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Enabling today and differentiating tomorrow: Supply chain best practices

Contents

The supply chain today

Most common problems

No vertical market appears to be immune to the hardships and challenges resulting from the unprecedented uncertainty and volatility of today's geopolitical strife, climate disasters, and global pandemics. Which makes it even that much more challenging for organizations to try to meet consumer preferences and requirements that are always changing.

All of this uncertainty underscores the importance for organizations to focus on optimizing all facets of their supply chain costs—including cost-to-source, cost-to-procure, cost-to-manufacture, logistics, and handing. Supply chain optimization must also factor in the direct labor that drives supply chain activities in manufacturing, distribution, and retail. Total cost has never been more critical to understand and control—regardless of an organization's industry or sector.

Optimizing the supply chain means making critical decisions about many key factors. Even just managing the day-to-day workings of a supply chain typically involves having to weigh options and making choices. Decisions are best made when they're based on accurate and up-to-date information. Conveniently, many organizations have access (or at least the possibility of access) to lots of data that's captured throughout the supply chain. The challenge is figuring out how to leverage all of that data to drive actionable insights.

Global uncertainty or not, many organizations continue to struggle with supply chain visibility and traceability—made even more difficult when organizations must contend with internal data trapped in functional silos, along with a lack of transparency with their trading partners. As a result, many organizations recognize the need to shift to collaborative business ecosystems, but struggle with where to start and how to implement this level of collaboration effectively and efficiently.

All of these challenges from across the supply chain reiterate the need for supply chains to be more agile and resilient. When that happens, organizations can respond appropriately when disruptions occur, and can better adapt for future business models that may emerge as a result.

Key objectives of a best-in-class supply chain
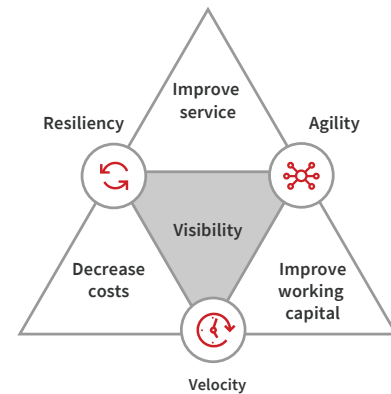
Challenges impacting the supply chain

Many of today's supply chains are struggling in key areas that have a profound impact on both customer satisfaction and profitability. These challenges include:

- **Late deliveries to customers**, which can result in a diminished customer experience and perhaps even penalties

- **Stockouts or empty shelves**, which can cause customers to search for products from other sources or even substitute with competitors' products

- **Long lead times**, which can result in lost sales when a competitor can fulfill a need in more timely fashion

- **Excess costs due to expedites**, which may force organizations to use a more expensive carrier or even change to a more expensive mode (such as shifting ocean to air transport)

To address these challenges, many organizations increase their inventory in order to try to hedge against uncertainty. Unfortunately, this also increases expenses and often leads to later discounts—or even scrapped, obsolete, or damaged supply.

Many supply chain professionals spend significant amounts of time mining data, building huge spreadsheets, making many phone calls, and responding to what feels like never-ending email chains to chase down orders, reschedule production, and more because they don't have the requested materials. This often creates a need to expedite orders to customers because there's an inventory shortage or backlog. Much of this "extra" work is because the supply chain professionals don't have the right tools or processes. Ultimately, this can result in missed sales opportunities and increased costs.

Best-in-class supply chains

Our own research and testing with customers, partners, and analysts provide a clear view of what makes best-in-class supply chains work. The primary goal of a best-in-class supply chain typically involves maximizing service levels, while optimizing costs and working capital. The key to unlocking improvements in these areas is improving supply chain visibility. Visibility breaks down barriers and creates connections that enable collaboration that drives agility, velocity, and resiliency across a supply chain ecosystem.

The continuous supply chain
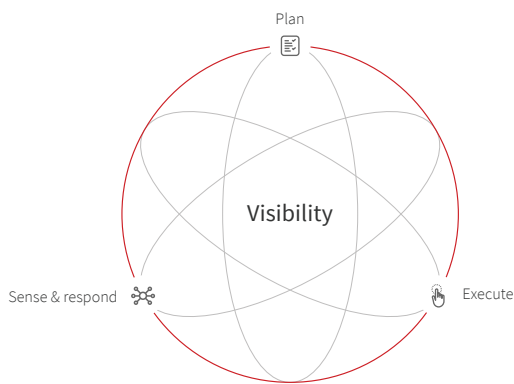
Supply chain vision for the future— the continuous supply chain

Those tasked with managing complex supply chains likely recognize that a shift has been occurring where the traditional lines between plan, execute, and sense are blurred. Instead, these processes all occur simultaneously and continuously. To accommodate this shift and the resulting changing requirements, organizations—now more than ever—need to leverage the potential openness and connections that accompany heightened visibility across a supply chain network.

Planning—connecting to one version of the truth

The future of planning is connected, intelligent, and continuous. But many organizations are still far away from this vision— with planning processes heavily siloed and disconnected from execution.

Fortunately, our evaluation of the planning landscape shows that many organizations are adopting technologies that move toward a de-siloed, network-based approach to planning. According to **Business for Social Responsibility**, as supply chains continue to evolve "procurement teams will increasingly look to suppliers for innovation in products and processes, and to partner on areas of mutual benefit. For example, companies describe opportunities to strengthen demand planning and inventory management in tandem with suppliers."

One of the primary goals of planning should be to connect an organization's planning functionality to "one version of the truth"—where all the disparate pieces of supply chain planning have access to the same accurate and up-to-date data. For true planning optimization, this needs to be in place, not just at the enterprise level, but also in the broader supply network.

This involves:

- Using integrated business planning (IBP) or sales and operations planning (S&OP) capabilities to collaborate, analyze, run different scenarios

- Performing demand planning and demand sensing to improve short-term forecast accuracy and increase service levels

- Optimizing supply planning with appropriate constraints— such as workforce, supply, and capacity—to drive efficiency

- Synchronizing the plant schedule with production scheduling to increase productivity

Each of these areas are critical to a successful planning process. They are most powerful when integrated and connected with other supply chain processes across the supply chain network.

IBP, S&OP, and S&OE

Even organizations that have advanced supply chain planning capabilities should continuously seek new methods to improve forecast accuracy, reduce inventory, drive customer service improvements, increase capability utilization, reduce manufacturing lead time, and optimize their supply chain costs.

These goals are difficult to achieve when so much work is done in silos. When employees only see the business through their own perspectives, they rarely consider the overall organization and extended supply chain. Decisions are made without the full picture. The result can be data latency that results in "multiple versions of the truth."

Achieving one version of the truth is not an easy endeavor, but adopting IBP and/or S&OP practices can help organizations get closer to that reality. Some key value drivers that can emanate from adopting IBP and/or S&OP include:

- Providing a platform to synchronize and rationalize sales and operational forecasts

- Engaging an organization's cross-functional teams (e.g., sales, finance, operations, etc.) in the supply chain planning process

- Encouraging employees to complete their reviews and approvals on-time via workflow capabilities

- Enabling a forum where everyone provides input into a single shared forecast

- Opening communication to a unified forecast in multiple languages, currencies, and formats

- Allowing users to track the assumptions made about a unified forecast

As more real-time data becomes available through the digital supply chain, organizations can further improve operations with S&OP. The increased visibility can help identify challenges—especially when there's a misalignment between actual sales and planned production.

S&OP systems synchronize demand and supply, identify imbalances, and coordinate a resolution across operating functions and business units. In addition, S&OP enables planners and managers to understand key performance indicators (KPIs) before replanning. Pre-built planning scenarios can guide planners through quick resolution of capacity constraints, sales spikes, allocation challenges, new product introductions, and performance shifts. Some solutions have collaboration built into IBP systems that enable planners to quickly engage other departments to address planning challenges.

Business management process definitions

Sales and operations planning (S&OP)

"S&OP is an integrated business management process through which an executive team continually achieves focus, alignment, and synchronization among all functions of the organization. In practice, S&OP processes rarely stretch far enough to cover all the bases of integrated, tactical and strategic business planning and tend to focus on developing a demand consensus or tactical volumetric supply and demand balancing."—**APICS**

Integrated business planning (IBP)

"IBP focuses on ensuring continuous alignment among demand, inventory, supply, and manufacturing plans on the one hand, and between the tactical and strategic business plans on the other, in an effort to maximize operational performance and meet financial objectives. IBP is a fairly new competitive weapon for supply chain leaders in the battle to accelerate, direct, and optimize business decisions for both near- and long-term planning."—**APICS**

Sales and operations execution (S&OE)

"The S&OE process is a weekly cyclical multistep process that involves at least four subprocesses or steps running in parallel with an underlying financial-alignment process. These subprocesses include a merchandising review, a demand review, an inventory plan and gap reconciliation, and an executive S&OE meeting."—**Gartner**

When an organization compliments its S&OP process with sales and operations execution (S&OE) capabilities, the organization gains additional agility in addressing the needs of today's complex markets and empowers managers to respond better to emerging near-term issues. When S&OE capabilities—such as collaboration and user-defined tolerances to key metrics—are embedded, it can help teams track-to-plan and course-correct with speed.

This helps contribute toward deconstructing supply chain silos and can transform planning processes. For instance, when a multi-enterprise business network can connect to planning and S&OE processes, suppliers' updated quantities can be incorporated and machine learning can be utilized to estimate shipment arrival times. Access to more current and accurate data for a multi-enterprise business network can help planners with their most frustrating planning problem, adjusting plans to reflect the current status versus relying on historic data.

Demand planning and sensing

Demand planning and sensing are other areas where increased visibility can help usher in significant improvements to the planning process.

> "Demand planning is the development of a consensus-driven demand plan that optimizes the balance between market opportunity and supply network capability. Demand planning enables organizations to make more accurate demand forecasts for a product or service, increasing their efficiency in producing and delivering the product to the customer's satisfaction."—**Gartner**

> Demand sensing is "a newer concept that incorporates several approaches, such as including data from all levels of the supply chain network to adjust forecasts in real or near-real time."—**MIT**

Organizations that deploy modern demand planning solutions can better calculate statistical forecasts, launch new products, manage promotions, and even determine safety stock. Modern technologies are also driving process improvements. For instance, machine learning and artificial intelligence (AI) have shown that they can **enhance statistical forecasts tenfold** beyond what traditional historical-based forecasting can achieve. Utilizing a demand planning solution can help organizations improve planning processes, such as:

- Modeling demand scenarios to understand and choose the best scenario for a customer

- Capturing all costs related to current demand

- Improving responsiveness and understanding profitability of last-minute requests

- Applying constraints that consider variables, rather than making do with a fixed model (these variables might include revenue, margin, and profitability when determining inventory allocation)

- Improving customer service levels and managing all exceptions

- Handling make-to-stock (MTS) and make-to-order (MTO) production in a mixed-mode environment

Supply planning

Organizations conduct supply planning to create optimized and constrained plans for capacity, materials, inventory, and distribution—as well as combined replenishment. Identifying ideal optimization levels can be difficult, so it's an area where organizations can greatly benefit from the power of a modern supply planning solution. Such a solution can help organizations improve their supply plans to experience better balanced stock, increased order fulfillment performance, and optimized inventory policies.

Supply planning can also help improve an organization's safety stock levels—enabling it to store the right quantities related to seasonal demand volumes across multiple locations and a wide range of products and SKUs. A modern supply planning solution should also support collaboration across the extended supply chain network, as well as the use of optimization algorithms to calculate a cost-optimal plan on automated processes.

Modern supply planning solutions should include these key capabilities:

- Highly analytical and visual overview of supply chain plans
- Multisite purchase, manufacturing, distribution, and inventory across complex, multitier networks
- Feature-rich templates that support management by exception
- Single sourcing of purchasing, transport, production
- Multilevel bill of materials (BOM)
- Reducing costs and penalties
- Safety stock by level and coverage

Production scheduling

When production scheduling is done right, it synchronizes schedules for the entire factory—optimizing schedules based on unique criteria such as labor resources, change-over time, and equipment cleaning requirements. To truly optimize production schedules, enterprise resource planning (ERP) systems, planning solutions, workforce management (WFM) systems, enterprise asset management (EAM) systems, and manufacturing execution systems should all be integrated to allow optimization across people (skill sets), capacity (equipment), and product (supply). This requires production scheduling to have inputs from systems that haven't traditionally been well-integrated. Integration also creates additional opportunities to eliminate more data silos.

Production scheduling is often highly specific to a given industry. For example, tank scheduling is critical to process manufacturers, but it lacks applicability to discrete manufacturing production schedules. This means that manufacturers can greatly benefit from the capabilities that are built into production scheduling solutions with industry-specific functionality.

The most important capabilities of a production scheduler are constraints around product, people, and equipment. Secondary constraints include labor, supply, capacity, and financials (revenue and margin). The goal is to create a 360-degree view of production to enable optimization through demand and profitability.

A modern production scheduling solution should allow manufacturers to:

- Engage volume-based constraints (e.g., mixing tanks, ovens, freezers, etc.)
- Manage supply, demand, workforce, and capacity variability in the supply chain
- Handle and remove bottlenecks to the production process
- Synchronize across multiple complex stages of manufacturing
- Manage the impact of shortages, disturbances, and delays at any point in the manufacturing process
- Optimize conflicting objectives at different stages of the manufacturing process

Seamless end-to-end network execution

It's one thing to plan and build the continuous supply chain; it's another thing altogether to execute those plans—such as managing fulfillment, product tracking, and transportation. And in today's fast-moving business environment, organizations should have the ability to execute these supply chain processes seamlessly and in real-time or near real-time. These are essential capabilities as organizations build the connected, intelligent, continuous supply chain of the future.

Real-time (or near real-time) execution of supply chain processes requires that an organization have visibility into multiple facets of execution—not just into the order management system (OMS), but also into the transportation management system (TMS) and warehouse management system (WMS). These are the key components of implementing continuous supply chain execution.

Integrated multi-party source-to-settle process

Sourcing execution or the ability to establish real-time connectivity to suppliers is what we identify as one of the four key "pillars" of supply chain execution. Achieving this means that end-to-end physical and financial operations need to be orchestrated between order management, global trade management, transportation, warehouse, traceability, and even payables management.

Streamlined manufacturing

The second pillar, manufacturing execution, in contrast, focuses on streamlining processes, driving better decision-making, and gaining productivity. To achieve optimal manufacturing execution, organizations must optimize and automate the entire manufacturing process—from raw materials and components, all the way to finished goods.

Strategic warehouse fulfillment and optimization

Maintaining complete visibility into inventory, shipping, and tracking can be very complex—even more so when executed across numerous geographies. In addition to making sophisticated warehouse operations even more challenging, globalization also makes it more difficult for supply chains to remain competitive, keep costs down, and maintain profitability. Ineffective order management, excessive labor costs, and inefficient asset use just exacerbate the problem. To tackle these challenges, organizations must reevaluate how their warehouse management practices, processes, and systems need to evolve in order to improve warehouse productivity, visibility, and costs.

One reason why it's critical that organizations address these issues is so that they can better meet customer expectations. Over time, customers have increasingly exercised their power over brands and sellers, demanding more from the supply chains that serve their needs. Customers want orders delivered more quickly, more accurately, and more specifically tailored to their requirements—all at lower cost. Today's supply chains are expected to turn around orders on shorter notice than in the past.

The third pillar, strategic fulfillment execution and optimization, addresses this. Outside-in and customer-centric strategies center around the concept that organizations must satisfy the customer first and consider their needs.

An organization's ability to align capabilities across warehouse operations and all fulfillment channels is critically important.

As more organizations seek to improve existing e-commerce operations, or even implement direct-to-consumer operations from a manufacturer level, having the right processes in place will be the difference between perfect order fulfillment and lost customers. As the last touch point before a product enters the final mile, ensuring warehouse operations are up-to-date and running smoothly enable the fulfillment strategy to work as a competitive advantage.

Enormous gains in warehouse performance can be realized through the implementation of advanced warehouse management capabilities and best practices. Supply chains that invest in driving warehouse improvements can strengthen order management, increase labor productivity, and maximize their use of warehouse assets. To get there, organizations must first identify the current needs of existing warehouse operations, where the organization is going, and where the organization wants its business to grow.

As customer demands rise and supply chains grow increasingly global, organizations need to drive gains in warehouse productivity and performance to avoid crushing costs. These investments also provide a larger return on investment (ROI) in terms of greater warehouse visibility, agility, and productivity—while also ensuring customer loyalty.

Traceability, product tracking, and transportation control

With extended supply chains and globalized markets, the safety, security, sustainability, and brand promise of many products has become more visible—and more vulnerable. Extensive supply chain history must be captured for items to create a product traceability solution suited for the challenges ahead. The benefits of a comprehensive product traceability program include greater location accuracy, faster root cause analysis, reduced time and cost in product quarantine activities, and improved compliance.

Consumers around the world increasingly demand more information about the origins of a wide range of products and materials they purchase or use, including the conditions under which the products were produced and transported. The ability to validate sustainability claims in the areas of human rights, labor conditions, environmental protection, and anti-corruption programs can materially impact sales revenue. Agricultural products increasingly seek program certification to confirm that they're grown in sustainable cultivations.

Traceability, the fourth pillar, can help organizations achieve value and compliance from product track-and-trace with minimal disruption to their ongoing operations. Traceability should be designed to identify and track products from birth to destination, capturing lifecycle events across the journey to market, and even to the final point of consumption.

Because this level of traceability is a multi-stakeholder endeavor, having the ability to view and monitor network activity and collaborate with trading partners is paramount. Achieving true traceability requires key tracking capabilities, including:

- Tracking location at the serial-number level
- Containment and "spill" management
- Pre-transit event capture
- Inbound/outbound shipping traceability
- Accurate and timely information for regulatory reports
- Historical data management

To help contain growing transportation spending as a percent of global revenue, organizations should complement their final-mile transportation strategy with global transportation visibility and control. Adopting this "bimodal" approach to global enterprise transportation can help organizations move their performance to the next level of logistics maturity—finding opportunities to contain freight costs, even as demands on shipping performance continue to escalate. When global visibility and planning can be combined with final-mile views, the enterprise gains formidable tools to transform supply chain performance and cost control.

Sense and respond

Competitive supply chains enable a new level of coordinated performance that creates a highly detailed picture of in-process flows of products, materials, orders, demand, and capital across the extended network. In addition, layering in context intelligence and predictive insights will help proactively drive customer-centric operations. Competitive supply chains combine the power of multi-enterprise network collaboration—enhanced by rich, in-network data, applications, and trading-partner connectivity—with advanced data science to empower organizations to interpret and respond to dynamic signals. An effective competitive supply chain monitors for contextual deviations, conveys alerts, and drives continuous planning via sense and respond capabilities. As a result, organizations can filter out noise, focus their efforts on meaningful events, and discover underlying issues.

Optimizing multi-party business processes

Supply chains are complex networks, often with more than 80% of the data and processes residing with partners and partner systems. To see and act on an accurate picture of their supply chains, organizations must have access to this "external" data.

Unfortunately, most organizations use point connections between partners and their various enterprise systems, which leads to siloed and fractured information. Data is often latent and outdated, delivered via batch updates.

These point-to-point connections can result in friction, delays, and inefficiencies. The supply chain of a large enterprise can easily change 50 times per second. This creates an incredible amount of variability in the supply chain, with limited visibility to the changes between partners.

Most current supply chain structures can't handle this massive amount of highly dynamic data. Visibility is often poor and incomplete, leaving organizations reactive and slow in response to changes. This lack of visibility and agility is a product of organizations taking an enterprise-centric approach to solve what is a multi-enterprise problem.

The only way to overcome these enterprise-centric limitations is to take a networked approach. Connecting all partners to shared processes, data, and metrics—all managed within a single platform—creates one version of the truth for all parties. This allows organizations to eliminate the data silos and their inherent latency, as well as reduce the root causes of friction, variability, and costs—both internally and externally.

It's critical that today's supply chains address the management of multi-party business processes. A single-network execution approach enables all parties to share common processes, data, and information—in real time—to determine the most flexible and robust courses of action. Network-wide connectivity provides supply chains with the foundation to collectively sense and respond to issues and opportunities in real time, aligning all partners with the agility to better serve the customer.
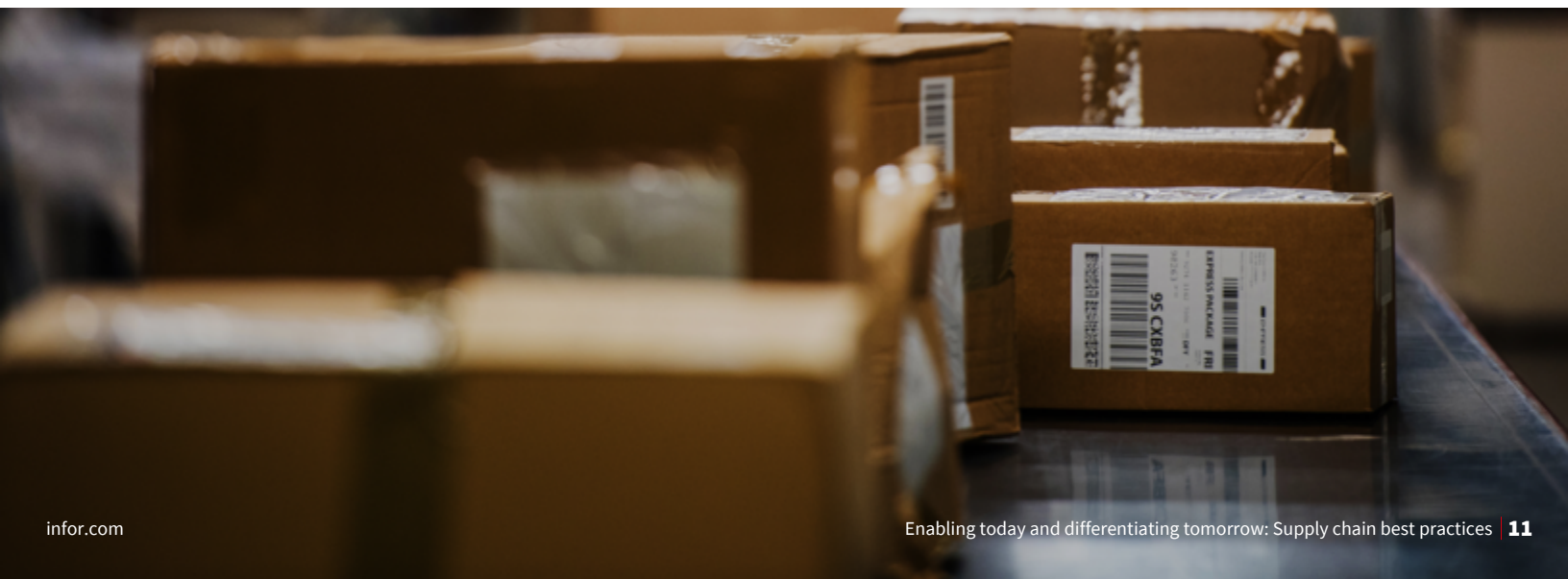
Product flows

Serving today's customers' needs, however, is more challenging than ever before, due to customer expectations for how quickly products need to get to market to capture sales and how quick delivery turnaround needs to be. This puts increased pressure on organizations to meet on-time and in-full (OTIF) delivery—and doing so cost-effectively. Shrinking lead times and growing demand for OTIF put pressure on supply availability in normal times; and can become virtually impossible during periods of extreme disruption, such as during the 2020 global pandemic.

Setting the status of orders to "in-transit" is no longer acceptable for large, complex supply chains. More detailed information is required—with complete visibility into shipments, orders, and inventory to recognize and respond to potential disruptions.

Expedites are an option for better meeting customer expectations under some circumstances, but expedites are expensive and don't help organizations that are trying to squeeze capital out of their operations. Adding more touch points, data transfers, and portals can also help meet demand, but comes at the cost of potentially losing agility and responsiveness.

Today's supply chain structures are just not equipped to deal with modern demands. With critical data spread across partners and systems, organizations fail at attaining complete visibility. Achieving this level of visibility requires collaborating with multiple partners on a single-instance data model with real-time visibility and machine learning to assist with predictive sensing of product availability issues.

A connected supply chain operating with a single view of orders, shipments, and inventory and shared digital processes provides the visibility needed to improve velocity and the agility to respond to disruptions in a timely and efficient manner. It helps wring out inefficiencies and delays from the order lifecycle, and gives organizations the ability to make real-time adjustments to meet customer service agreements

High customer service isn't possible without real-time supplier collaboration. But even this isn't enough. Organizations also need to be able to detect disruptions early and collaborate with partners on optimal resolutions. The agility and responsiveness that are enabled by end-to-end visibility and early detection can greatly reduce expedites and increase workforce productivity.

Achieving all of these goals simultaneously might seem impossible, but with the right technology partner, network approach, and set of capabilities, supply chains can realize these benefits.

To deliver product agility, supply chains need key capabilities, such as:

- **Supply collaboration** capabilities with true, online, real-time collaboration that enable cooperative forecasts and supply commitments; flags inventory constraints and excesses; alerts to potential upstream disruptions and inefficiencies; and presents data as information that's actionable for increased worker productivity

- **Visibility** into inventory orders, movement, and in-stock locations to increase response times

- **Traceability** that improves compliance and access to new markets with minimal disruption to ongoing operations; the ability to answer "how did the product get here?" and identify the chain of custody to help meet a customer's qualifications around sustainability and ethical sourcing; reduce the risk of non-compliance; provide faster root cause analysis; and reduce time and cost of sequestering or quarantine activities

Advancing supply chain visibility maturity in the organization

Today's supply chains require a more predictive and proactive approach in order for organizations to achieve the perfect order, reduce costs, improve working capital, and strengthen partner relationships. This can't be achieved without complete supply chain visibility. Leaving aside long-term forecasting and planning that depend on insight to market demand, the operational aspects of the supply chain that organizations can materially impact with improved and multi-dimensional visibility involve:

- Orders
- Shipments
- Inventory

For each of these elements, there's the need to consider visibility to and for external stakeholders—whether to keep them advised of changes or to engage with them in execution and issue management.

This can include:

Order stakeholders: Procurement, suppliers, contract manufacturers, regional business units, raw material suppliers in multiple tiers, freight forwarders and third-party logistics (3PL) providers, and even in-country business agents and possibly trade finance providers

65%
of executives have limited or no visibility beyond tier-one suppliers—Deloitte

Only 6%
of executives have full supply chain visibility—Deloitte

21%
of supply chain professionals say that visibility is their biggest organizational challenge—Statista

Shipment stakeholders: Freight forwarders, dray carriers or truckers, ocean and air modes, consolidators, container yards or depots, rail transport, 3PLs, customs brokers, parcel carriers, destination warehouses and distribution centers (DCs), end-customers or consignees, and value-add and upfitter nodes; as well as connecting to product orders for full context to production or a customer's operations at risk from shipment disruptions, failures, and exceptions

Inventory stakeholders: Supply chain operations, production facilities, DCs and outsourced warehousing, retail outlets, and e-commerce fulfillment operations

Supply chain data and functional organizational needs may also intersect at different levels across the network, affecting the data objects that are relevant in network connections:

- **Orders**—Purchase and customer/sales orders to manage products in demand, inventory, and supply

- **Shipments**—Shipments and deliveries, with additional logistics/transportation information

- **Services**—Service and activity orders with additional execution and operations information

Extent of supply chain visibility among organizations

62%	17%	15%	6%
Limited visibility	Extended visibility	Visibility is only on production	Full visibility
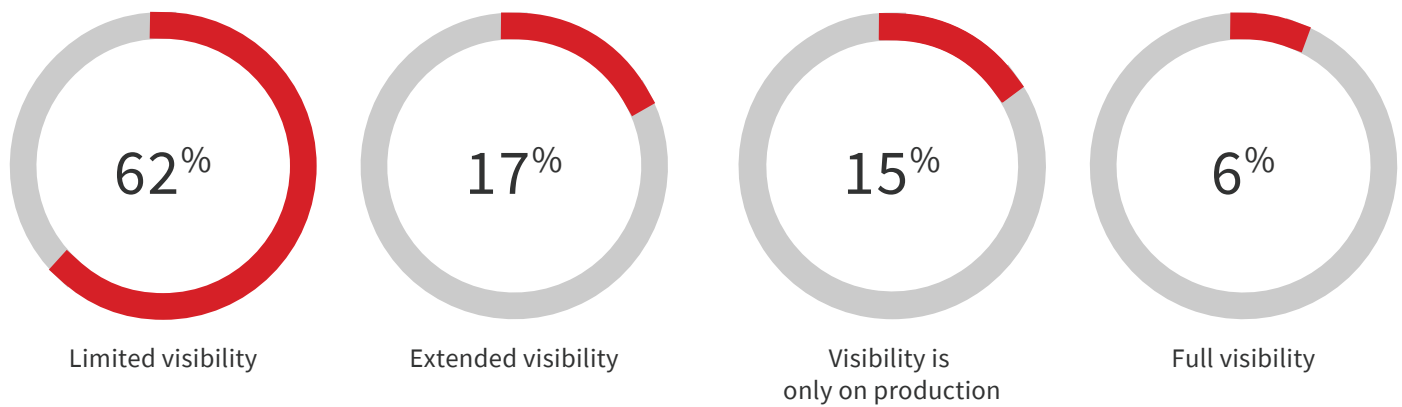
Source: Jenny Chang, "**51 Supply Chain Statistics You Must Know: 2020 Market Share Analysis & Data**," FinancesOnline.

Underpinning physical product flows and enabling end-to-end visibility

Supply chain visibility can't be achieved from a single data source or just one set of participants. The word "chain" in supply chain implies multiple connections—which today can more accurately be described as a network. A networked solution to building multidimensional visibility to the supply chain ecosystem offers the best path to value. A network-based visibility approach means that business benefits can be realized across many cross-functional and cross-domain areas.

For global supply chains, gaining the necessary visibility to improve operations is far more complex than gaining visibility for in-country or domestically sourced supply networks. Complexity is driven by many variables, including:
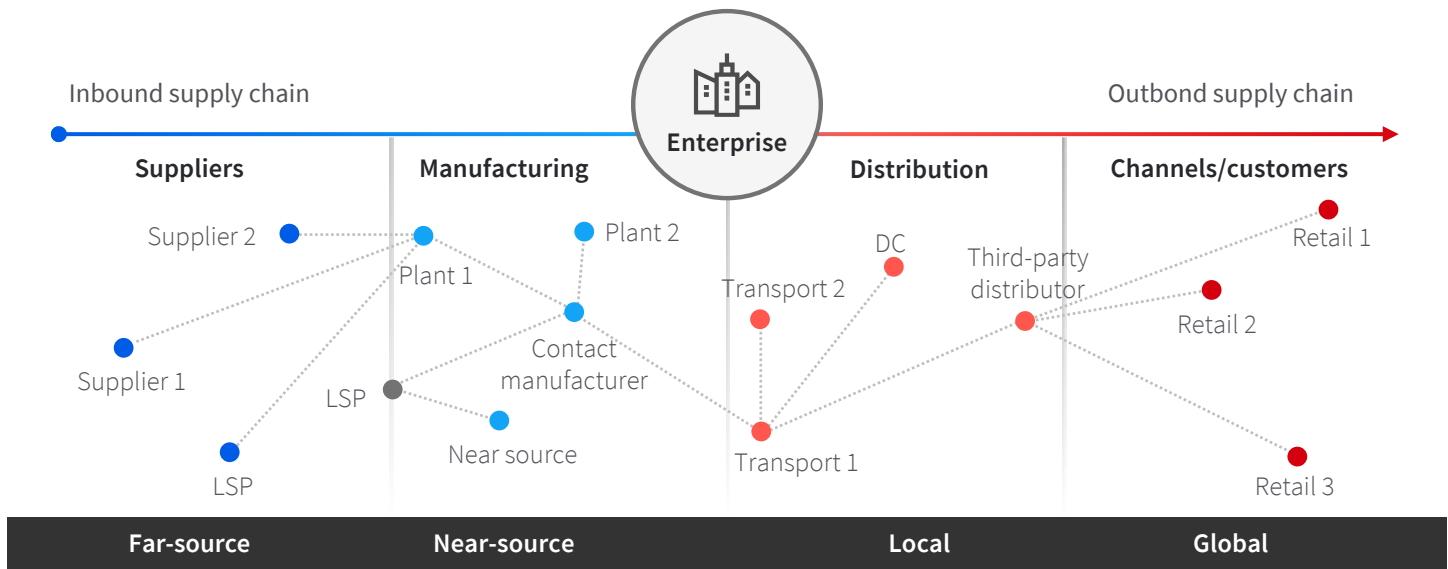
- The number of different types of parties involved in production
- Freight forwarding
- Customs compliance
- Multi-leg, multimodal transport that move goods and materials from origin to point of consumption
- Cross-border, language, currency, and time-zone issues

Achieving visibility across extended lines of supply requires more than just carrier track-and-trace capabilities (although in-transit visibility is an essential component). Orchestrating the many transactional exchanges between multiple parties demands a level of network collaboration that ERP systems were never intended to support. Yet most organizations still think in terms of connecting each trading partner and service provider directly to their internal business systems via EDI or APIs to achieve the external visibility they lack.

This enterprise-centric connection model has shown to be too rigid, limiting, and expensive for in-house IT systems to maintain in today's volatile markets and economic cycles. Leading industry analysts recognize that supply chains demand network capabilities to **deliver the real-time agility** their businesses require to compete effectively in both local and global markets.

Forging a modern supply chain requires these three fundamentals:

- Visibility into supply chain processes beyond an organization's own enterprise
- The ability to collaborate seamlessly with trading partners
- Data infrastructure that utilizes technologies like AI and Internet of things (IoT) to make the entire supply chain smarter

Inbound supply chain — **Outbond supply chain**

Enterprise

Suppliers	Manufacturing		Distribution	Channels/customers

Supplier 2 · Plant 2 · Plant 1 · DC · Retail 1
Supplier 1 · Contact manufacturer · Transport 2 · Third-party distributor · Retail 2
LSP · Near source · · ·
LSP · · Transport 1 · · Retail 3

Far-source	Near-source	Local	Global

The value of visibility

An inbound visibility framework should recognize all the milestone components that make an international product flow successful. This can include:

- Initial supplier acceptance of a purchase order and delivery time frame
- Notification to the in-country forwarder that the order is ready to ship
- Booking on an ocean vessel or air freight service
- Submitting shipment documentation to a customs broker
- Receiving customs clearance
- Drayage pickup of containers from the terminal
- Truck ETA to final DC or end-customer location
- And many other customizable waypoints and key events and processes

In contrast to such global product flows, visibility to outbound truck shipments from point A to point B is relatively simple—constrained more by the challenge of reliable connectivity to many different carriers (especially smaller firms). But even here, new real-time visibility networks and services offer simpler connectivity to leading truck carrier networks in Europe and in North America, with robust visualization and data features, such as:

- Global, zoomable, map visualization with detail and summary views
- Ocean coverage for worldwide cargo-vessel tracking
- Sensor coverage for shipment or container-specific monitoring
- Truckload coverage in North America and Europe, with carrier options for other regions
- Air freight carrier tracking

Operational supply chain visibility is the aggregate of integrated internal and external information that comes from a close collaboration with supply chain partners—not the exclusive result of any single initiative or data source within an organization's supply chain systems.

Collaboration with trading partners is the only way to gain the necessary level of visibility that can significantly improve global supply chain planning and fulfillment operations. For most business stakeholders, knowing the current GPS location of an individual shipment offers limited value. To keep production running and customers happy, it's critical to know with reasonable certainty when expected product availability for fulfillment or consumption is in jeopardy—preferably as early as possible in the product lifecycle or journey to market.

Finance and trade flows

Volatility in supply chains can make it challenging to profitably meet demand. Sourcing is complex, typically involving hundreds of partners. Suppliers often don't have access to adequate capital, causing instability in the supply base. The majority of inventory, cost, and risk reside outside of a single enterprise's control.

Too many siloed systems and not enough shared data make it impossible to reliably meet consumer demands. Organizations that lack complete visibility into the supply chain must scramble to track inventory and provide accurate ETAs.

Extended payment terms and late remittance put unnecessary stress on suppliers. Outdated processes—such as manual three-way match—slow down the payment process and put supplier relationships at risk. This can result in:

- Suppliers lacking access to capital at competitive rates
- Quality is negatively affected as suppliers fight to protect margins
- Supply base instability, with poor relationships and difficulty building trust between OEMs, suppliers, and supply chain partners

As organizations deal with greater volumes of suppliers from multiple regions, it becomes increasingly difficult and costly to pay supplier invoices via manual processes. The traditional three-way match of invoice, order, and receipt of goods becomes tedious and inefficient when supply chains involve a large network of suppliers; and the reliance on external parties to manage document flow often results in low supplier satisfaction.

Organizations find it difficult to optimize working capital in this situation. If an organization attempts to extend payment terms to increase days payable, suppliers suffer from liquidity constraints—often leading to strained relationships and an inability to ship goods on time. Manufacturers need a way to automate supplier payment and use exception-based management to catch discrepancies in the financial supply chain.

A healthy supply assurance program can help optimize working capital and adds value to all of an organization's trading partners. Buyers will see a drop in inventory-related costs, while partners benefit from financial stability and easier communication on production, cycle times, and shipment of parts and final products. Execution is synchronized across all partners, complex workflows managed without extra manpower, and the physical and financial supply chains are viewed from a single source.

Automation of supplier payments can also help improve supplier relations, optimize working capital, and reduce fees and inefficiencies along the financial supply chain. To automate supplier invoice payments and standardize documentation, organizations must transform from silo-based, inward-facing corporate operators to interconnected, highly agile business network orchestrators.

End-to-end visibility and orchestration

Sense and respond is critical to the continuous supply chain because it allows organizations to:

- Optimize multiparty business processes
- Improve product availability
- Control multi-leg, multimodal transportation planning
- Optimize procurement, payables, and trade finance processes
- Provide advanced visualization for intelligent sense and response

A network platform foundation with product, finance, and trade-flow orchestration to create sense and respond capabilities drives end-to-end supply chain visibility. Organizations can visualize the supply chain in real time and create predictive alerts to potential opportunities and disruptions. The impact of each scenario can be anticipated, along with decision support, multiparty collaboration, and in-network execution for faster and smarter resolution.

Today's escalating market expectations heighten the need for organizations to see broader implications—evaluating the consequences of actual flows (whether materials, orders, or demand) and interdependencies of events. Next-generation control towers (or control centers) deliver pervasive end-to-end visibility, shining a light on what's occurring that might impact delivery.

Control centers create a cohesive picture of actual supply chain flows. They tap all available, in-network data and processes, and add intelligence (data enrichment, context, and learning algorithms) to predict where issues may arise and determine how to adjust. With the right data foundation, such a system can:

- Interpret meaningful triggers
- Sense when material changes occur
- Proactively infer underlying issues
- Evaluate actions for impact
- Directly resolve issues

> **Controlling the flows is all about gaining improved visibility into the supply network and using that information to address inefficiencies. To obtain a granular view of the material flowing through the network, an organization must create a platform that connects data from multiple systems. It can then feed the data into advanced algorithms that fuel descriptive, predictive, and prescriptive analytics."**
>
> Source: Gideon Walter, Frank Cordes, Pepe Rodriguez, Jonathan Lowe, and Neeru Pandey, "Turning Visibility into Value in Digital Supply Chains," Boston Consulting Group, January 25, 2018

In addition to providing visualization of supply chain dynamics, control centers capture impact, interconnections, repercussions, and resolution options. Control centers synchronize participants to help dissolve a functionally siloed approach to fulfillment. Further, control centers identify systemic issues and underlying shifts that represent untapped opportunities for growth and responsiveness.

Organizations often base decisions on department-centric metrics. As such, control towers have historically focused on alerts within a specific area or silo. Control centers extend potential resolution options across functions, processes, and trading partners—shifting attention from what has already happened to what will happen.

Utilizing advanced data science and AI capabilities, control centers are trained with available network data housed in multi-enterprise business networks. Machine learning captures relevant information, escalates issues without manual intervention, identifies implications, and prescribes an optimal response.

With connected parties sharing a single view of items, orders, and shipments—along with a control center to provide agility and resiliency—organizations can obtain end-to-end visibility and assert control of disruptions to plan or capture new opportunities.

Supply chain maturity—
shift to digitalized ecosystem

The evolution of modern supply chain business models was accelerated by 2020's pandemic disruptions—with a shift away from analog supply chains and toward digitalized ecosystems. These new business models recognize and necessitate the move to a digital and integrated supply chain that provides visibility and ease of use for consumers. This journey is about moving toward a world where all parties participating across a supply chain network are connected to a single version of the truth.
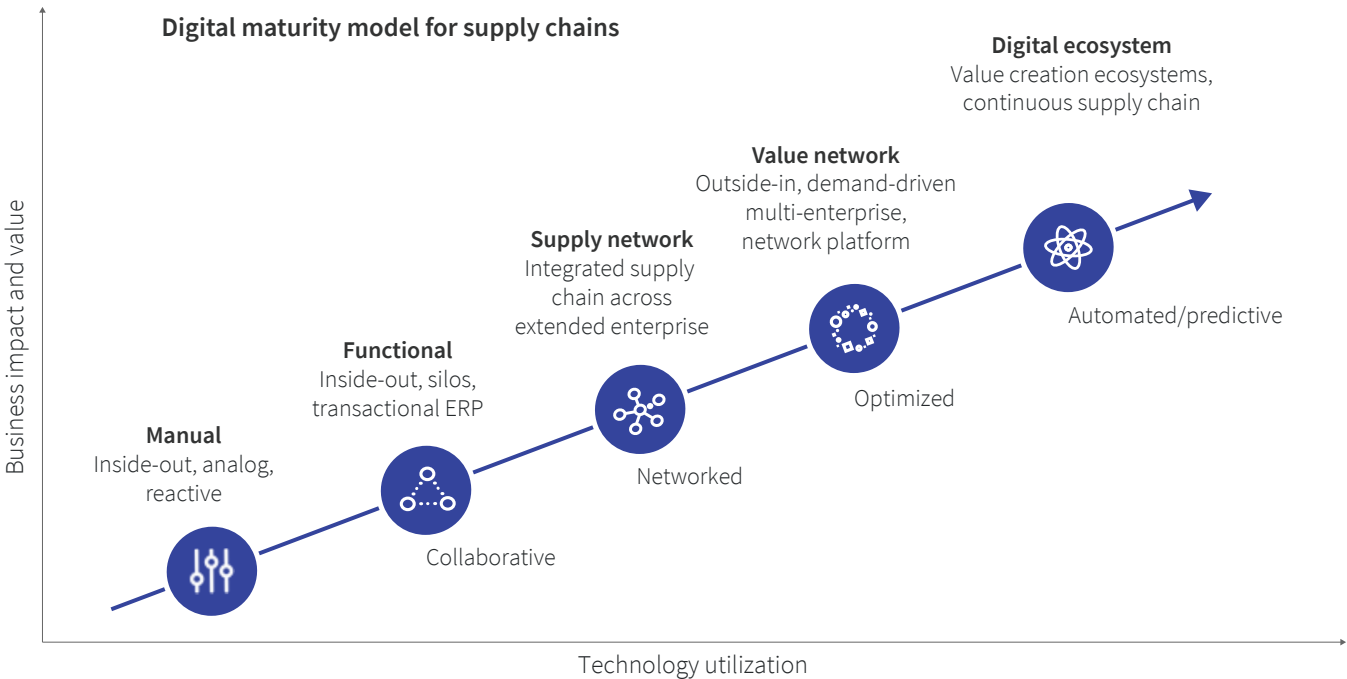
Organizations need to become demand-driven—executing on initiatives along five stages of supply chain maturity. Today's supply chain models are shifting from *linear supply chains* to *supply chain ecosystems*, propelled and *supported by digital technologies* (the chart below shows how the supply chain has evolved with the increased utilization of integration).

Manual—inside-out, analog, reactive

Operating at the most-basic level, businesses rely on a combination of spreadsheets and manual business process to run their supply chains. This is not intrinsically wrong, but it presents significant technology limitations in terms of speed, security, and collaboration. Most organizations have already moved beyond this phase.

The first stage in the path to digital maturity is an analog stage, where an organization is hallmarked by manual processes and siloed goals. The organization uses disparate tools that limit visibility and functionality, often conducting manual transactions with the widespread use of spreadsheets. An analog organization is reactive, with an inside-out supply-driven view of the supply chain—often with just-in-time (JIT) manufacturing that's susceptible to disruption. Manual supply chain management is often tenuous.

Companies will mature by leveraging technology solutions across an expanding business scope

Digital maturity model for supply chains

Business impact and value

Digital ecosystem
Value creation ecosystems, continuous supply chain

Value network
Outside-in, demand-driven multi-enterprise, network platform

Supply network
Integrated supply chain across extended enterprise

Automated/predictive

Functional
Inside-out, silos, transactional ERP

Optimized

Manual
Inside-out, analog, reactive

Networked

Collaborative

Technology utilization

When a problem occurs, managers and distributors locate the issue through a paper trail, which increase labor costs. Even simple things like changing orders or quantity, or shifting suppliers, becomes a lengthy and complex procedure during times of disruption. A significant issue with this stage is the lack of transparency within an organization. Without data-driven tracking tools, pinpointing areas of blockage or risk is virtually impossible.

Stage 2:
Functional—inside-out, silos, transactional ERP

The functional stage is the most common, and is generally supported by the use of ERP software. This stage delivers a foundational supply chain plan, as well as tools for execution with the ERP system to provide a common system of record for transactions. Unfortunately, this data is focused internally on the enterprise and doesn't consider inventory, capacity, or the costs of the end-to-end supply chain.

The second stage in the digital maturity model still scales functions with siloed goals, but it introduces digitization. Organizations at this stage have an inside-out supply-driven view of the supply chain, but have consolidated to a few systems of record by incorporating a transactional ERP system. This allows businesses to gain some visibility into different areas inside the organization that were not previously possible in the analog stage. Even at this stage, organizations still have a long way to go before truly gaining transparency and integration throughout the organization.

Stage 3:
Supply networks—integrated supply chain across the extended enterprise

The supply network stage is where organizations start to tap into data and information from beyond the enterprise. This is also the stage where organizations start to utilize collaboration across the supply chain—between organizations and their key suppliers or customers. This is the first stage that recognizes that supply chains are not linear.

An organization has reached the third stage when it starts integrating its supply chain with the deployment of additional cross-functional processes and technologies for a more holistic view of the supply chain. This stage continues to use ERP systems, with the deployment of planning systems of record (SORs) to support end-to-end integrated planning. This increased emphasis on integration of cross-functional processes and the steps toward transparency are what separate this stage from the functional stage (stage 2). These capabilities make organizations more resilient and increase their capacity to recover quickly from disruptions.

Stage 4:
Value networks—outside-in, demand-driven multi-enterprise, network platform

Stage 4, value networks, builds upon the previous stage (supply networks) by leveraging the ability to share data to integrate business processes across trading partners. In this stage, an organization has become demand driven, now with an outside-in view of its supply chain network. Organizations architect this network across the extended enterprise to more effectively support customer and consumer demands across all tiers in the supply chain. With increased presence of systems of differentiation supporting mature processes and external collaboration, this stage has greater transaction visibility with integration across multiple systems and domains.

Stage 5:
Digitalized ecosystems—value creation ecosystems, continuous supply chain

The final stage, digitalized ecosystems, represents a fully connected ecosystem on a shared cloud platform—with increased reliance on automation and autonomous decision-making. AI and machine learning take more of a central role—anticipating, predicting, and automating the response mechanisms. This is what ultimately enables the continuous supply chain with the ability to simultaneously plan-execute-sense and respond in real time.

Moving forward

Supply chains can be "messy"—with multiple parties, many nodes, and lots of complexity. The continuous supply chain enables organizations to overcome these challenges with a real-time, plan-execute-sense and respond closed loop across the supply network—with end-to-end supply chain visibility as a core tenant. Effectively seeing, planning, and acting on supply and demand requires a connected, multi-enterprise approach. This empowers organizations to simultaneously optimize service levels, cost of goods sold (COGS), and working capital.

This means focusing on the following key elements to effectively evolve the supply chain to meet modern needs:

- **Transform**—Increase resilience, agility, and velocity

- **Digitalize**—Plan, execute, sense, and respond in real time across the supply chain network

- **Optimize**—Improve service levels, costs, and working capital with AI/machine learning

With the right strategies in place, supply chain professionals can drive productivity, overcome challenges, and meet internal and external demands to build a differentiated supply chain operation. Meeting today's demands and building for tomorrow's growth—especially during times of disruption—requires supply chains that are agile and resilient.

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1 Ivybrook Boulevard, Suite 177
Warminster, PA 18974, USA
Phone: 215.675.5754
www.ICCG.com