Microsoft

The Resilient Supply Chain:

Trusted, Sustainable, Intelligent

Contents

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.

Introduction

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.

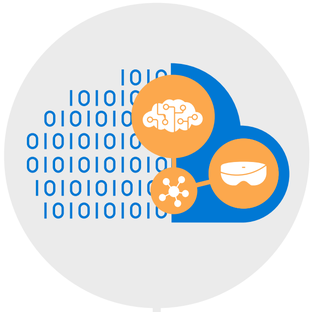
Five macro forces are changing the way we design, make, sell, source, and deliver products. Each has an effect on the resiliency of our supply chains:

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

Source: Frost & Sullivan

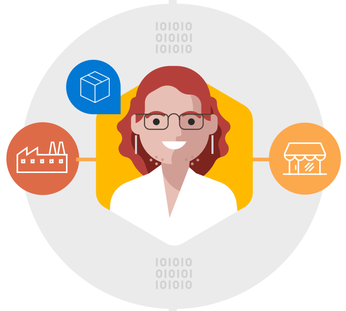
Five macro forces

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

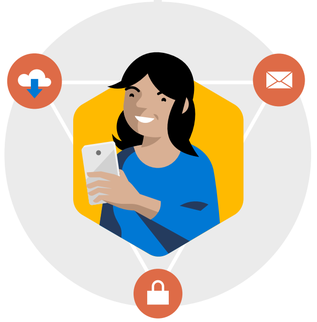
Manufacturers are embracing direct-to-consumer models to drive loyalty while retailers are branching out to push home-grown labels to consumers. In healthcare, drugs, medical devices, and personal protective equipment are manufactured by and delivered to a complex supply chain of healthcare providers, 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.

Navigating the new normal

Drivers for a resilient supply chain

Workforce impacts

Short-term pressures

Demand-side challenges
meet supply-side intelligence

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

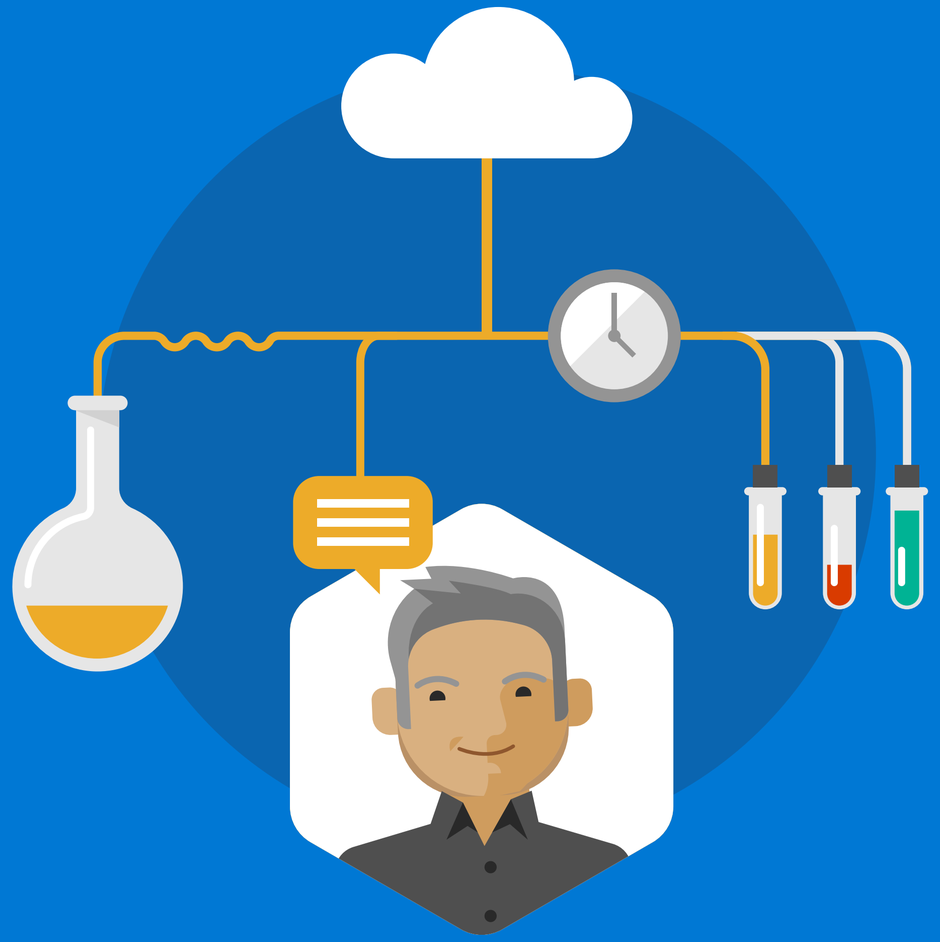
Technology that provides timely information will ultimately support swift adaptation and disruption recovery. Enable agile, predictive manufacturing by adding end-to-end visibility throughout your supply chain.

Risk mitigation

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

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

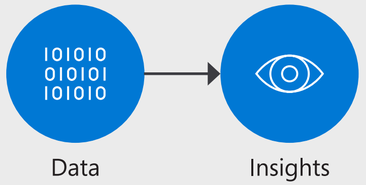
Data stranded across the enterprise

Isolated supply chain

Current

Semiautonomous supply chain

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



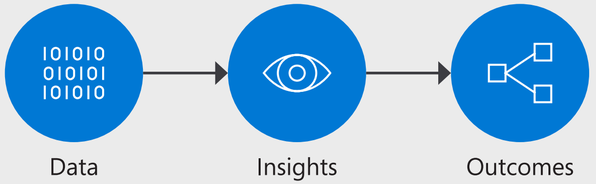
Products

Sensors

Future

Intelligent and autonomous supply chain

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



Outcome-based

Analytics (AI/ML) and blockchain

Cloud platform

Source: Frost & Sullivan

Critical issues impacting the supply chain

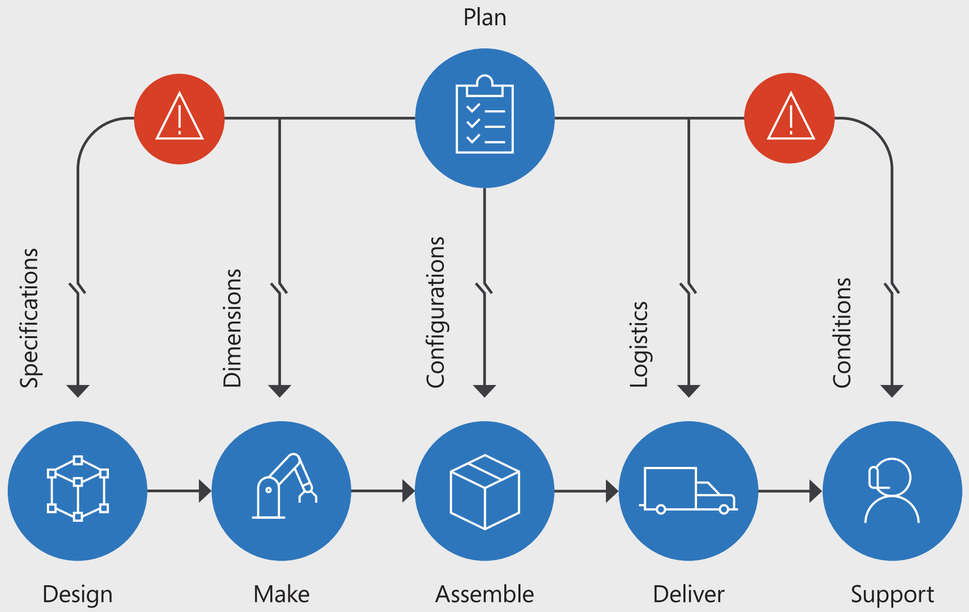
The future of the supply chain is trusted, sustainable, and intelligent. Optimizing operations utilizing intelligent business applications that use sensors, networks, and ambient intelligence to create autonomous supply chains can help to ensure high-quality customer experiences and outcomes. Pivoting 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.

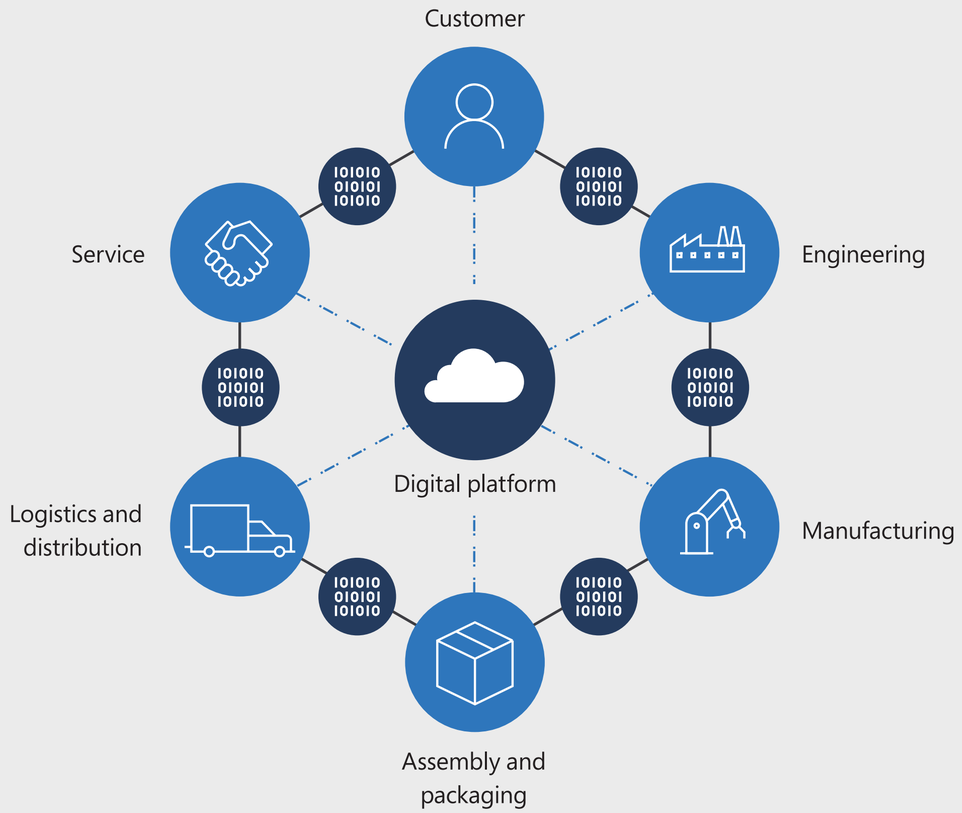
Today’s supply chain



Long lead times, low schedule compliance, and lost productivity

- Disconnected process
- Reactive execution
- Layered planning
- Excess inventory

Future supply chain



High service levels, cost optimized, and dynamically responsive

- Orchestrated processes
- Predictive operations
- Layered planning
- Closed loop end-to-end

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.

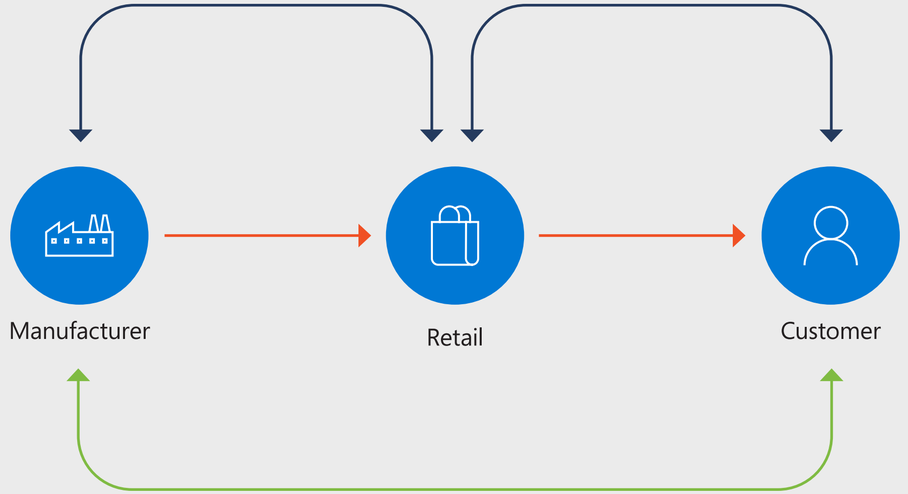
Critical issue: Blurring of lines between manufacturing and retail

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.

Crossover impact



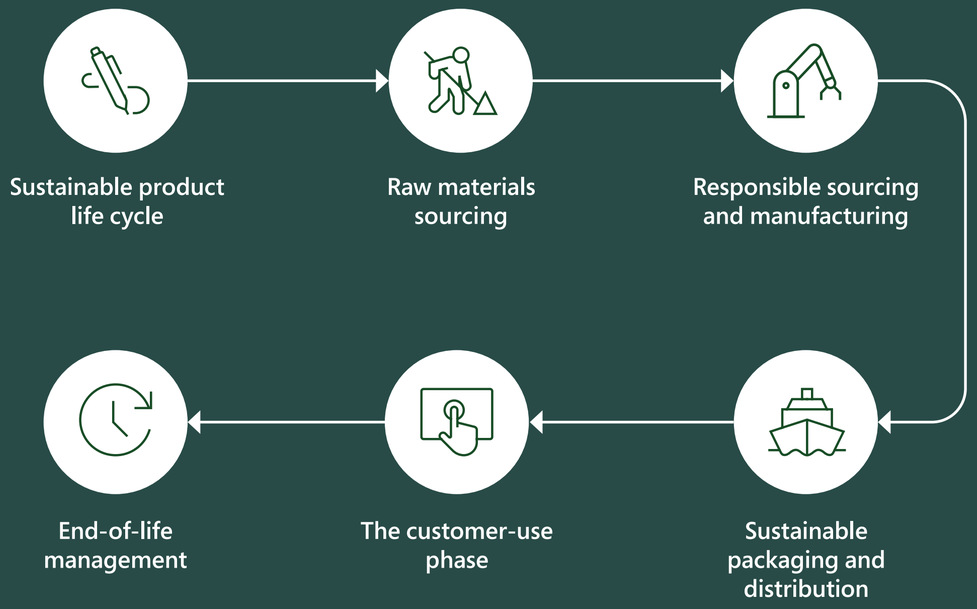
Traditional GTM route
Low customer engagement and ability to sense/predict demand
Mark-up and schedule delays

Retailer manufacturing white label goods and selling to consumers
Vertical integration allows efficient cost management and builds customer stickiness

Manufacturer direct to consumer (MDC)
MDC creates meaningful customer engagement and the ability to predict demand and service effectively

Source: Frost & Sullivan

Sustainability in Microsoft Devices product life cycle



Microsoft

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.

20%

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.

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.

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 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.

Design
Design with sustainability in mind, as this is where it ideally starts.

Assembly
Packaging material use can be optimized by design, along with the right choice of materials.

Engineering
Simulate, iterate to understand carbon footprint across its life cycle.

Logistics and distribution
Locally booked and built, locally sourced. This reduces the carbon footprint.

Manufacturing
Sustainable design leads to sustainable manufacturing and responsive raw material consumption.

Services
Remote troubleshooting and support streamlines life cycle experience.

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.

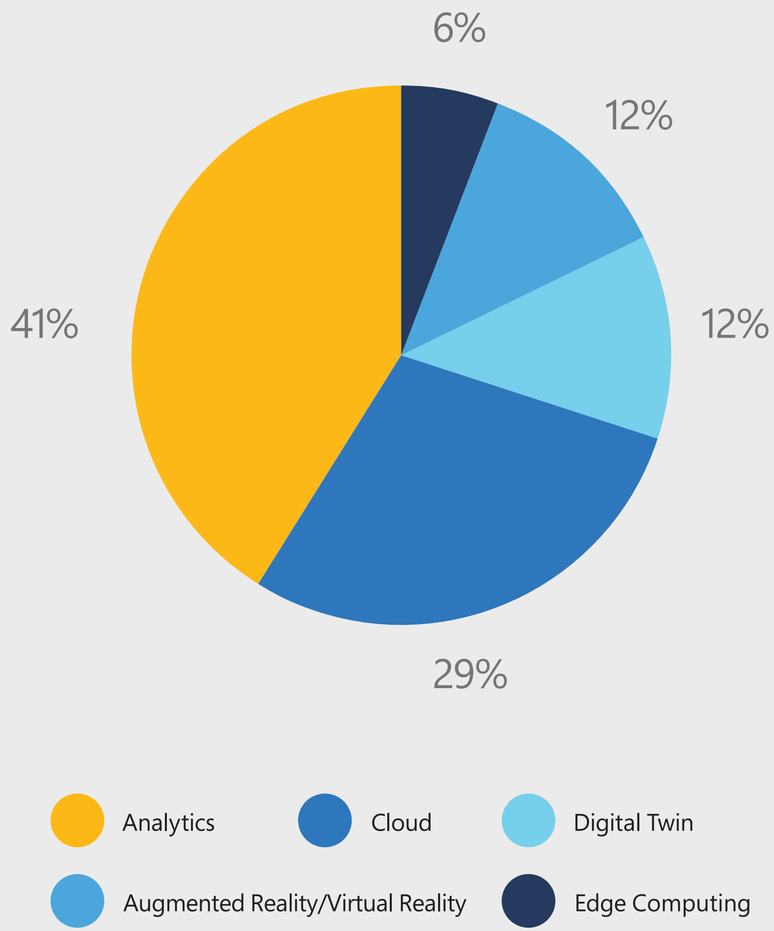
The power of AI is in augmented decision-making for humans. Co-augmentation is key, and it also frees up bandwidth for personnel to focus on strategic and value-added activities. As seen in the chart on the following page, over the next three years 41% of respondents are planning to invest in AI/ML solutions.

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.

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.



Source: Frost & Sullivan

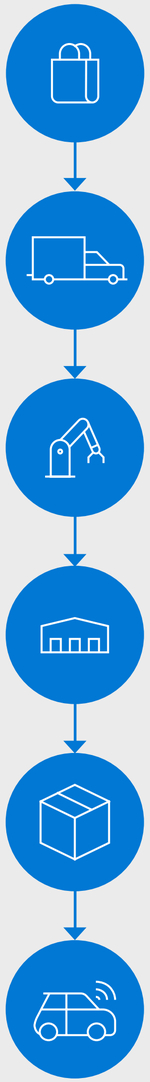
Solution: Streamline to simplify

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.

Past

Latency-laden value chain



Procurement
eProcurement solutions, vendor management, invoice and payment management

Transportation
Sensorization of shipments and vehicles—real-time tracking and tracing, TMS and FMS

Manufacturing
Material Resource Planning (MRP), automation, additive manufacturing (3D printing), TMS and FMS

Warehousing
Automation, sensorization for better inventory planning and management, WMS

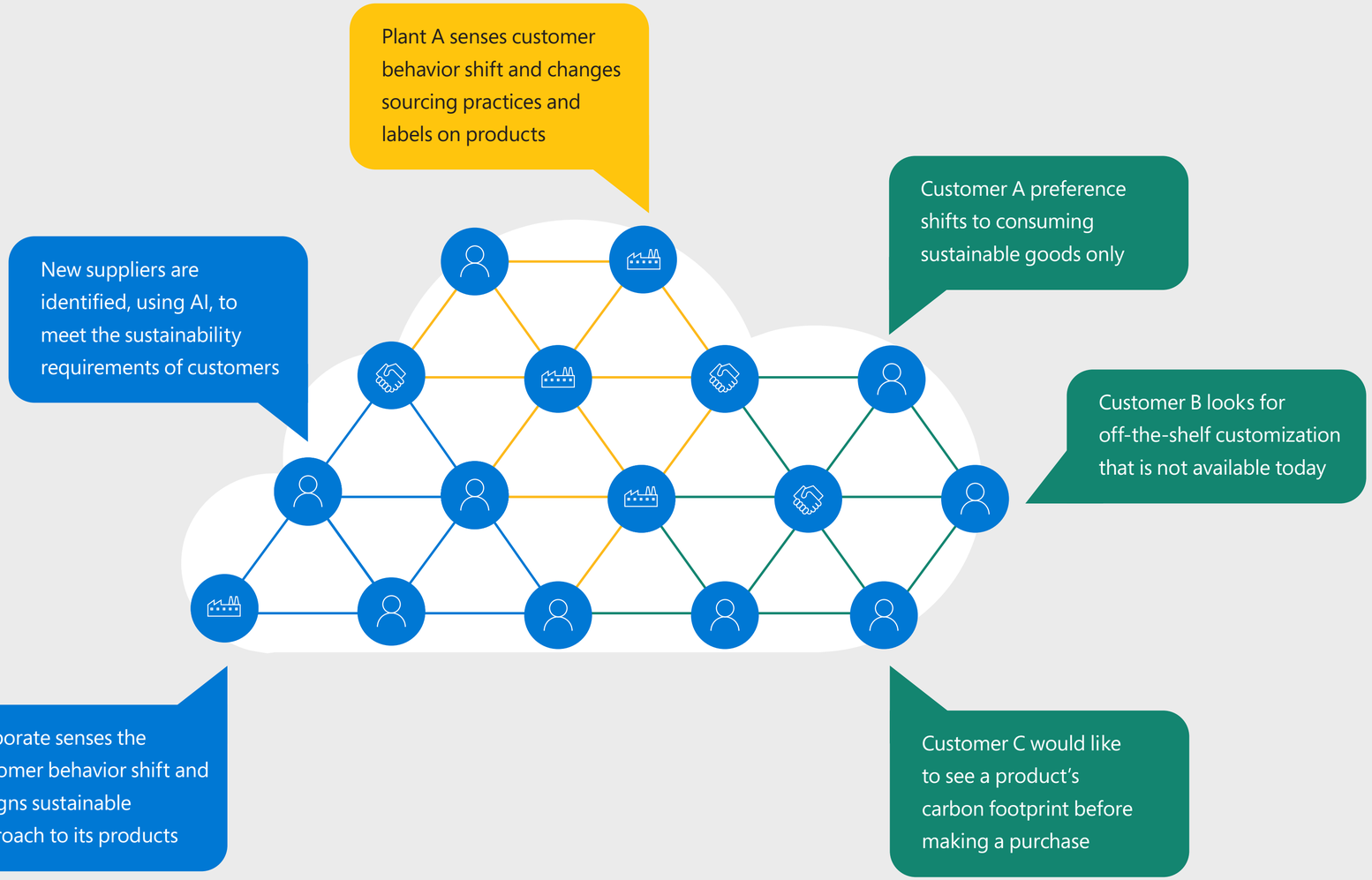
Distribution
FMS, distributed order management (DOM), TMS and FMS

Retail
Drones, delivery robots, other autonomous vehicle-based deliveries, customer behavior, analytics

Future

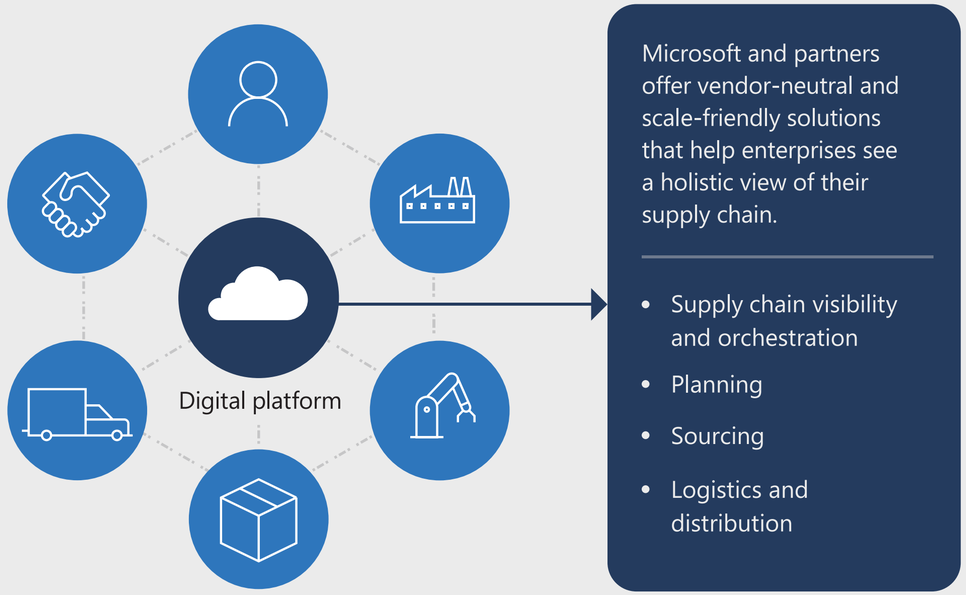
Responsive and dynamic network of networks and demand webs, connected by a single cloud platform, streamlining data collection and the surfacing of insights

- Supplier network
- Manufacturing network
- Last-mile network



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.



Microsoft and partners offer vendor-neutral and scale-friendly solutions that help enterprises see a holistic view of their supply chain.

- Supply chain visibility and orchestration
- Planning
- Sourcing
- Logistics and distribution

Connected

Leverage the cloud to connect, automate, visualize, E2E view

Predictive

Move from reactive to predictive with big data, machine learning, and IoT

Cognitive

Amplify with algorithmic decision-making and automated execution

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.

Microsoft Azure

"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

Microsoft Azure

"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

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.

Achieve engineered outcomes by making sense of massive data volumes.

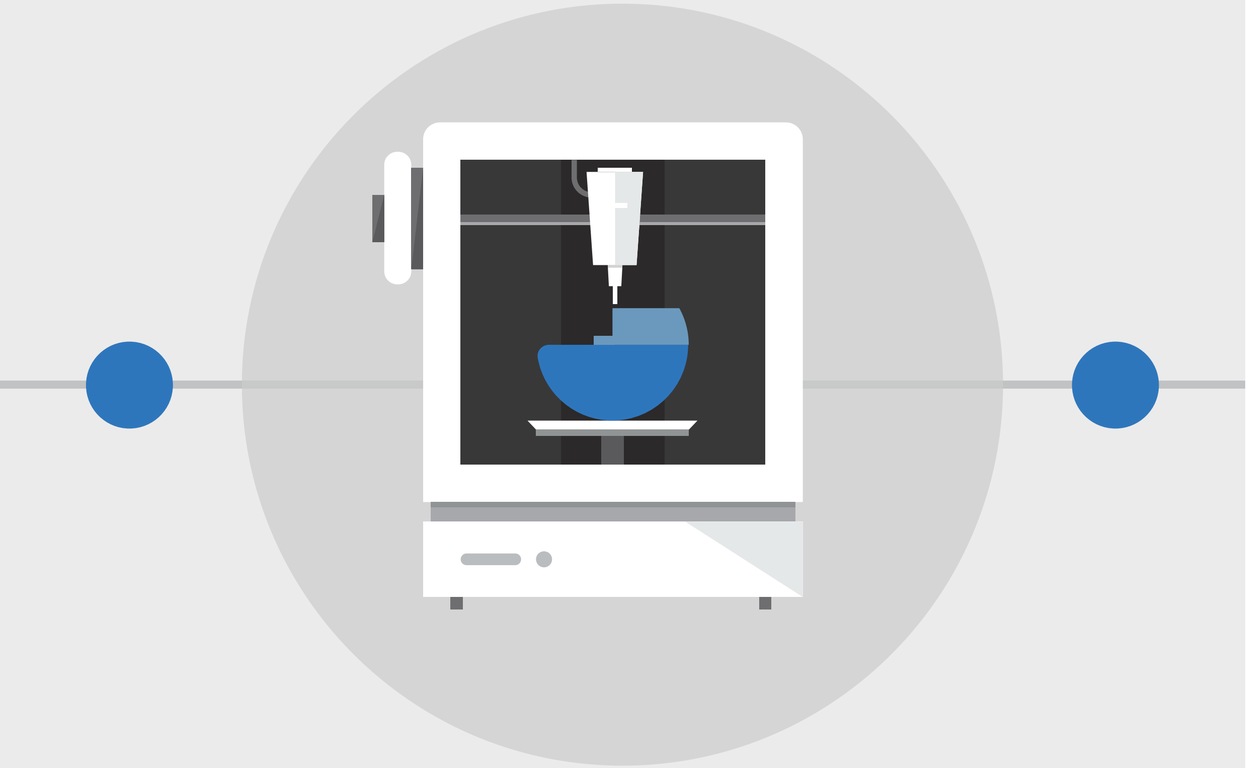
It's important to prepare for the future by rethinking current processes, products, and operations. Majans, a small, family-run consumer goods manufacturer, grew to the point where production and operations needed to be streamlined in order to reach its business goals. IoT intelligence is not just about 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 Bl, Power Apps, and flow and talent solutions helps visualize massive volumes of data in a meaningful way. Read more about the Majans story here.

Microsoft Dynamics 365

"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

Microsoft Azure



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