The Resilient Supply Chain: Trusted, Sustainable, Intelligent
Contents

3 Foreword
4 Introduction
6 Navigating the new normal
8 Evolution of the supply chain
10 Critical issues impacting the supply chain
15 Pivoting to a resilient supply chain
18 Supply chain maturity
20 Solution: Streamline to simplify
24 Resilient supply chain: Key principles
29 Conclusion
Foreword

The world has dramatically changed. The way we work, produce, and live has also changed.

Many organizations have had to move to remote work, while factories pivot to implement social distancing in order to keep employees safe, and critical supply chains in operation. These recent events have shown that digital technology and data have become indispensable tools for businesses as they adapt to changes across their organizations. Many business leaders are reassessing their plans, and imagining a future where technology is seen as a key tool in helping their enterprise handle and overcome the immediate challenges stemming from the pandemic, as well as preparing for future disruptions.

At Microsoft, we are committed to helping the world stay connected, secure, and productive through the crisis and beyond. Together, we can enable teams to be productive and secure from anywhere, rapidly adapt business processes, and stay engaged with customers.

This e-book serves to provide insights to help leaders move forward, through digital transformation.
Increasingly complex, interdependent, and volatile markets demand agile and resilient supply chains. Enterprises need to understand the challenges facing supply chains, and pivot to embrace new technologies that optimize the value chain for better stakeholder outcomes and business continuity. In this guide, you will learn how to improve service resilience and profitability through intelligent supply chain planning and execution. This can be achieved by utilizing intelligent business applications powered by sensors, networks, and ambient intelligence to create autonomous supply chains, requiring intervention only outside risk-modeled parameters. This enhanced infrastructure will ensure increased resilience, better inventory management and cost savings, and help close the gap between demand and fulfillment for your customers.

Five macro forces are changing the way we design, make, sell, source, and deliver products. Each has an effect on the resiliency of our supply chains:

- Digitization
- Industry convergence
- Regulations
- Sustainability
- Customer experience

Source: Frost & Sullivan
Digitization
Data silos and the diversity in solution infrastructure can create significant issues for enterprises. However, digital technologies (such as AI, blockchains, hyperscale cloud, augmented reality, digital twins, virtual reality, etc.) are also allowing customers to rethink operations and business processes in new and unexpected ways. These innovations are helping enterprises achieve end-to-end visibility and foresight into variability that will impact sales and operations planning, as well as sourcing and quality management.

Industry convergence
Manufacturers are embracing direct-to-consumer models to drive loyalty while retailers are branching out to push home-grown labels to consumers. In healthcare, drugs, medical devices, and personal protective equipment are manufactured by and delivered to a complex supply chain of healthcare providers, retailers, and direct to consumers for increasingly personalized patient experiences. Food supply chains must adapt and respond quickly in the face of rapidly shifting customer demands, resulting from disruptions ranging from natural disasters to the current health pandemic. The sustainable future—including autonomous vehicles, smart homes, cities, and grids all powered by renewable energy sources, as well as precision agriculture capable of feeding a growing population—is increasingly connected and networked. The infrastructure required to support massive volumes of data exchange and analysis across industry value chains is becoming critical to business success.

Regulations
Regulatory compliance by organizations is a recognized measure of accountability and responsibility within an industry. Globally, organizations are adopting enterprise goals such as safe chemical use, conflict-free mineral sourcing, and sustainability development. With increased dependency across industry and national boundaries augmenting risks and sharpening competitive forces, we can expect to see even more regulation from governments for traceability and provenance.

Sustainability
Consumer awareness is changing how businesses approach sustainability. A new global consumer awareness of sustainable consumption, recyclability, and upcycling is changing the way manufacturers design, make, source, and supply products. Enterprises can drive down costs and increase profitability in this key area by reducing waste and energy costs, while also being able to charge a premium where consumers are willing to pay more for sustainably made products.

Customer experience
Digital technology is poised to drive a seamless and frictionless experience for customers, presenting the largest opportunity for innovation. In a dynamic and high-paced market, the supply chain plays a critical role in driving agility and customer responsiveness. Typically, organizations used a push-based strategy to move products to customers. However, dynamic customer needs, rapid competitive shifts, and the ability to sense demand have altered the pyramid of supply. Supply chains of the future will be resilient, sustainable, and intelligent, thus becoming demand webs of the future.
Navigating the new normal

As the global impact of COVID-19 has affected manufacturing production, altered supply and demand predictability, and created unforeseen gaps with suppliers, manufacturers are responding by paying increasing attention to the resilience of their supply chain. So much so, that “resilience” as a concept has grown from a little-used term into an oft-cited core tenet of the intelligent supply chain.

While the long-standing macro forces discussed previously continue to drive an overarching need to rethink the supply chain, the pandemic has interrupted or shifted—and in some cases, halted—business as usual, adding to the urgency to modernize practices. As a result, business leaders are taking immediate steps to build resilience into every aspect of planning and execution, driven by three current forces: the impact on the workforce, short-term pressures on their business, and the intersection of demand-side pressures with supply-side intelligence.
Drivers for a resilient supply chain

The current forces driving a resilient supply chain intensify five key considerations for manufacturers, as business leaders address immediate challenges and plan for future needs.

**Business continuity**
Workforce transformation will be key to recovering from business disruptions and supply chain inconsistency.

**Sustainable growth**
Disruptive technology will drive innovation in the development of sustainable products, processes, and services.

**Diversified operations**
Market conditions demand the diversification and localization of manufacturing, as well as the ability to overcome the complexities of existing supply sourcing.

**Visibility**
Technology that provides timely information will ultimately support swift adaptation and disruption recovery. Enable agile, predictive manufacturing by adding end-to-end visibility throughout your supply chain.

**Risk mitigation**
Supply chain leaders will reexamine risk mitigation strategies and upfront investment, to address future disruptions while also advancing security and compliance goals.

- Workforce impacts
- Short-term pressures
- Demand-side challenges meet supply-side intelligence

Navigating the new normal
Evolution of the supply chain

Enterprises must evolve to help supply chains sense and predict customer and market demands, service them in real time, and redirect sourcing networks in case of disruptions. The right infrastructures can ensure cost savings through better inventory management. This evolution requires a network that is integrated on one common platform, and able to source recommendations from the amassed volumes of data captured across the entire supply chain ecosystem.
Supply chains of the past and present

In the past, supply chains were push-based, and placed an extensive focus on ad hoc production and stocking. Broken data threads across the value chain made them reactive in nature.

Today, enterprises suffer from mountains of data and molehills of insights. Value inversion needs to happen, wherein more time needs to be spent on analytics compared to data collection. The ability to use sensors to sense customer data and react based on the same is an area of focus today. Technologies such as the cloud, AI, and blockchains play an important role in helping enterprises reach the future state.

### Past

**Push-based, reactive**

- Produce, stock, and dispose of excess, with no visibility into customer expectations

Data stranded across the enterprise

Isolated supply chain

### Current

**Semiautonomous supply chain**

- Partial automation allows organizations to selectively digitize (e.g., sensors on pallets)

### Future

**Intelligent and autonomous supply chain**

- The supply chain ecosystem is able to sense and predict demand peaks, and shape outcomes

Data → Insights → Outcomes

Outcome-based

Analytics (AI/ML) and blockchain

Cloud platform

Source: Frost & Sullivan
Critical issues impacting the supply chain

The future of the supply chain is trusted, sustainable, and intelligent. Optimizing operations utilizing intelligent business applications that use sensors, networks, and ambient intelligence to create autonomous supply chains can help to ensure high-quality customer experiences and outcomes. Pivoting to an agile, resilient supply chain requires an evaluation of the current state and addressing three critical issues: broken data threads, industry convergence, and sustainability.
Critical issue: Broken, siloed, and stranded data

Today’s supply chain

Legacy supply chains were not built to accommodate multiple sources of data; they were built to simply follow materials, products, and people. Unfortunately, this linear design can result in excess inventory and a lack of customized products.
The Resilient Supply Chain: Trusted, Sustainable, Intelligent

A new approach

Future supply chains will be circular, enabled by a core cloud-based central platform that will integrate, orchestrate, and execute actions by working with each variable of the value chain. This creates a more holistic view of operations for enterprises, providing for new levels of agility, responsiveness, and risk mitigation.
Critical issue: Blurring of lines between manufacturing and retail

Innovative consumption models are building new avenues for value creation, by providing a path for manufacturers to engage with customers directly. The four trends driving this direct-to-consumer transition are dynamic customer preferences, a shift to a circular world of consumption and recyclability, consumption with a sense of purpose, and a willingness to pay a premium for sustainable solutions.

Direct-to-consumer manufacturing model

As the boundaries between these two industries continue to erode, capturing the data flow in a centralized manner is vital to the processes for sensing, predicting, shaping, and servicing needs.
Critical issue: Sustainability across the value chain

Growing global awareness of a sustainable future is driving enterprises to embrace a circular economy and change the way products are designed, made, sold, and sourced. Better returns can be yielded by weaving sustainability as a fabric across aspects of design, packaging, and sourcing. However, application of this principle across the value chain is key, as compared to the siloed implementations of the past.

Spotlight on the product life cycle

Microsoft works to apply sustainability across its device value chain—from efficient product design to less-than-load shipping, to responsible mineral sourcing. The shift is complex and requires an adjustment in measurement KPIs, infrastructure, and evaluation of present-day carbon footprint. Continuous monitoring of these metrics can help enterprises understand the economic value of the integration of sustainable practices into their operations. Read the full device sustainability report here.
Pivoting to a resilient supply chain
Emerging opportunity: Negative latency enterprises

Imagine a situation wherein enterprises are able to sense peak demand for a particular product ahead of time, which forces an action in the supply network to re-route subcomponents. Sensing, predicting, shaping, and servicing demand peaks before they actually happen—these are capabilities no one possesses today. Although, the subsequent re-alignment of the manufacturing network can help to create a more efficient production process that better aligns to customer needs.

Currently, enterprises suffer from latency in their production processes. Tomorrow’s competitive advantage will be based on the speed of information flow and ability to use AI to intelligently predict, simulate scenarios, and ultimately become negatively latent. Some of the key outcomes for customers include 20% cost savings potential from sensing data in the supply chain—and, by pivoting to an autonomous and cognitive supply chain of the future, at least 30% efficiency can be realized. This is mainly driven by shifting from manual and paper-based processes to intelligent AI-augmented decision-making by humans.

The average cost savings from eliminating data silos and using data captured from sensors.

30% Efficiency achieved through implementation of autonomous and cognitively enabled supply chain.

Source: Frost & Sullivan
Emerging opportunity: Sustainability as a customer experience

Sustainability is seen as a cost center. However, it can evolve into a profit center by focusing on key areas of the value chain. In fact, as the global pandemic brings new priorities to the forefront, many businesses are currently making adjustments to improve sustainability in their factories and operations—after all, it is more difficult to make changes after the fact, than to consider them holistically as part of modernizing manufacturing processes. This is why now is an important time to design for sustainability, especially when making shifts in the production and distribution of goods.

Whether driven by long-term goals or pressing priorities, fully embracing sustainability will help enterprises rethink every aspect of their value chain, and realize the promise of sustainability with the seven key shifts outlined in this chart.

Progressive shifts that enterprises need to take for sustainability to be embraced holistically:

1. Data silos ➔ Data centralization
2. Ad hoc design ➔ Design with purpose
3. Reactive customer experiences ➔ Frictionless and seamless customer experience
4. Poor visibility ➔ Enterprise-wide visibility
5. Conflicting KPIs ➔ Sustainability-centered KPIs
6. Latent information ➔ AI-enabled outcome optimization, in real time
7. Untraceable transactions ➔ Secure, blockchain-enabled transactions
Supply chain maturity

It took 30 years for the industry to get from Reactive Identification (Level 1) to Management by Exceptions (Level 3). Since technology refresh cycles are becoming rapidly compressed, the industry will take just seven more years to reach Level 6 maturity.

The power of AI is in augmented decision-making for humans. Co-augmentation is key, and it also frees up bandwidth for personnel to focus on strategic and value-added activities. As seen in the chart on the following page, over the next three years 41% of respondents are planning to invest in AI/ML solutions.
Supply chain maturity

Frost & Sullivan estimates that continued investment in AI/ML will spur the industry to reach Level 6 within the next seven years.

Level 1
Reactive Identification

Level 2
Manual Exceptions Identification

Level 3
Management by Exceptions

Majority of the industry is here

Level 4
Analytics Identify Exceptions, at scale

Level 5
Analytics Act with Foresight

Level 6
Analytics Drive Self-loop optimization

Survey of the top digital technologies being invested in over the next 3 years

N=75 customers across process and hybrids industry verticals. The survey was conducted in 2019.

- Analytics: 41%
- Cloud: 29%
- Digital Twin: 12%
- Augmented Reality/Virtual Reality: 12%
- Edge Computing: 6%

Source: Frost & Sullivan
Solution: Streamline to simplify
Solution: Streamline to simplify

The past is a latency-laden value chain with broken data silos. The future is a dynamic, responsive network-of-networks value chain enabled by the cloud and analytics. A disruption in any part of the future value network will create alerts that trigger automated action across the value network. Managing this complex, network-of-networks effect is not easy with present-day systems. The industry needs to adopt a centralized approach, using a central cloud platform to streamline data collection and orchestrate insights and outcomes. By replacing complexity with intelligence, you can leverage multi-enterprise collaboration tools to coordinate suppliers, manufacturers, and logistics providers.
Future

Responsive and dynamic network of networks and demand webs, connected by a single cloud platform, streamlining data collection and the surfacing of insights

- Supplier network
- Manufacturing network
- Last-mile network

Plant A senses customer behavior shift and changes sourcing practices and labels on products

New suppliers are identified, using AI, to meet the sustainability requirements of customers

Corporate senses the customer behavior shift and designs sustainable approach to its products

Customer A preference shifts to consuming sustainable goods only

Customer B looks for off-the-shelf customization that is not available today

Customer C would like to see a product’s carbon footprint before making a purchase

Source: Frost & Sullivan
In a traditional supply chain many steps are siloed, leading to a fragmented view of data and operations. By leveraging a digital platform, enterprises can bring those discrete insights together into a full view across the entirety of the supply chain.

Solution: Mapping Microsoft’s offering

Elasticity and scalability in the Microsoft cloud helps enterprises scale based on needs and optimize long-term costs, balancing service and budget. This makes it easier to maintain optimal inventory levels and manage the cost of goods while meeting customer expectations—without sacrificing innovation or speed. Once the value network identifies a shift of customers to consumption of sustainable products, enterprises are able to anticipate and source suppliers (if needed) to cater to these needs. This graph illustrates the relationship between faster information flow and engineered business outcomes.
Resilient supply chain: Key principles

Working toward a resilient, intelligent supply chain program begins with assessing (understanding your current state of systems, infrastructure, readiness), identifying where to simplify your infrastructure (consolidation of siloed platforms, data flows), and ultimately planning a path for end-to-end transformation.

Whether you are implementing a resilient supply chain model for a greenfield or a brownfield project, the four following case studies demonstrate key principles of the resilient supply chain.
Be ready for disruptions and increasing customer expectations.

Infusing agility, resilience, and nimbleness within your supply chain infrastructure is essential for operations. Starbucks Corporation, a Seattle-based coffee company, sources beans from over 380,000 farms—so it needed visibility into the movement of beans across its vast supply chain. This global coffee chain achieved digital real-time traceability and improved visibility into its supply chain through a partnership with Microsoft’s Azure blockchain cloud services. This cloud platform coexists with Microsoft Edge for storage, massive data volume ingestions, machine learning, and predictive model generation. The AI and blockchain technologies can help with customer pain points such as traceability, supplier quality management, and design and IP protection. This solution provided trusted proof of end purchase to farmers, enabled access to higher-quality credit, and allowed them to monitor movement of beans from farm to pour. Read more about the Starbucks story [here](#).

“Our passion and our love for coffee—from the ground our coffees comes from, to the farmers who handpick the coffee cherries, to the expert coffee roasters who roast each bean to perfection, to the talented baristas who handcraft each beverage for the perfect cup—each step reflects both our Starbucks heritage and an unwavering commitment to a brighter future for our farmers, our partners and our customers.”

—Michelle Burns
Senior Vice President of Global Coffee and Tea, Starbucks
Centralize the optimization of your supply chain.

Bringing data from all parts of the supply chain to a unified dashboard enables enterprises to create a single version of the truth from organizational data and suppliers. Caterpillar, the world’s largest construction equipment manufacturer, wanted to move toward product-as-a-service due to the volatile nature of its business, and had been looking for an effective business-planning approach to effectively manage operations. In 2015, Caterpillar embraced a digital approach to optimize its supply chain and resolve inventory-related issues by connecting its database with o9 Solutions’ platform. Read more about Caterpillar here.

“Not only does this enable us to more effectively manage operating hours, IoT components give us more insight into the effectiveness of our machines and help us predict machine failures.”

—Andrew Lee
Senior Procurement Manager, Caterpillar
Achieve engineered outcomes by making sense of massive data volumes.

It’s important to prepare for the future by rethinking current processes, products, and operations. Majans, a small, family-run consumer goods manufacturer, grew to the point where production and operations needed to be streamlined in order to reach its business goals. IoT intelligence is not just about correcting problems; it also helps improve production performance and can unlock greater value from the supply chain. Finance and operations solutions can streamline functionality, helping enterprises move closer to achieving a single version of the truth. The integration of Power BI, Power Apps, and flow and talent solutions helps visualize massive volumes of data in a meaningful way. Read more about the Majans story here.

“With Dynamics 365 IoT intelligence, we can rely on meaningful signals and insights and thus reduce the cycle time to action, keep our teams engaged, as well as deliver on our promise to our customers.”

—Amit Raniga
Director at Majans
Deliver an end-to-end sustainable and secure user experience using blockchain.

Engineering the value chain to provide optimal customer interactions and outcomes is crucial. Moog—a designer and manufacturer of motion, fluid controls, and control systems for applications in aerospace, defense, and industrial and medical devices—needed a secure system to transfer component plans to customers for 3D printing in the field. Each piece is precision-crafted under extremely small tolerances, so quality and integrity are paramount. With the help of Microsoft Azure, Moog was able to ensure their parts and associated design plans were tamperproof and resistant to hacking. This collaboration also helped to develop 3D printing with digital transaction and delivery capability, enabling greater efficiency in aftermarket services. Read more about Moog here.
Conclusion

An intelligent, resilient supply chain that supports a customer-centric approach is vital in our dynamic, fast-paced market. As businesses shift their focus from “just-in-time” to “just-in-case,” current supply chain challenges may become the new normal. By understanding the macro challenges and current forces facing the supply chain, enterprises can pivot to embrace new technologies that improve digital operations while optimizing the value chain for customer outcomes. An enhanced infrastructure ensures better inventory management and cost savings, and will help close the gap between demand and fulfillment for your customers.

You can take steps to increase supply chain resiliency, achieving results in the short term that can build into long-term sustainability for your business.

Microsoft products and solutions are designed to support the most salient points of the value chain: sales and operations planning, supply chain visibility and orchestration, and sourcing and last-mile delivery. Microsoft Azure, Dynamics, and M365 map across the value network of an enterprise and can provide a 360-degree approach to supply chains, starting with obtaining the raw materials and managing inbound materials to the production processes.

Make sure your supply chain is ready for what’s next

Successful organizations make the most of their transformation journey by equipping people with the right technology, so they can do more. By uniting productivity, intelligent cloud, intelligent edge, AI and big data platforms, and tools to solve business problems, Microsoft helps industries innovate fast, and achieve better customer and social outcomes.

Contact Microsoft today and request a demo of Dynamics 365 Supply Chain Management solution to help with your digital transformation efforts.

Want to talk to Microsoft sales? Call 1-800-426-9400