Effective supply chain management depends on visibility, open communication, and quick access to information and insights. Thanks to real-time data and the ever-expanding Internet of Things, a majority of respondents said it has never been easier or more important for businesses to have clear visibility into their inventory across all channels.

MORE DATA BRINGS MORE TO MANAGE

While the rise of real time within the supply chain has helped take the guesswork out of inventory management, more customer touch points mean more data to manage along with regular inventory. Business leaders are facing enormous pressure to limit short-term supply chain disruptions and ensure greater supply chain resilience.

Many of the supply chain experts Grainger interviewed said technology trends like IoT and real-time data have become an indispensable part of everyday business. Before cloud computing and the [era of Big Data](#), collecting inventory information required more resources and extra manpower. Plus, manual data entry often left inventory management susceptible to human error.



Future Inventory Management Trends: IoT, Digital Assets and 3D Printing

Some trends related to IoT that are beginning to get more attention in academia include digital assets, the digital supply chain, 3D printing, and blockchain technology.

As commerce grows more complex, logistics and inventory management professionals are increasingly relying on IoT devices to help maintain the dynamic, data-driven approach that today's supply chains require. By tracking inventory in real time, IoT provides greater transparency and accountability enabling companies to monitor if their items were delivered on time and intact.

With digital commerce and the growing use of blockchain technology, companies are now also able to create optionality in their supply chains by producing digital assets, which helps to create a digital twin of their physical supply chain, securely and in real time. According to one respondent specializing in blockchain technologies, "A digital asset is a part or product that is created [using computer aided design or other software] and is then sent electronically through the supply chain to be produced at the time of use by a CNC (Computer Numeric Control) machine or 3D printer."

Inventory Management in an Age of Disruption

Digital assets can help supply chain managers to understand and analyze situations digitally and take action within the supply chain before incidents can occur. Explained one respondent, “While I’m creating that part, I’m also creating a digital twin so that I can have a record of every touch. Everything that ever happened to that part. And then now I can aggregate that across hundreds of parts and start creating knowledge and wisdom that didn’t exist before. And then the result of that is I can start creating predictive and prescriptive models for part replacement or ordering or so on that didn’t exist before.”

In the future, several respondents believe D-commerce consisting of digital asset management, blockchain and optionality will allow companies to push a lot of inventory costs further down the supply chain. Digital assets can help create supply chain optionality and inventory buffer by allowing companies to buy, sell and trade assets in a more flexible, digital format. As one supply chain expert respondent explained, “If you’re able to push the cost of raw material out to manufacturing further downstream by selling your digital assets so it doesn’t have to ride on your balance sheet, that actually creates value for both sides because you’re able to buy the digital asset cheaper and then consume them at the point of need as opposed to having 10 things on a shelf and pulling them off the shelf, but you’ve already sunk all the cost in.”

VENDOR MANAGED INVENTORY

Keeping the right amount of inventory stocked helps improve customer service and ensures you can find the right supplies, in the right place, at the right time. It’s common for many businesses to go through a lot of trial and error before their inventory management system gets where it needs to be.

One strategy some supply chain managers are now adopting is using shared facilities to help manage inventory and to support ongoing sourcing, labor and storage needs.

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We have more potential customers that are coming at us that don’t necessarily need a hundred-thousand-square-foot warehouse with dedicated resources. They’re looking for something that we could share the office or warehousing space, and people are less concerned as they maybe once were, as far as trade secrets. They just need the warehousing expertise, they need some resource requirement, but certainly not to the point where you’ve got to set up a management staff and a full-blown WMS process.

— *Portfolio Operations Director
at a Major Transportation
and Logistics Company*

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Inventory Management in an Age of Disruption

KEY INSIGHTS FROM OUR EXPERT PANEL



How has the IoT changed the way inventory is tracked and managed both in the immediate and near future?

Companies have gone through work that would have taken them typically five to 10 years of transformation time in a couple of months. A lot of companies have started projects that they were considering starting in the next three to five years immediately or projects that are automation projects around using artificial intelligence and machine learning. There is a big risk of people not being able to come to work and since supply chains are very people centric, the fact that they can't have the same workforce or people are working from home means that they need to start thinking about solutions that use AI or robotics, or automation.

— *Associate Professor of Information Systems*

A lot of intelligence or AI being used really increases the complexity of your decision making. If you have one supplier giving you low-cost products, anytime you need to replenish, you basically go to that supplier and ask for more stuff. But what's happening is as you try to build more resilience into your supply chain, you have this sort of host of factors. It can be pricing, it can be lead time, it can be risk of disruption. If you just think about one particular product or one particular part, it's a complicated problem. If you think about thousands of parts and thousands of suppliers, it becomes a very, very complex problem. There's no way a human being can solve that problem. You have to rely on complex algorithms and AI to really figure out what's the optimum mix that you should be ordering to reduce your cost.

— *Professor of Executive Management Education and Blockchain Expert*



Conclusion

Throughout 2020, companies have faced unprecedented challenges, constant unpredictability and operational changes related to the COVID-19 pandemic. The global economy and workforce have been deeply affected by supply chain disruptions, making it difficult to secure the products and services that were once readily available.

As businesses look ahead in 2021 and beyond, one thing is clear: leaders must continue to guide their organizations through uncharted waters by finding new and innovative ways to adapt to continually shifting supply chain issues and ever-changing consumer demand.



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