Hype Cycle for Supply Chain Strategy, 2023

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Leading organizations strive to balance a focus on foundational capabilities with the pursuit of innovation. This Hype Cycle offers CSCOs a snapshot of the maturity and benefits of key technologies, operating models and supply chain frameworks to support their goals.

Analysis

What You Need to Know

Amid ongoing heightened risks, economic headwinds and evolving political unrest, supply chain organizations must excel at the fundamentals while pursuing innovation to seize new opportunities. Leaders are leveraging partner ecosystems, emerging technologies and new service models to drive business growth.

They are redefining skills, roles and organizational structure to drive high performance and engagement. They are rising to social and environmental goals, like building a circular, sustainable supply chain and embracing diversity, equity and inclusion (DEI).

To rise to these goals, CSCOs must pursue and invest in a portfolio of mature and emerging capabilities that balance the need for operational excellence and innovation and growth.

This Hype Cycle highlights these key capabilities. It describes the capability's maturity level, business impact and potential obstacles, and provides guidance for successful adoption.

The Hype Cycle

This Hype Cycle organizes the key capabilities into five categories:

- **Technologies:** These include machine customers, GenAI, AI, machine learning and digital supply chain twins.

- **Competencies:** These span data literacy, supply chain cybersecurity, supply chain risk management and network design.
- **Frameworks:** These include supply chain resilience, sustainable supply chain and supply chain segmentation.
- **Business model strategies:** These span ecosystem partnerships, circular supply chain, and supply chain as a service.
- **Organizational models:** These include agile teams, hybrid work, DEI and centers of excellence.

Examining the Hype Cycle, we observe:

- A few capabilities to the left of the peak, representing emerging trends.
- A peak with a crowd of hyped capabilities that promise significant benefits, but have yet to be adopted at scale.
- Capabilities heading toward the trough as they struggle to demonstrate expected benefits.
- Tried-and-true mature capabilities that have demonstrated ability to scale and generate return on investments.

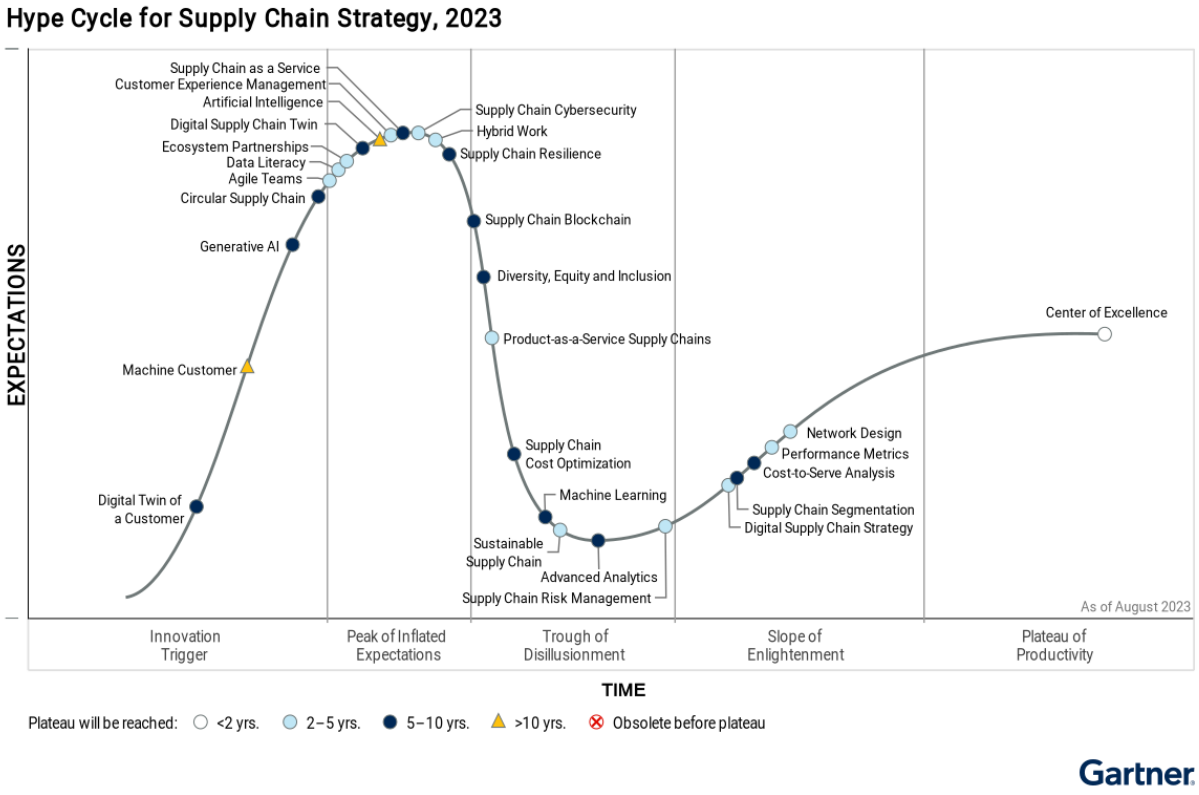
This year's Hype Cycle sees three new additions that reflect heightened supply chain priorities:

- **Digital Twin of a Customer (DToC)** is a dynamic virtual mirror representation of a customer that can be used to simulate and to emulate and anticipate behavior.
- **Sustainable Supply Chain:** Sustainable supply chain is the embedding of sustainability principles into how organizations plan, source, make, buy, and deliver goods and services.
- **Generative AI:** Generative AI refers to AI techniques that learn a representation of artifacts from data and generates brand-new artifacts that resemble, but don't repeat, the original data.

We made the following changes:

- **Circular economy** has been renamed to **circular supply chain** to more accurately refer to the supply-chain-specific capability tracked on the Hype Cycle. While organizations track the evolution of a circular economy, they seek to build a circular supply chain operating model.
- We combined **predictive analytics** and **prescriptive analytics** into **advanced analytics,** since the companies — and technology providers — rarely make a clear distinction between the two techniques. Rather, they pursue advanced analytics capabilities that can answer both "What is likely to happen?" and "What action should be taken to achieve objectives?"
- **Solution supply chains** is renamed to **product-as-a-service supply chains** to emphasize that the solution — services, customization or digital enablement — is anchored around a physical product.

Figure 1: Hype Cycle for Supply Chain Strategy, 2023



The Priority Matrix

The Priority Matrix helps CSCOs identify the immediate and future opportunities to adopt technologies and build supply chain competencies, based on their potential impact and maturity.

It is imperative that CSCOs invest in capabilities with transformational benefits that will reach the Plateau of Productivity in five years or fewer. If they haven't done so yet, they must dedicate resources to quickly build or expand these capabilities. For example, they must focus on scaling customer experience management to support digital business transformation. They also must focus on building effective ecosystem partnerships to collectively address risk mitigation, innovation and sustainability goals.

Similarly, adopting the capabilities that have benefits categorized as transformational, and that are expected to plateau in five to 10 years, is critical to future competitiveness. For example, embracing generative AI or DEI now will position the supply chain organization to reach and maintain its longer-term goals.

Although it will be more than 10 years before capabilities like machine customer intelligence reach the Plateau of Productivity, CSCOs must realize their potential for business transformation and start active exploration and experimentation. This understanding will afford them an active role as key partners in crafting the organization's long-term business direction.

Table 1: Priority Matrix for Supply Chain Strategy, 2023

(Enlarged table in Appendix)

Benefit ↓	Years to Mainstream Adoption: Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Customer Experience Management Digital Supply Chain Strategy Ecosystem Partnerships	Circular Supply Chain Digital Supply Chain Twin Digital Twin of a Customer Diversity, Equity and Inclusion Generative AI Supply Chain Resilience	Artificial Intelligence Machine Customer
High	Center of Excellence	Agile Teams Data Literacy Hybrid Work Network Design Performance Metrics Product-as-a-Service Supply Chains Supply Chain Cybersecurity Supply Chain Risk Management Sustainable Supply Chain	Advanced Analytics Cost-to-Serve Analysis Machine Learning Supply Chain as a Service Supply Chain Blockchain Supply Chain Cost Optimization Supply Chain Segmentation	
Moderate				
Low				

Source: Gartner (August 2023)

Off the Hype Cycle

We retired the following capabilities from the Hype Cycle:

- **Modular Operating Model:** Modular operating model is an advanced process segmentation that enables quick delivery of new capabilities and outcomes. Over the past few years, we have observed that the modular operating model is no longer a distinct capability that organizations seek to adopt. Rather, it is an element of an overarching segmentation strategy to build agility in meeting changing business and customer needs.

- **Immersive Experience:** Immersive experience reimagines the user experience by enabling users to perceive the virtual world using virtual, augmented and mixed reality. As the technology has matured, tracking and adopting this capability now likely falls outside of the purview of a CSCO or a strategy execution leader, and in the domain of functional leaders in manufacturing, logistics and services.
- **Environmental, Social and Governance:** ESG is the process for setting, managing and reporting strategy and metrics for an organization's environmental and social impacts, governance mechanisms, and related policies. It allows the board and company leadership to synthesize and weigh stakeholder interests to inform corporate strategy, manage a new set of risks and communicate ambitions and progress to external audiences. Gartner is retiring this capability from the Hype Cycle because, while the supply chain organization is an essential contributor, ESG is typically managed by an enterprisewide function. Supply-chain-specific elements of ESG are presented in other capabilities, including sustainable supply chain, circular supply chain, risk management, and DEI.

On the Rise

Digital Twin of a Customer

Analysis By: Beth Coppinger, Pierfrancesco Manenti

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A digital twin of a customer (DToC) is a dynamic virtual mirror representation of a customer that helps to simulate, emulate and anticipate customers' behavior. Customers can be individuals, enterprise customers, personas, groups of people or machines.

Why This Is Important

DToCs can help supply chains of all sizes better understand their customers and consumers and anticipate their behavior — in real time. As part of an overall digitalization strategy, DToCs can improve demand forecast accuracy, agility and responsiveness, costs, and customer experience (CX). DToCs will enable supply chains to design personalized, empathetic services and solutions for customers, many of whom have altered buying habits during periods of disruption and change.

Business Impact

Digital twins enable organizations to anticipate how a physical product or asset will perform or to maintain it under different conditions. Supply chains can use DToCs to simulate how a customer will react, given a specific set of ecosystem parameters, conditions, and control or input signals. This ability to simulate customer reactions in real time will allow supply chains to better sense changing customer demands, predict scenarios for response, and accelerate the time to value for new products and services.

Drivers

While still a nascent technology, early pilots and survey data indicate that DToCs will help supply chains:

- Gain critical insights into customers' behaviors and responses in real time, driving improvements in demand planning.

- Drive end-to-end digital integration and prediction of supply and demand (when linked with a digital supply chain twin).
- Enable better, faster, more accurate decisions and reduce supply chain risk.
- Enable new ways to serve customers, as well as facilitate new data-driven business models.
- Predict and simulate customer behaviors to create and improve products, services and solutions that are more successful and reduce unnecessary costs of failure.
- Improve customer engagement, retention, lifetime value and company growth.

DToCs will help customers:

- Reduce friction in interactions with the supplier organization across their journey.
- Increase positive outcomes, creating better value.
- Engage in curated and concierge-like experiences specifically tailored to drive value for them.
- Protect privacy with the ability to change what personal data is collected and how organizations use it.

Obstacles

- Privacy and cyber risk concerns may lengthen the time it takes DToCs to mature and increase legal and regulatory risk.
- Organizations need competency in digitalization skills, such as data science, graph technology and AI, to build and manage DToCs.
- DToCs will transform ways of working and significantly impact both people and culture. Organizations must include a strategy for managing this transformational change in the digital roadmap.
- Organizations need to establish trust with customers for them to agree to share information. Customers will need transparency about what data is collected, how it will be used, and the privacy and data controls that will be applied. For B2B, they need to know the benefits, such as providing a more personalized experience, more relevant products or services, convenience and exclusive offers.

- Internal bias and concern exist about a DToC's ability to drive revenue or reduce costs. Organizations will need a strategy based on use cases of how to create value.

User Recommendations

- Identify and pilot the use cases for which DToCs can help deliver a better CX and for which relevant data is available by examining customer journeys and failure points.
- Define measurable KPIs and specific objectives clearly to validate improved business outcomes, such as CX, demand forecastability, or agility and responsiveness.
- Develop a transformation program to address the required people and cultural impacts. Ensure your business and operating models are ready to support the endeavor.
- Encourage customers to share their data with you. Define benefits they can expect from a DToC, and agree to the level of control they will have over their data, including canceling the digital twin. Provide clear visibility into how their data will be used.
- Align your activities with customers' privacy and cybersecurity concerns based on the availability of customer assets and establish a trust center to house these documents and expectations.

Gartner Recommended Reading

Supply Chain Executive Report: Drive Growth & Elevate Experiences With Digital Twin of the Customer

A Digital Twin of a Customer Predicts the Best Customer Experience

Top Trends in Strategic Supply Chain Technology 2023

Machine Customer

Analysis By: Pierfrancesco Manenti

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A machine customer is a nonhuman economic actor that obtains goods or services in exchange for payment. Examples include IoT-connected devices or assets that place orders independently of a human command, intelligent replenishment algorithms that maintain availability of consumables and intelligent assistants that suggest deals to consumers.

Why This Is Important

Gartner's 2020 CEO and Senior Executive Survey indicates that 61% of CEOs believe that demand from machine customers will become significant in their industry by 2030. On average, these business leaders believe that at least 21% of their revenue will come from machine customers by 2030. Given this projected revenue, CSCOs must accelerate their efforts to build an adequate strategy to get their supply chain ready to respond to machine-customer demand.

Business Impact

Machine customers buy based on facts and rules set by humans. They leverage real-time data and predictive algorithms to determine why, what, when and how much to buy. They tend to buy "just in time," when the product is actually predicted to be needed. The expectation is that machine customers will tend to buy more frequently, in lower amounts and at greater speed than their human counterparts. To respond to this different buying behavior, CSCOs must adapt their supply chain operating model.

Drivers

- The emergence of machine customers has the potential to dramatically transform the way organizations execute their supply chain, including the order-to-cash, demand forecasting and replenishment processes — both internally and externally with partners.
- Machine customers will have a significant impact on how supply chains perceive and interact with customers, expanding the definition of the customer to include both human and autonomous, nonhuman demand generators. Customer experience will need to be reimagined.
- Machine customers will be more reliable and predictable than human customers, because they buy based on data and logic. However, they will also be better able to quickly find substitutable products that may be more convenient, carry lower shipping costs or be delivered more reliably.
- Machine customers will observe and measure supplier behavior closely and take actions immediately. To respond to machine-customer demand with the expected behavior, CSCOs will have to enable real-time decision-making execution and create a higher level of agility and resilience in their end-to-end supply chain, across source, make and deliver operations.
- Connecting digitally with customers — and specifically with their autonomous buyers — is the first critical step in a machine-customer strategy. However, it doesn't stop there. Properly responding to machine-customer demand also requires connecting digitally with suppliers and other trading partners, and having aligned decision making across the end-to-end supply chain.
- Putting this trend in perspective, the opportunity is that supply chains must not simply serve machine customers. They have the chance to manufacture their own customers, e.g., connected products that can replenish themselves on behalf of human customers.

Obstacles

- Machine customers won't commit to a supplier unless the fulfillment process works smoothly and meets requirements. Suppliers' reliability will be mathematically determined and perfectly recorded. This is unlike the human, who may be influenced by one personable account manager.
- While companies focus on unleashing machine customers' autonomous buying, they must also invest to make their supply chain response equally autonomous, integrating machine customers with machine suppliers.
- As CSCOs expand their digital ecosystem, they have a tremendous responsibility to ensure that data housed within or integrated into the digital ecosystem is accessible, secure and unbiased.
- Machine customers will further increase the volatility and fast-evolving nature of supply, however 69% supply chains aren't able to consistently make the necessary fast and accurate decisions in real time.
- Organizations will advance asynchronously in the ability to create and respond to machine customers. This may lead more advanced organizations to cease doing business with those on the slower side.

User Recommendations

- Gain leadership alignment to the urgency of addressing oncoming demand from machine customers and the relevant role of the supply chain to respond to that.
- Redesign your strategic priority to include a long-term plan to grow with the emerging machine customer. Reflect on your business model and product portfolio to identify opportunities for making your own machine customers.
- Design a supply chain operating model that provides higher levels of agility and resilience, digitally connects the partner ecosystem, automates processes and decision making, and attracts and retains digital-adaptable staff.
- Accelerate the role of the supply chain as a platform for customer experience. With machine customers, the supply chain will be totally tuned into its customers. CSCOs should accelerate the design of new customer experience roles.

Gartner Recommended Reading

Supply Chain Executive Report: Designing a Digital Supply Chain to Respond to Autonomous Machine Customers

How the Emergence of Machine Customers Will Impact Your Supply Chain

Why Machine Customers May Be Better Than Human Customers

Generative AI

Analysis By: Noha Tohamy

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

Generative AI (GenAI) technologies can generate new derived versions of content, strategies, designs and methods by learning from large repositories of original source content. GenAI has profound business impacts, including on content discovery, creation, authenticity and regulations; automation of human work; and customer and employee experiences. In supply chain, GenAI improves communication with internal and external partners and interfaces to tech, and derives novel strategies and workflows.

Why This Is Important

GenAI can create tailored customer and supplier communications. It can increase technology adoption by providing users with an intuitive Q&A-based interface to provide a better understanding of the logic behind complex supply chain solutions. It can come up with novel scenarios and workflows for complex supply chain problems like production scheduling and long-range planning. Through code generation, GenAI can accelerate the development and deployment of advanced analytics.

Business Impact

GenAI will help synthesize contracts, ensure regulatory compliance, communicate with suppliers, prepare meeting materials and offer tailored customer service. This can free up staff for higher value tasks, enable better communication across functions reducing siloed decision making.

GenAI will democratize data and analytics through intuitive conversational interfaces, but could pose data and cybersecurity risks.

Drivers

- The hype around and interest in GenAI in our personal lives has accelerated the desire for supply chain organizations to understand its potential impact on their supply chains.
- Supply chain organizations are assessing its potential in various supply chain use cases, as it observes its opportunities and challenges in other enterprise functions, like marketing and customer service.
- Synthetic data draws enterprises' attention by helping to augment scarce data, mitigate bias or preserve data privacy. These capabilities can be well utilized to predict demand and supply patterns in complex supply networks.
- Combined with development automation techniques, GenAI can automate up to 70% of the programmers' work. In addition to its direct impact on the productivity of software engineers, these gains will significantly improve the availability and speed-to-value of supply chain solutions.

Obstacles

- There are a few pilots and proof points of benefits in the supply chain as it is an emerging technology.
- Little clarity of the investment requirements to adopt GenAI.
- Lack of cohesive messaging of how tech providers will incorporate GenAI in their solutions.
- Lack of clarity of the most suitable deployment model for GenAI: consuming GenAI embedded in supply chain applications, embedding generative AI model APIs in a custom application frame, extending GenAI models via data retrieval, extending generative AI models via fine-tuning or building custom foundation models from scratch (How to Choose an Approach for Deploying Generative AI).
- Lack of tech and data foundation limits the ability to leverage GenAI in the short term.
- There is a lack of clarity of how GenAI solutions will fit in current technology footprint.
- Full and accurate detection of nefarious content, such as deepfakes, will remain challenging or impossible.
- Investments in compute resources for training models are substantial and unaffordable to most enterprises.
- Sustainability concerns about high energy consumption are rising.

User Recommendations

- Assess the organization's technical maturity level and cultural appetite for emerging technology.
- Secure requisite subject matter expertise and technical talent to build, maintain and adopt Gen AI solutions.
- Understand and communicate expected ROI ranging from understanding of potential and challenges to quantifiable productivity improvements.
- Work with your supply chain technology providers to understand their — and require a clear — roadmap of incorporating GenAI in their offering.
- Quantify the advantages and limitations of GenAI. Supply GenAI guidelines, as it requires skills, funds and caution. Weigh technical capabilities with ethical factors. Beware of subpar offerings that exploit the current hype.
- Mitigate GenAI risks by working with legal, security and fraud experts. Understand the risks that GenAI can pose to your organization's intellectual property and your internal, customers and suppliers data security and privacy.
- Optimize the cost and efficiency of AI solutions by employing composite AI approaches to combine GenAI with other AI techniques.

Gartner Recommended Reading

Innovation Insight for Generative AI

Quick Answer: What CSCOs Should Know About ChatGPT's Capabilities and Pitfalls

Emerging Tech: Generative AI Needs Focus on Accuracy and Veracity to Ensure Widespread B2B Adoption

ChatGPT Research Highlights

Circular Supply Chain

Analysis By: Laura Rainier, Sarah Watt

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Circular supply chain is the application of circular economy principles to the end-to-end supply chain. A circular supply chain decouples consumption from growth using three principles: design out waste, keep material in use at the highest quality for as long as possible and return materials to the environment to have a positive impact. Benefits of the circular supply chain include enhanced customer engagement, raw material security and containment of inflationary-driven costs.

Why This Is Important

A circular supply chain decouples resource consumption from growth, enabling leaders to maintain business competitiveness while reducing environmental impact. According to the 2022 Gartner Future of Supply Chain Survey, engaging in circular economy activities is important to 75% of supply chain leaders. Additionally, 92% of high-performing supply chain leaders expect to have sufficient capabilities to enable circular economy benefits in three to five years.

Business Impact

A circular supply chain uses resources more efficiently by designing waste out of products, packaging and processes, and better-leveraging materials through product take-back, refurbishment, product life extension and other means. The approach shifts economic incentives toward durability and material efficiency and provides a hedge for materials volatility. Digital technology allows for product orchestration while also gathering insights into customer use, which is fed back into product design.

Drivers

- Legislative drivers: Various regulatory requirements are emerging to drive enhanced circularity. For example, the “right to repair” requires access to spare parts and technical information to enable products to be kept in use for as long as possible. EU waste policy aims to ensure that high-quality resources are not lost from the economic system. Concerningly, 60% of EU household waste still goes to landfill.
- Supply chain resilience: Circular supply chains enable the organization to meet customer demand amid disruption through second-life products or by reclaiming raw materials for manufacturing new products.
- Impact on climate change and biodiversity: A circular approach has the potential to reduce climate change impacts, as product embodied energy (and emissions) is used more efficiently. By slowing the rate of consumption, the circular supply chain reduces its reliance on the extraction/production of new raw materials and their associated emissions. Enterprises must undertake life cycle analysis to review the environmental impacts of end-of-life options, enabling trade-off decisions to be made.
- Enhanced value: The circular economy enables enterprises to access new markets, offer new business models and products, and build a differentiated sustainability narrative.
- Innovation: The circular economy is a catalyst for innovation. Examples include design for reuse and longevity, innovative business models and design for disassembly.
- Customer expectations: According to the 2022 Gartner Circular Economy Survey, customer demand for circular products is the biggest driver of changes to the physical supply chain network to enable circular economy outcomes.

Obstacles

- Metrics: Traditional ROI metrics do not effectively capture the benefits of the circular supply chain due to short-term focus, siloed thinking and a transactional approach. Circular strategies capture more value from materials, over a longer period of time.
- Stakeholder engagement: Scaling the circular supply chain relies on engaging with partners across the organization and ecosystem. Partnership is required to enable product return flows, materials recovery, industrial symbiosis between organizations and additional customer value offerings. Convening external stakeholders and sharing relevant data with the ecosystem is a key barrier.
- Execution: Take-back models enable remanufacturing and reuse, but the supply chain has less control over what is returned. This can create excess inventory without a productive next use.
- Impact: Standards are emerging to measure the impact of circular initiatives, but accurate assessment of environmental and other trade-offs is complex.

User Recommendations

- Prioritize products: Select the products best positioned for the circular strategy by assessing which products deliver the most financial and nonfinancial benefits, evaluating the customer appetite for circular products and assessing the feasibility of circular models.
- Enable: Apply circular design guidelines (for example, modularity, durability), craft circular business models (for example, reuse, product as a service), and implement processes that enable material loops (for example, reverse logistics, reverse planning).
- Pilot: Demonstrate how to overcome common leadership concerns, such as the cannibalization of market share.
- Digitalize: Leverage digital technology for product use insights, and to improve the speed, rate and quality of second-life products. Formulate performance scorecards to aggregate data from multiple parts of the organization.
- Organize: Organization structure is a key enabler in advancing circular economy strategy. Use centers of excellence to embed circular economy into operating models.

Gartner Recommended Reading

3 Criteria to Select “Winning” Circular Economy Products to Enable Growth

3 Accelerators to Advance the Circular Economy in Supply Chain

Use Circular Economy to Mitigate Inflation, Drive Growth and Deliver Value Amid Economic Uncertainty

Craft a Reverse Supply Chain Strategy to Enable Circular Economy at Scale

How to Structure Your Organization to Drive Circular Economy Integration

At the Peak

Agile Teams

Analysis By: Ken Chadwick

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Agile teams are small, multiskilled groups with defined decision authority to deliver fast-cycle solutions for supply chain projects, innovations or challenges. They work in iterative cycles to design and implement minimum viable solutions. With a high tolerance for ambiguity and risk, they test assumptions as solutions are applied to real-world operations, redirecting actions quickly as they learn.

Why This Is Important

As disruptions continue to hit supply chains, the theme of agility continues to increase in importance. Companies are looking to organize people to both respond to disruptions and innovate in shorter cycles of decision making. Agile teams are one solution to this organizing challenge.

Business Impact

Gartner has seen successful application of agile teams to speed solution development in disruptions (trade and tariff network realignment), as well as in supply chain operations (manufacturing planning). Companies can use agile teams to increase the pace and adoption of innovations (digital technology), engage in better user design for supply chain processes (sales and operations planning [S&OP]) or get better outcomes from supply chain technology (planning systems).

Drivers

- A sustained increase in the pace of disruption, business, and innovation across industries and functions.
- The lack of organizational structure solutions to deliver faster decision making and outcomes for the business.

- The need to deliver business-defined outcomes (reduced inventory, improved network capacity, etc.) at a faster pace.
- A drive to speed up decision making in response to supply chain disruptions.
- Increased focus on end-to-end supply chain management, aligning goals and motivations of teams to business or customer outcomes rather than functional outcomes.
- A desire for faster cycle time for solution delivery (faster time to market) for either new products or process changes in the organization.
- Leaders' desire to deliver better user-defined outcomes (usability) in their systems and solutions.
- Proofs of concept that exist in companies' pandemic response, illustrating that agile teams have the ability to make faster decisions in response to business needs.

Obstacles

- While "agile" is often in the press, we do not see significant application of true agile methods to team-based work in supply chains. Perhaps this is because the industry is conflating agility (speed of decision making) with more formal Agile approaches.
- Limited examples of companies applying Agile methodology (a descendant of IT Agile) to supply chain environments are emerging. These examples are picking up on agile team constructs, agile mindsets, sprint methodology and the concept of minimum viable product (MVP) to accelerate time to development of innovations, projects or solutions to disruptions.
- While there is a lot of hype around agility, we see few instances in supply chain organizations where an agile team has elements of agility beyond being nonhierarchical and moving quickly.

User Recommendations

- Develop a clear definition for your agile teams. A typical agile team should have a small team with representation and skills needed to design the solution with the customer in mind. It should have a clear accountability for decision making and access to enough information to make decisions. An understanding of the goals and design parameters of the project is an important prerequisite. Lastly, there must be an agile development process in place, where work is broken down into sprints to ensure fast-cycle design, test and delivery (defined as the MVP).

- Empower your team to make decisions and accept the risks of failure that come with each sprint. The team must embrace its decision-making role, be willing to make decisions with less-than-perfect information, be willing to take risks, and deliver the MVP while learning from each success and failure.

Gartner Recommended Reading

Adaptive Decision Process (Schneider Electric)

Organization Design Choices to Support Enterprise Agility

Case Study: Agile Methodology Adoption to Accelerate Supply Chain Digital Transformation

Supply Chain Executive Report: Designing a Social Supply Chain

Data Literacy

Analysis By: Noha Tohamy

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Data literacy is the ability to read, write and communicate data in context, with an understanding of the data sources and constructs, analytical methods, and techniques applied. Data-literate individuals have the ability to understand, interpret and act upon data, describe its use-case application, and influence resulting business value or outcomes.

Why This Is Important

Supply chain organizations report significant investments in data and analytics to cope with increased complexity and constant disruption. But they cite lack of data and analytics talent and lack of cultural readiness as major hurdles to return on those investments. Leading organizations have adopted data literacy programs to overcome these hurdles by educating their staff on foundational principles in data and analytics and their applicability to improve supply chain performance.

Business Impact

The ability of the supply chain organization to embrace and leverage data and analytics is critical for supply chain digitization. Data literacy allows the staff to understand the data elements needed to represent supply chain conditions. A data literate organization appreciates the role of analytics in turning data into insights. Data literacy training supports organizational change by helping the users articulate the business value generated by data and analytics.

Drivers

- There is a growing realization by supply chain leaders that the lack of data literacy is at the root of unsuccessful data and analytics initiatives.
- A majority of supply chain organizations have been actively investing in digital technologies that rely on data and advanced analytics.
- To support their organization's digital readiness, leaders are investing in their staff's overall digital competencies.
- Supply chain organizations seek to increase the adoption of data and analytics initiatives by educating their staff on how to leverage data and analytics insights in their decisions.
- As analytics become pervasive in supply chain decision making, foundational understanding of analytics techniques and their role in use cases enable business users to effectively leverage data and analytics while still capitalizing on their domain expertise.
- Analytics leaders' need for building a business case for additional funding depends on the users' ability to articulate business value, which is one of the tenets of data literacy.

Obstacles

- Data literacy initiatives intended to drive organizational change can be overwhelming to immature organizations still focused on building the technical foundation.
- Organizations tend to take a piecemeal approach to data literacy training, with narrow focus on training on individual solutions.
- Supply chain leaders lack understanding of how to measure their efficacy to ensure continued focus and funding.
- Supply chain organizations can be at a loss on who to partner with on data literacy. They can often lack clarity of scope of services from external service providers, whose data literacy programs can range from training on visualization to fostering curiosity in data and analytics.
- Data literacy programs can stall due to weak governance of training programs where there is lack of clarity on ownership among supply chain, HR, and data and analytics functions.

User Recommendations

- Secure top-down executive commitment to improving data literacy levels for all supply chain staff.
- Track and measure the efficacy of data literacy programs by mapping to improved supply chain performance.
- Tailor data literacy training programs to different user persona and business roles.
- Build communities of practice to share knowledge, best practices and lessons to keep staff engagement, and create a fun learning experience.

Gartner Recommended Reading

Toolkit: Assessment of Data Literacy in the Supply Chain

Criteria for Selecting Data Literacy Providers for Enterprises That Want to Be More Data-Driven

Ecosystem Partnerships

Analysis By: Simon Bailey

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Enterprise-, platform- and purpose-centric supply chain ecosystems are communities of interconnected organizations that share capabilities through equitable relationships to create value for participants in pursuit of a common goal. They differ from networks as all partners are interconnected, instead of being connected to a central enterprise in many one-to-one relationships. Data sharing protocols, connected governance, interconnecting technology and trust are key to success.

Why This Is Important

Ecosystems are becoming C-suite priorities as they seek to address challenges far larger than a single enterprise, such as Scope 3 emissions. As per the 2022 Gartner Strategies to Establish Successful Ecosystem Partnerships Survey, 86% of respondents said ecosystems were very or extremely valuable in achieving their goals. Ecosystems offer "partner" as an alternative to traditional "build/buy." Midmaturity enterprises should focus on partnering and higher-maturity ones should consider ecosystem orchestration.

Business Impact

Chief supply chain officers (CSCOs) must make conscious decisions about participating in or orchestrating different types of ecosystems, based on clear goals. Examples of business and ecosystemwide benefits include;

- Agility and resilience through faster response to unexpected changes with more effective risk management.
- Faster innovation by involving academics, nongovernmental organizations and other novel partners.
- Environmental progress toward creating circular economy solutions and addressing greenhouse gas (GHG) emissions.

Drivers

- Ecosystems co-create future business capabilities, establish mutual value exchange and develop shared intelligence.
- Enterprises increasingly find that their competitive advantage (e.g., enabling differentiation, generating cost advantages) comes from collaboration with other firms and/or entities, rather than solely through their own efforts.
- Most organizations are already operating in some form of ecosystem, as the 2022 Gartner Digital Business Ecosystem Involvement and Barriers to Partnership Survey shows that 94% of organizations have at least one ecosystem partnership.
- Gartner research finds that greater success comes from more “positive sum” metrics that emphasize the mutual benefits of the ecosystem in terms of value, capability creation and growth.
- Ecosystems are expected to be a key driver of competitiveness in future. By 2026, more than 50% of large organizations will compete as collaborative digital ecosystems rather than as discrete firms, sharing inputs, assets and innovations.
- Customer experience and business growth are two key goals, as the 2022 Gartner Supply Chain Community Survey data indicates that 45% of respondents see ecosystem partnerships as a key enabler of customer experience (CX) and revenue.

Obstacles

- A lack of trust is the key barrier to ecosystem success, whether it be of trading partners or competitors.
- Internal barriers center around perception of added workload and an inside-out mindset, with many companies liking the control that comes from managing one-to-one relationships or one-to-many networks. An inside-out mindset is an obstacle to recognizing the benefits of interconnectedness, and a lack of trust is the key barrier to those that are hesitant to share value, innovation and purpose.
- Wariness about data sharing and data privacy is the top-ranked external barrier to ecosystem success, driven by concerns over data security as the number of participants grows.
- Enterprises that still rely heavily on spreadsheets and email for communication with trading partners are not ready for ecosystem partnerships. The inability to contribute data at scale limits visibility into their supply chain, which in turn limits the network effect and the ecosystem's potential for value creation.

User Recommendations

- Evangelize the benefits of ecosystems by communicating how they solve problems that the enterprise can't resolve independently. Share how they reduce rather than add to employee workload through a build/buy/partner approach.
- Co-define the core purpose of the ecosystem at the outset with a positive-sum mindset by agreeing clear operating principles to act as guide rails for participants in place of central control.
- Choose appropriate platforms for data sharing by vetting for foundational capabilities for data security and standardization, as well as advanced decision automation capabilities that offer seamless partner integration and collaboration.
- Flip to a new mindset of "must share data unless" with data exchange protocols to promote a virtuous circle that drives ecosystem outcomes and opens up further opportunities.
- Establish connected governance to provide a virtual framework that bridges existing governance bodies to give strategic oversight and accountability management across them.

Gartner Recommended Reading

Supply Chain Executive Report: Realizing the True Potential of Ecosystem Partnerships

Build Industry Ecosystem Culture, Connections and Capability to Solve Issues Beyond Your Enterprise

Podcast: Realizing the True Potential of Ecosystem Partnerships

E2E Supply Chain Ecosystem Collaboration: Part 1 — Before Thinking About the Technology, Clarify the Business Capabilities

Supply Chain Executive Report: Fostering a Digital Supply Chain Ecosystem

Digital Supply Chain Twin

Analysis By: Tim Payne

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A digital supply chain twin is a high-resolution digital representation of the physical E2E supply chain that is synchronized with the real world to provide visibility and enable aligned E2E decisions. It is built from granular low-latency data to form a dynamic, synchronized, real-time representation of the various associations among the data objects and entities that describe and make up how the physical supply chain operates. It is then used for future projections across the supply chain.

Why This Is Important

The digital supply chain twin's primary purpose is to enable higher-quality aligned decisions for the E2E supply chain. This increase in decision quality is the essence of any supply chain maturity journey that companies embark on. Therefore, it sits at the heart of any digital supply chain initiative and is transformational.

Business Impact

Digital supply chain twin is making an impact in several ways:

- The increasing hype in digital supply chain twin is causing confusion for businesses interested in this concept.
- Impact is the resulting higher-quality decisions an organization can drive, with increased value generation and reduced value loss.
- A digital supply chain twin enables the digitization of decision making by enabling appropriate visibility, aligning and supporting automation of decisions, raising the impact of low-latency and granularity data, and providing the basis for innovation.

Drivers

- The majority of technology providers working in the supply chain visibility, control tower, command center and decision-making spaces are heavily messaging on digital supply chain twins. This is increasing the hype. Vendors in areas such as supply chain planning, supply chain analytics, supply chain visibility, big data and machine learning are marketing their interpretation of the digital supply chain twin.
- The evolution (and combination) of technologies, such as hyperscale cloud platforms, artificial intelligence and machine learning, and graph data models is helping data-derived digital supply chain twins to gradually emerge to replace previous human-derived abstract models of the E2E supply chain.
- The end-user market's desire for outcomes, such as agility, responsiveness and resiliency, through the application of E2E visibility, insight and recommendations is driving significant interest in digital supply chain twins.
- The end-user market's desire to move away from fragmented and siloed visibility and decision making to E2E visibility and horizontally and vertically aligned decision making is driving significant interest in digital supply chain twins.
- The end-user market's desire to digitally transform E2E supply chain is driving significant interest in digital supply chain twins.
- The market wants to enable E2E visibility and support E2E decision making by being in lockstep with the real-world supply chain. Through this link to the real world, situational awareness, supply chain decision making and risk management are greatly enhanced. Moreover, a digital supply chain twin provides the basis on which all existing and new predictive and prescriptive analytics can run and align, allowing their full value to be realized by the organization.
- The desire to converge execution visibility and decision making is driving significant interest in digital supply chain twins.

Obstacles

- Getting a fully evolved digital supply chain twin is not easy — it is an emerging capability. We have yet to see a fully evolved digital supply chain twin at either a technology provider or an end-user organization.
- A digital supply chain twin evolves in breadth and depth dimensions — breadth of scope of the supply chain that is being modeled, and depth of how detailed and synchronized to the real world that model is. This often leads to initiatives trying to address each dimension separately, and potentially missing the required connection between model breadth and depth that a digital supply chain twin requires.
- Enabling a fully evolved digital supply chain twin requires the ability to handle and process huge amounts of low-latency granular data from numerous internal and external data sources. These issues will take significant time to fully resolve.
- There is confusion between digital supply chain twins, control towers and command centers, which is slowing the progress.

User Recommendations

- Take an uncompromising position on reducing decision-making models across the supply chain. A digital supply chain twin initiative implies a single model of the E2E supply chain.
- Establish a roadmap for the evolution from the breadth and depth perspectives. Understand that acquiring a digital supply chain twin is a journey, and a fully evolved one cannot currently be purchased or built. Drive the breadth through the supply chain planning technology roadmap and the depth through the execution visibility/control tower/command center roadmaps.
- Merge the roadmaps for the digital supply chain twin, visibility control towers and command centers at an appropriate point along the breadth and depth spectrums.
- Examine early opportunities to add digital-supply-chain-twin-like capabilities to your landscape. This might be pairing up the new capability with supply chain visibility and/or planning solutions. Be prepared to experiment and/or go outside of your usual technology providers to get this capability.

Gartner Recommended Reading

Acquire and Mature a Digital Supply Chain Twin With a Gradual Approach

Quick Answer: Defining Control Tower, Command Center and Digital Supply Chain Twin

Artificial Intelligence

Analysis By: Noha Tohamy

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Artificial intelligence (AI) applies advanced analysis and logic-based techniques, such as machine learning, deep learning, regression analysis and prescriptive analytics, to identify and predict patterns, self-learn, and make and execute decisions. AI augments human decision making or automates routine and nonroutine tasks.

Why This Is Important

AI has the potential to transform supply chains. It significantly augments humans' ability to make decisions, by identifying patterns and making actionable recommendations.

With AI, organizations can automate decision making and execution. This is critical for dynamic supply chain processes that require analyzing large sets of data and real-time response. For example, AI can automate order promising, production scheduling and product testing. AI can support overall digital transformation.

Business Impact

Leveraging AI in decision automation allows supply chains to dynamically react to changing supply and demand patterns. AI closes the gap between planning and execution, ensuring that the factors driving decisions are still valid at execution.

AI has a profound impact on talent, freeing up staff from non-to-low value-add tasks. This allows them to pursue more fulfilling, higher value-add priorities, such as internal and external collaboration and scenario planning.

Drivers

- Continued interest in AI from supply chain leaders looking to alleviate supply chain talent shortages.
- Ability of supply chain technology providers to embed AI capabilities for identifying patterns and predicting, making and executing decisions into their existing solutions.
- More best-of-breed, AI-oriented supply chain technology vendors that position their solution as a complementary intelligence layer to augment current supply chain solutions.
- Identifying more use cases for AI within individual functions such as planning, sourcing and manufacturing.
- Interest in using AI to augment decision making with better actionable recommendations.
- A better articulated vision for automating supply chain decision making, beyond initial use cases like demand forecasting and demand sensing.
- Emphasis on supply chain agility as organizations cope with significant spikes in demand and supply variability, inflationary pressures, and continuously changing business conditions.

Obstacles

- Continued challenges with the availability and quality of data that can accurately represent a supply chain process.
- Limited data required to effectively train AI algorithms and generate accurate recommendations.
- Shortage in data science talent attracted to supply chain organizations due to organizations' technical immaturity and lack of attractive career paths.
- Lack of organizational readiness to adopt complex AI solutions and rely on them in mission-critical decisions.
- AI initiatives are mostly pilots, with few deployments — at scale — that have demonstrated technology maturity and ability to support supply chain objectives.
- Lack of transparency in AI technology, further challenging the willingness of users to trust their output.

User Recommendations

- Experiment with AI in lower-order supply chain processes such as improving data quality and data harmonization.
- Align supply chain AI strategy with overall enterprise AI strategy to leverage enterprisewide technology and talent resources.
- Beyond pilots, prioritize solution scalability and reusability when choosing AI technology vendors to support broad AI adoption.
- Focus on specific use cases where you believe AI presents the highest potential, and embark on small pilots to gauge potential benefits and challenges to success.
- Ensure the availability of data science resources, internally or from service providers, to build and maintain AI solutions.
- Focus on cultural changes to ensure that the organization is in step with the AI vision. This includes training supply chain users on incorporating AI into their decision-making process.
- Define new career opportunities for supply chain users to pursue, once their nonroutine tasks are automated with AI.

Gartner Recommended Reading

Use-Case Prism: Artificial Intelligence for Supply Chain

Top Trends in Strategic Supply Chain Technology 2023

Customer Experience Management

Analysis By: Beth Coppinger, Michael Dominy

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Customer experience management (CXM) is the discipline of understanding customers and deploying strategic plans that enable cross-functional efforts and customer-centric culture to improve satisfaction, loyalty and advocacy. Customer experience (CX) is the customer's perceptions and related feelings caused by the one-off and cumulative effect of interactions with a supplier's employees, systems, channels or products.

Why This Is Important

Leading supply chains are embedding capabilities to proactively listen and respond to changing customer needs. They are driving seamless customer interactions and commercial innovation by offering new and unique-to-the-supply-chain value to customers. Sixty-three percent of surveyed supply chain leaders indicated that improving customer experience is a critical area their supply chain is being asked to support as part of the digital business strategy over the next three to five years.

Business Impact

According to the 2021 Gartner Supply Chain Customer Expectations Survey, customers who were satisfied with their supply chain interactions were 30% to 40% more likely to repurchase from the same organization. However, enabled customers who experienced customized service and solutions such as innovative packaging or product delivery were twice as willing to repurchase from the same organization. Repurchase was 80% more likely for B2C customers and 62% more likely for B2B customers. Enablement requires the application of CX principles.

Drivers

- Elevation of supply chain as a strategic partner in the delivery of an improved CX value proposition that provides differentiation and competitive advantage through better CXM in support of growth. Supply chain CEOs site growth as the top business priority with 47% placing it in their top three mentions.
- Fewer forms of sustainable business differentiation are driving senior executives to have a greater focus on CXM as a means of differentiation. This includes assigning "Chief of CX" leaders, dedicated CXM resources (centrally and within the supply chain function) and CXM-specific investments that are pulling supply chain into wider enterprisewide CXM activities.
- Higher-profile examples of organizations associated with negative CXs that have humiliated management, damaged credibility and brand trust, all negatively influencing stock prices.

- Evolving customer expectations in B2B settings driven by increasingly convenient, personally relevant and seamless digital transactions.
- Greater customer access to information and power in the supplier-customer relationship, resulting in more customer willingness to switch suppliers and negative word of mouth (WOM) regarding the supply chain customer experience.
- More case studies and documented evidence of businesses that are delivering excellent CXs via the supply chain, achieving a positive ROI and demonstrating financial benefits as a result.
- Improved ability for technology to provide real-time insights on customer perceptions, allowing a broad portion of the organization to take CX-focused actions. Adoption of, and supply chain focus on, CX should accelerate given the consistent CEO focus on customer-centric strategies to handle the increased uncertainty caused by disruptions and the rise of digital business.

Obstacles

- Three barriers must be overcome to drive excellence in CXM: understanding customers; setting and adapting the strategic direction; and driving a customer-centric culture and governance.
- Supply chains have traditionally been internally focused on standardizing activities to increase productivity and lower cost. This leads to a focus on providing fast, efficient, transparent transactional service without fully understanding and designing for what customers really want and need. Many of these supply chains often underestimate investments required to build new capabilities to understand and respond to customer needs.
- Commercial teams do not always appreciate the impact that CX strategies and initiatives may have on the ability of supply chain to deliver.
- Supply chain struggles to break down internal functional silos to act on customer insights. It is challenging to drive an overall culture of CXM into processes and decisions further removed from day-to-day customer interactions.

User Recommendations

Supply chain contributes to the holistic CXM through design and operations:

- Invest in capabilities such as voice of the customer (VoC), personas, customer journey mapping and jobs to be done to uncover gaps and unarticulated customer supply chain needs.
- Align design strategy, operating model, measures, culture, products and service options to address customer needs/preferences and create competitive advantage.
- Establish a CX lead position in the supply chain to provide oversight and direction on CX objectives.
- Elevate measures of CXM (such as quality, reliability, customer satisfaction score [CSAT], service level, customer effort) as key KPIs.

Supply chain actions often in support of a companywide CXM initiative include:

- Supply chain membership on the CXM steering committee
- Action insight from corporate VoC programs to create a feedback loop
- Providing differentiated (segmented) customer service
- Creating collaborative customer relationships in B2B that enable customer-led goals

Gartner Recommended Reading

Supply Chain Executive Report: The Future of Supply Chain 2023

Leverage Customer Enablement to Drive Commercial Growth

Overcome 3 Key Barriers to Improve Supply Chain Customer Experience

The Gartner Customer Experience Management Maturity Model for Supply Chain Leaders

Answers to Key Questions for Establishing a CX Program in Supply Chain

Supply Chain as a Service

Analysis By: Michael Dominy

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Supply chain as a service (SCaaS) is the ongoing management of one or more supply chain functions for other enterprises. SCaaS is a revenue-generating, digitally enabled service that taps into the business process or operational capabilities of an enterprise.

Why This Is Important

SCaaS is an opportunity to directly grow revenue by using existing or new capabilities to perform a supply chain activity for another company. There are two primary types of SCaaS: Operations as a service, which involves contracting out physical operations. Business process as a service which involves performing a nonphysical operational activity for another enterprise.

Business Impact

- Increased revenue for manufacturers, retailers, distributors or healthcare providers with factories, private fleets, warehouses, stores or other leverageable physical assets with operational capacity or business process capabilities to deliver physical or digital SCaaS to organizations.
- Reduced cost by better utilization of supply chain assets from physical assets such as warehouses and trucks to business process and technology assets such as supply chain planning.
- Expanded relationships with existing customers by offering additional services.

Drivers

- **Capabilities and capacity.** Operational capability, capacity or availability of supply chain business and technology expertise present opportunities for organizations with advanced supply chain capabilities to directly deliver revenue to their organizations by monetizing their supply chain through services provided to other enterprises.
- **Cloud platforms and applications.** Cost-effective availability of cloud computing infrastructure services, multitenant SaaS applications, open-source software and analytics tools have enabled service providers and some enterprises to create, launch and sustain supply chain business process services.
- **Connected and intelligent things.** Lower technology costs and increased connectivity with products changes what the supply chain function must do. In the past, the supply chain managed products. Today, intelligent connected things are starting to manage the supply chain, essentially turning the supply chain organization into a service provider for the physical object. For example, a piece of equipment or appliance that is tracking inventory or activity on its own can order replacement inventory or create a service order.

Obstacles

- **Identifying and selling physical operational SCaaS.** Most buyer and provider matchmaking in physical operations has been between companies and providers versus company to company.
- **Onboarding SCaaS customers.** Whether it is physical operations as a service or business process services, integrating systems and defining roles, responsibilities and required activities are complex and time-consuming.
- **Differing commercial arrangements.** Instead of an order-to-cash process, with invoicing and collections triggered by a shipment, a contract with service agreements governs payments.
- **Transforming talent**. SCaaS requires new ways of working. Supply chain professionals must switch from an internal orientation to an external client mindset. Not all individuals are comfortable and skilled to do so. Because all SCaaS involve digital skills, individuals in the supply chain organization will need to develop or expand digital competencies.

User Recommendations

Enterprises such as retailers or manufacturers contemplating offering SCaaS should:

- Determine physical asset SCaaS opportunities by analyzing capex and capacity forecasts.
- Evaluate which processes can technically support multitenancy and scalability requirements by reviewing IT architecture.
- Assess competitiveness by benchmarking an offering against existing providers including 3PLs, contract manufacturers and BPO providers.
- Create customer journey maps by documenting physical and digital flows from customers back through the supply chain.

Enterprises considering contracting for SCaaS should:

- Target lower-performing supply chain activities by using maturity assessment and benchmarking.
- Audit and monitor areas of higher risk, such as global trade management, by asking how systems such as denied-party lists are updated.
- Assess SCaaS for specialized purposes, such as network design or inventory optimization, by assessing skills of those in the supply chain organization.

Sample Vendors

Amazon; Arrow Electronics; Avnet; Cardinal Health; Lenovo; Mayo Clinic; Primary Connect; Quiet Platforms; Target

Gartner Recommended Reading

Take Four Steps to Develop Your Supply-Chain-as-a-Service Strategy

Operationalize and Scale SCaaS Through Multienterprise Organization, Governance and Talent Capabilities

Supply Chain as a Service Converges Physical and Digital Supply Chain to Deliver Revenue

Market Guide for Supply Chain Strategy, Planning and Operations Consulting

Supply Chain Cybersecurity

Analysis By: Brian Schultz

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Supply chain cybersecurity is a holistic and integrated approach to protecting the supply chain from operational outages, malware, ransomware, implants or other similar threats. This approach aims to protect data, IT infrastructure and cyber-physical systems used in the supply chain, as well as the products that a company manufactures and delivers. It looks internally across the organization, as well as across the third parties that make up the supply chain partner ecosystem.

Why This Is Important

Cyberattacks continue to present an ongoing, ever-evolving threat to businesses across all sectors. In 2023 we saw ransomware continue to be the most highly utilized and effective attack vector. Cyberattacks continue to have real business impacts to supply chain operations, revenue and profit. Supply chain leaders need to understand the extent of their supply chain attack surface and build a more cyber resilient supply chain.

Business Impact

Cyberattacks have brought entire supply chains to a standstill impacting operations. These attacks have resulted in significant damage to revenue, profit, reputation, brand, loss or theft of intellectual property, product safety and integrity, and substantial fines and fees.

Drivers

- Increasing automation and digitization of supply chains leads to an increased cyberattack surface.
- The increasing number of supply chain partners increases the cyberattack surface.
- Geopolitical tensions and global trade wars are increasing the likelihood and impact of cyberattacks.
- The high costs associated with operational shutdowns.
- Media visibility and awareness of cyberattacks and business impacts.
- Other roles in the supply chain becoming more aware of the threats in addition to CSCO, especially procurement, manufacturing and logistics.
- Ransomware as a service, which has made ransomware attacks more common as the technical barriers for deployment are lower. According to the 2022 Verizon Data Breach Investigations Report, "ransomware attacks surged dramatically in 2022; ransomware was involved in 25% of all breaches." The Cybersecurity and Infrastructure Security Agency reported in February 2022 that it is aware of ransomware incidents against 14 of the 16 U.S. critical infrastructure sectors.

Obstacles

- The breadth of data and technology in need of protection within the internal supply chain and wider ecosystem.
- Lack of clarity associated with ownership and budget for management of cybersecurity risks. The pace of threat expansion makes it harder for supply chain and IT teams to keep up with the protection of systems, products and third-party deliverables.
- Lack of supply chain talent that is knowledgeable in cybersecurity.
- Fragmentation of the security tools and solutions currently available.
- Volume of upstream, downstream and IT partners that present potential third-party cyber risk to the supply chain.

User Recommendations

- Partner with CIOs and IT security and risk management leaders to develop a governance model for identifying, assessing and addressing the various cyberthreats to the supply chain.
- Assess the cyber talent needed and the required skill set for the supply chain organization.
- Map the flow of high-value supply chain data and assets across systems outside their core IT systems, including equipment in manufacturing operations or logistics networks as well as software and hardware components within products. Assess their risk and security posture.
- Conduct penetration testing exercises on your supply chain operations.
- Define security specifications with high-value supply chain partners, then pass on the specifications to supply chain partners through contract addendums.
- Implement supply chain partner assessments and continuous monitoring to identify and prioritize potential failure points and benchmark progress over time.

Gartner Recommended Reading

Supply Chain Executive Report: Combating Enterprise and Ecosystem Cybersecurity Threats

Top Trends in Strategic Supply Chain Technology 2023

Thrive in Uncertain Times by Formalizing Risk Appetite and Connecting Business and Procurement Strategies

Identify and Assess Supply Chain Risks to Improve Your Capabilities to Respond

Voice of the Customer for IT Vendor Risk Management Solutions

Hybrid Work

Analysis By: Dana Stiffler

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

Hybrid work describes a working model where employees are expected to attend the office at least one day per week while being permitted to work from a location other than the office some of the time. Hybrid work models vary, i.e., offering employees the individual choice or orchestration or schedule of days in the office. Hybrid work can sometimes refer to space, as in "hybrid workplace," which describes an office that is able to support interactions that include in-person and remote employees.

Why This Is Important

Hybrid work is positively correlated with better business performance and talent outcomes when it is inclusive of individual and team preferences rather than one size fits all. Employers that offer workplace flexibility enjoy a career brand premium over employers that don't, achieving better attraction and retention outcomes. Now, site-centric supply chain organizations have also understood the benefits of hybrid work, and 96% of HR leaders say that they already have/will implement hybrid work.

Business Impact

Flexible hybrid, defined as a mix of on-site and remote but "offered the flexibility to choose where I work from," results in a:

- 1.6x greater likelihood of high intent to stay,
- 1.3x greater likelihood of high performance, and
- 1.8x greater likelihood of low fatigue.

According to Gartner's 2022 Digital Worker Survey, 71% of employees currently working in a combination of locations were more productive over the last 12 months versus 42% who worked mostly at home and 47% who worked mostly in the office.

Drivers

- The current hypercompetition for talent grants employees more bargaining power. The ability to work hybrid or remotely factors into their decisions to stay at their current jobs or look for new opportunities.
- Location is the No. 2 employee value proposition driver of attraction across all industries (after compensation).
- Fifty-two percent of employees said the ability to work flexibly would affect whether they decided to stay at their organizations.
- Significant numbers of employees said they were willing to quit their jobs over a variety of hybrid work-related issues, such as being required to work on-site or having to take a pay cut to work remotely.
- The focus on hybrid work by both proponents and detractors has resulted in many organizations' strategies pushing slightly past the Peak of Inflated Expectations. They have moved to a place where they feel the consequences of no or poor hybrid work design — disengagement, burnout, attrition and lack of compliance.

Obstacles

- Many leaders still feel nostalgia for opportunistic interactions such as those that occur at a water cooler and equate physical presence with effectiveness, and this presents major obstacles to acceptance of hybrid work. Organizations risk the failure of their senior leaders, managers and work structures to keep pace with employees' changing expectations for flexibility.
- One top-down obstacle supply chain leaders cite is enterprisewide steps to get "back to normal" in the second half of 2022 and early 2023, reopening offices and encouraging — or even requiring — employees to work on-site some or all of the time. An extreme version of this, a so-called "hard return" to the office full time, puts up to 39% of your workforce at risk of attrition.
- Most organizations lack applications that will help employees and managers plan the best day to visit, navigate workplaces to find services and amenities, and find colleagues outside of inviting folks to meetings in the office.

User Recommendations

- Shift from a location-centric to a human-centric work design — flexible experiences, intentional collaboration and empathy-based management — to drive performance by resetting expectations around how, where and when we work.
- Shape work initiatives in six areas through experimentation, learning and iterating to position the organization for digital era success. These six areas are human-centric work design, rethinking the workplace, reshaping the culture, managing in a hybrid world, digital enablement, and shifting talent and skills.
- Invest in workplace experience applications to support the planning and orchestration of hybrid work and deliver a hospitality-like experience in the office (see Market Guide for Workplace Experience Applications).
- Shed industrial-era beliefs about work that constrain digital-era success by listening for outdated assumptions from your peers as well as yourself, then countering them with new data-driven insights and work design thinking.

Gartner Recommended Reading

Hybrid Work Data Overview 4Q22

Case Study: Reset Hybrid Collaboration Habits (Dropbox)

3 Ways to Help Managers Overcome Hybrid Team Challenges

Supply Chain Resilience

Analysis By: Ronak Gohel

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Supply chain resilience is the ability to withstand and recover from disruption. Resilience enables the supply chain to profitably meet demand with supply despite disruption.

Why This Is Important

Unprecedented levels of disruption in global supply chains challenge the supply chain's ability to identify, assess, mitigate and respond to each discrete risk. Instead, resilience as a strategy promises to improve the supply chain's blanket ability to withstand and recover from any disruption. It focuses on mitigating the impact any number of risks will have on the supply chain and therefore promises to offer an easier, more efficient approach.

Business Impact

Given the high frequency and interconnected nature of risks, resilience is seen as a primary goal of supply chains, with approaches such as holding inventory and alternative suppliers often pursued. While this approach inevitably increases upfront costs, it can reduce costs associated with materialized risks. Supply chains are however finding this approach too expensive and in some cases either unobtainable or unsustainable.

Drivers

- Companies are reassessing their heavy weighting toward short-term and fragile cost-efficiency strategies with the frequency and impact of risk events increasing. The severity and interconnected nature of these materialized risks have been, to date, ineffectively predicted within supply chains. When disruptions occurred, expensive workarounds were required to attempt to maintain continuity of service. This approach is no longer viewed as an effective, proactive strategy.
- Given that, a resilience solution that is risk agnostic appears the most reasonable. In today's volatile environment, it is not possible to identify, assess and mitigate all risks across a global supply chain. As it is likely that further untested and interconnected risks will materialize in the coming years, resilience as a solution is identified by supply chains as having the ability to withstand and respond to all disruptions.

Obstacles

- Differing and often conflicting views within the supply chain and at a wider organizational level on the meaning and focus of resilience leading to an inability to target investments and an inability to demonstrate return on investment.
- Difficulty in attaining the required level of resilience in supply constrained markets, particularly when suppliers are prioritizing customers of choice using scarce resources.
- Maintenance of resilience, for example, buffer stock can be expensive and has a direct impact on organizational financial reporting statements. Cash-rich organizations are much better placed to invest in resilience than their weaker counterparts.
- Difficulty in synchronizing resilience as a risk management approach with activities to improve visibility and agility. While all aim to help manage supply chain risk, if executed separately they introduce complexities impeding the ability to withstand and respond to disruption.

User Recommendations

- Engage supply chain stakeholders to ensure a consistent definition of, and metrics for resilience are used and understood throughout the organization.
- Partner with organizational teams adjacent to the supply chain including commercial and marketing to factor in the cost of long-term resilience to maintain continuity of supply to customers.
- Invest in people, processes and technologies to be executed swiftly should a disruption emerge and periodically review their effectiveness.
- Enhance visibility to the ecosystem and invest in redundancies to mitigate identified risks within the supply chain. This could include macro risks, for example, geopolitical, environmental and operational such as single and sole sources, and other bottlenecks.

Gartner Recommended Reading

Creating a Supply Chain Resilience Framework

Shaping Disruption: A New Strategy for Supply Chain Risk Management

Tool: Disruption Loss Calculator

Global vs. Regional Supply Chains — Identifying the Right Approach for Your Network

Infographic: Supply Chain Visibility Is Fundamental to Resilience in Supply Ecosystems

Sliding into the Trough

Supply Chain Blockchain

Analysis By: Leonard Ammerer, Dwight Klappich

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Supply chain blockchain is an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a predefined network. Each record contains a time stamp and reference links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant. A blockchain is one architectural design of the broader concept of distributed ledgers.

Why This Is Important

Supply chain blockchain use cases continue to emerge tied to physical goods movements, contractual service requirements, traceability and authentication, as well as capturing immutable records of transactions. However, there are few, if any, supply chain blockchain projects being deployed at scale. Interest in potential applications across supply chains remains stable, with some vendor offerings being enhanced by blockchain technology.

Business Impact

Value perception of blockchain in supply chains has shifted year over year. Before 2020, there was much interest, discovery and hype around potential solutions. Since 2020, interest slowed down with a revised value perception. Still, with blockchains' more agile role as a service to a broader portfolio of applications, its role in shaping digitized workspace and its ability to ratify contractual requirements in B2B or B2C transactions, blockchain continues to remain on the radar.

Drivers

- Though the potential of blockchain technologies is high, a significant difference exists in the execution of blockchain applications for supply chain compared to its origins in financial services use cases (for example, fintech). This is especially in areas that require readiness for collaboration and the digital exchanges of data between supply chain participants.
- Recent trends and shifts have seen blockchain being offered more as a service component to complement existing technology deployments supporting functional or high-risk initiatives. It is also being considered in network planning in areas such as responsible sourcing, sustainability, data mobilization, security and digitalization.
- Presently, initiatives continue to be a mix of vendor-led, stakeholder-, industry- and consortium-driven discussions. Multiple business use cases for blockchain across supply chains are yet to be proven. As supply chains become more mature and digital, the opportunity to cover niche requirements with blockchain technology increases.
- In contrast to early trials and pilots across extended pools of supply chain participants, solution adoption is anticipated to see acceleration in compact ecosystems of stakeholders (or even focused on single B2B or B2C transactions). This acceleration will happen especially in supply chain zones with heavy transaction and processing load such as logistics, supply and transportation. Smaller, compact ecosystem partners allow greater cadence to formalize governance, shared-value creation opportunities and lockdown rules of engagement that would constitute a block (immutable record) or groups of connected blocks — the “blockchain.”

Obstacles

- Blockchain technologies must adapt to use cases that can empower maturity to bridge physical levels of authentication and data capture, and to the needs for interoperable digital data exchange across all types and tiers of responsible trading partners within a company’s ecosystem.
- Blockchain in the supply chain suffers from a lack of cultural and maturity factors impacting modern supply chain networks. These factors include standards for governance across transactions, scalable distributed consensus systems and technical expertise enhancing the strategic positioning or placement across formalized technology planning and process roadmaps.

- The technology's potential to radically transform economic-related interactions should raise critical questions for society, governments and enterprises. Finding answers to the critical questions will be a prerequisite for the contribution of blockchain technology during the rise of programmable economy and more mobilized work environments. Although, at present, there are no clear answers to these questions, it is important to find the answers during the rise of the programmable economy and more mobilized work environments.

User Recommendations

- Identify how the term "supply chain blockchain" is being used and applied internally and by providers to better understand the possible return on capital employed, and the incremental value that could be realized beyond proven technology options.
- Identify high-risk or process-intensive areas of supply chains that exhibit transactional complexity across multiple stakeholders. The following are prime candidates for blockchain: trade contracts, automation, asset management, transportation and traceability.
- Shift to a broader and more thorough review of other viable technology options for consideration against objectives. Place more emphasis on blockchain services or its complementary role as part of a strategic positioning in roadmaps, but remain skeptical on value contribution and alert to limitations of the technology.

Sample Vendors

Arc-net; CHAINSTEP; Chronicled; Circulor; Guardtime; IBM; Omnichain; OriginTrail; SupplyBloc; Vechain

Gartner Recommended Reading

How to Detect Fakes in a Zero-Trust World Using Artificial Intelligence and Blockchain

Top Trends in Strategic Supply Chain Technology 2023

Truth and Transparency in Supply Chain: 3 Case Studies on How Blockchain, AI and IoT Are Shedding Light

Garbage In, Garbage Forever: Top 5 Blockchain Security Threats

Quick Answer: How Can I Assess Whether Blockchain Ensures Sufficient Trust in Supply Chain Traceability to Justify Investment?

Diversity, Equity and Inclusion

Analysis By: Dana Stiffler

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Diversity, equity and inclusion (DEI) is a combination of activities and outcomes associated with better business performance, the ability to attract and retain talent, and a growing matter of equity and fairness important to investors and customers in addition to employees. When all individuals are treated fairly and respectfully, and have equal access to opportunities and resources, they are able to contribute fully to the organization's success.

Why This Is Important

Diverse, inclusive and equitable organizations and teams are positively correlated with superior business outcomes, including innovation, resilience and profitability. They're correlated with improvements in human capital indicators as well — for example, the time to fill an open position, employee engagement, discretionary effort and intent to stay. Supply chain university graduates of all backgrounds reported that they want to work for diverse, inclusive organizations, per the 2021 Gartner People and Purpose-Centric Supply Chain Survey.

Business Impact

- Gartner research shows that diverse organizations see a 12% increase in employee discretionary effort.
- Significantly more employees are engaged and are high performing in organizations where the culture promotes not only diversity, but also inclusion and belonging, according to the 2023 Gartner Drivers of Global Belonging and Inclusive Culture survey.

Drivers

- It's becoming increasingly clear that less diverse, equitable and inclusive organizations will lose valuable talent, customers and investors. The 2022 Gartner/ASCM Supply Chain DEI Survey showed the strongest intent yet among CSCOs to formally support diversity, equity and inclusion, with three out of four supply chain organizations considering gender and ethnicity/race in their DEI strategies and objectives.
- Advancements in AI are transforming how organizations operate, specifically using these technologies can improve employee engagement and root out biases in talent processes and practices.
- Laws are changing as society at large pays more attention to DEI. The pandemic has compelled employers to reassess their employee value proposition (EVP) while factoring in the unique needs and desires of diverse talent segments. One example is balancing work and life outside of work, particularly for women.
- Pandemic-honed employee preferences and sustained labor shortages are forcing companies to move away from traditional assumptions about flexibility that require employees to separate their work life from personal life. Instead, leading employers are exploring flexible and accommodating work arrangements that embrace all aspects of an employee's life.

Obstacles

- Current and prospective employees, investors and customers want to see action in the form of real investment: budget, resources and internal changes. They also want transparency regarding how the organization arrived at the chosen actions and its progress against those actions. Without sustained action and transparency, leaders run the risk of disengaging employees and tarnishing the supply chain career and leadership brand.
- Although DEI has gained traction in supply chain organizations in recent years, it continues to be politicized.
- Legal policies regularly change and influence how DEI initiatives are perceived and how companies approach the recruitment and support of underrepresented talent.
- Hybrid work has disproportionately affected underrepresented talent (URT). For example, URT has seen a rise in incivility and is also more isolated from growth opportunities (see Address Disparities to Advance Racially Underrepresented Talent in a Hybrid Work Environment).
- While turnover is high among all employees, URTs are leaving their organizations at even higher rates.
- Inflation is eclipsing small gains in pay equity efforts.
- New HR technologies often have unintended embedded biases. For example, data used to train generative AI may be drawn from sources including Reddit, Wikipedia and Twitter, which could propagate inherent biases and potentially toxic content into job description creation, recruiting, learning and onboarding content, HR policies, performance reviews and coaching recommendations, and “humanlike” HR chatbots.

User Recommendations

- Prioritize DEI as a supply chain and business imperative by setting goals and objectives, and aligning specific projects and initiatives to achieve them.
- Choose recruiting, inclusive leadership development and integrated pipeline planning initiatives that show superior DEI results.
- Ensure that senior leaders of the majority demographic are co-leading and facilitating initiatives that target processes where decisions are made. Ensure URT are brought into decision-making opportunities aimed at addressing systemic inequities, but beware of overburdening them by assigning them the job of improving your organization's DEI profile.
- Do not communicate DEI as a supply chain priority internally or externally unless you are prepared to deliver transparency and progress. There are serious product, investor and employment brand reputation penalties for leaders who overpromise and underdeliver.
- Leverage technology to detect and mitigate biases across the employee life cycle.

Gartner Recommended Reading

2023 Women in Supply Chain Survey: Women Represented at Historic Levels

2022 Gartner/ASCM Supply Chain DEI Survey Shows Importance of Leadership, Transparency, Accountability

Ignition Guide to Developing a Diversity Recruitment Strategy for Supply Chain

Engage and Retain Underrepresented Talent by Addressing Top Attrition Drivers

Product-as-a-Service Supply Chains

Analysis By: Michael Dominy

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Product-as-a-service supply chains are integrated and coordinated forward, reverse and service supply chains that enable subscription, consumption or outcome-based business models. They are digitally enabled through a range of technologies from unified commerce applications for basic subscription offerings to IoT-connected products with embedded software and predictive analytics to support usage or outcome business models.

Why This Is Important

Product-as-a-service supply chains provide increased value to the business by enabling a differentiated customer value proposition, opportunities for premium pricing, recurring revenue and deeper customer relationships. Customers expect companies to offer their products or solutions that address their needs in commercial arrangements that extend beyond buying and owning a product. Supply chains must be designed and optimized to deliver such offerings to ensure new business models are profitable.

Business Impact

Supply chains that enable products as a service offerings can help improve revenue and sustainability by:

- Serving customers or market segments that are unable or unwilling to buy in a commercial arrangement where ownership of the product transfers to the customer.
- Managing products through more of the product life cycle and applying circular economy principles.

Drivers

- Increasing percentage of revenue driven by as-a-service business models. According to the 2022 Gartner Digital Business Impact on the Supply Chain Survey, companies that have implemented a digital business model, report that 66% of revenue is being driven by existing products and services enabled by digital or by digital offerings including as-a-service, up from 59% in 2019.
- Digital business models, such as subscription- or usage-based-as-a-service business models force a blurring or blending of what was historically the forward or delivery supply chain with the service and support supply chain. The supply chain organization must monitor the location, performance and needs of the product or asset after it has been delivered or installed. Service must be orchestrated from a physical supply perspective for items such as parts, but also from a digital perspective for needs like software patches and upgrades.
- Increased availability of enabling technologies including product connection technologies (i.e., IoT) and cloud technologies (infrastructure services, platform services and software-as-a-service) reduce the barriers to entry.
- Sustainability strategies, goals and objectives in response to customer demands and pressure from investors.
- Commoditization of physical products in industries such as electronics and industrial equipment requires companies to expand and differentiate their offerings. Product-as-a-service offers competitive action against low-cost competitors, new entrants or other innovators.

Obstacles

- Lack of maturity: New relationship dynamics, collaboration approaches and partnerships inside and outside the company require high maturity levels.
- Scaling challenges: Most supply chains already support multiple business models, but digitally enabled value propositions increase complexity. Due to late involvement in business innovation, supply chains miss opportunities to align processes, resulting in an inability to scale efficiently.
- Lack of cost transparency: Data, software and digital service over the lifetime of the service are part of the value proposition rather than just operational support. This complicates an understanding of the cost to serve, making profitability in solution-oriented business models difficult.
- Decision-making challenges: Across the life cycle of a solution, coordinating decisions within and across companies is the top challenge cited by those fulfilling solutions.

User Recommendations

- View a transformation to a product-as-a-service model similar to large-scale change management initiatives. Chief supply chain officers (CSCOs) must act as catalysts in the transformation by demonstrating how the supply network drives efficiency, value and competitive advantage.
- Promote supply chain expertise in value stream mapping, network optimization, sales and operations planning, and advanced analytics.
- Leverage upstream and downstream ecosystem linkages to provide required technologies, innovations or services to connect resources, orchestrate activities, synchronize information, monetize assets and align processes around offerings.
- Utilize dedicated roles and technology to speed the adoption of offerings.
- Use a partially modular operating model to allow composability of who completes processes and how and where they do it.
- Segment the supply chain operating model to support multiple business models, including as-a-service models.

Gartner Recommended Reading

4 Competencies Required for Supply Chain to Support Digitalized Products

Infographic: The Evolving Impacts of Digital Business on Supply Chain

Now Is the Time to Deliver IoT-Enabled Product Servitization to Manufacturers

Top 3 Digital Business Execution Challenges in the Manufacturing Supply Chain CIOs Must Resolve

Supply Chain Cost Optimization

Analysis By: Paul Lord

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Supply chain cost optimization is a comprehensive approach for designing and operating complex networks to efficiently fulfill customer demand. The methodology centers on stakeholder alignment with performance requirements for reliable product supply and effective service delivery. Success requires advanced organizational maturity and decision support capabilities to enable aligned design choices, profitable supply and demand balancing, and performance management for continuous improvement.

Why This Is Important

Traditional cost control focuses on reducing individual budgets while overlooking interactions and the impact to profitable growth. Supply chain leaders must create organizational alignment around network design choices, capability investments and constrained operating decisions to position inventory for value in support of reliable, optimized product supply and effective service delivery.

Business Impact

Successful adoption of cost optimization principles and capabilities can increase free cash flow by 5% to 10% of revenue annually beyond conventional approaches to functional cost management. Primary impacts can include reductions of 5% to 15% in logistics spend and 5% to 15% of inventory. Planning that synchronizes raw material sourcing with product supply can contribute an additional 2% to 5% benefit to the cost of goods sold.

Drivers

- Shareholder expectations for return on investment and continuous improvement of profitability.
- Slowing of revenue related to economic headwinds and underperforming revenue growth strategies put pressure on the supply chain to deliver improved operating efficiencies.
- Increased cost of materials, labor, energy or services (driven by inflation or market imbalances) that can't be recovered through pricing changes.
- Compressed margins due to increased competition that exert downward pressure on product and service prices.

Obstacles

- Business complexity resulting from product and service customization in pursuit of growth.
- Underdevelopment of constrained modeling capability to create feasible, optimized supply plans that control inventory risk.
- Governance challenges aligning independent sourcing and manufacturing functions to balance supply and demand for profitable growth.
- Challenges aligning with business stakeholders on realistic performance expectations in light of mismatches between network capability and business model strategies
- Conventional performance management practices that focus on siloed reduction while overlooking interdependencies and the need to reliably fulfill demand.
- Cost is not a unifying theme for nonfinancial stakeholders. Recent insights have exposed the need for more complex balancing between cash, margin, growth and risk.
- Recent softening of demand has generated more attention to inventory reduction that has distracted to impede progress on capability development.

User Recommendations

- Align with commercial stakeholders on performance requirements for market competitiveness.
- Realign supply and distribution networks periodically to ensure alignment to demand with sufficient agility and resilience.
- Construct and manage supplier portfolios for materials and services that enable desired performance of the supply network.
- Control inventory levels by balancing supply while fulfilling demand through S&OP governance, followed by transparent performance variance analysis to drive learning and improvement.
- Improve the agility and precision of operating decisions by developing technology-enabled network planning capabilities.
- Invest in digital operating capabilities that provide efficiency dividends while delivering improved scalability, quality and responsiveness.
- Realign and apply the approaches and capabilities for supply chain cost optimization toward more strategically aligned balancing of cash, margin, risk and growth.

Gartner Recommended Reading

Focus on Operating Outcomes, Not Reduction Targets, to Optimize Supply Chain Cost

Research Roundup for Strategic Optimization of Supply Chain Cost and Cash Performance

Toolkit: Playbook for Cost-Optimized Supply Chain Performance

Network Diagnostics and Planning Excellence Are at the Heart of Supply Chain Cost Optimization

Pursue Postponement for Risk-Optimized Supply of Customized Products

Machine Learning

Analysis By: Noha Tohamy

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Machine learning (ML) is an AI discipline that solves business problems by utilizing statistical models to extract knowledge and patterns from data. There are three major approaches that relate to the types of observation provided. These are supervised learning, where observations contain input/output pairs (also known as “labeled data”); unsupervised learning (where labels are omitted); and reinforcement learning (where evaluations are given of how good or bad a situation is).

Why This Is Important

ML can identify patterns, generate insights and predict future outcomes from massive amounts of text, video, image and sound data. This enables many supply chain decisions that were previously based on rudimentary manual analysis or traditional analytics techniques. In this way, ML can improve overall productivity, freeing up human resources to focus on higher-value tasks. ML needs are pervasive across supply chain functions, from planning to sourcing and transportation.

Business Impact

ML algorithms identify undetected patterns with fewer preconceived user assumptions or relation definition. They rely on data to identify patterns to generate insights and predict trends. These insights improve over time, as algorithms self-learn from prior performance. ML can be embedded in a number of supply chain processes, such as predictive maintenance, risk management or demand forecasting.

Drivers

- Interest in ML is driven by the surge in data — structured and unstructured, internal and external — and supply chain complexity, making traditional analytics techniques and manual analysis inadequate. With ML, supply chain organizations can take advantage of available data and rely on the algorithms to identify patterns and correlations, and predict outcomes to find the best course of action.
- Adoption of ML is driven by organizations' vision for an autonomous supply chain. Since ML is a prerequisite technique in AI, companies look to ML to further refine recommendations and continuously self-learn from previous performance.
- This past year, ML progressed along the curve, as organizations looked to respond and recover from conditions precipitated by the COVID-19 pandemic. With ML, they were able to leverage dynamic data from across the supply chain and business networks, consider external factors to predict future demand and supply trends, and plan resources and capacity to meet customer service requirements.

Obstacles

- Lack of good quality, available and representative, or unbiased data can deteriorate ML algorithms' output and recommendations.
- Lack of user trust in the logic and workings of complex models can limit adoption and take away from potential success.
- Lack of ongoing maintenance of ML models can render them obsolete, generating inaccurate insights and predictions.
- Inability to industrialize ML pilots can prevent organizations from demonstrating return on investment, further challenging broader adoption.
- Confusion over technology options and fragmentation of the market challenges organizations' ability to choose the best ML-enabled solution to support specific needs and best fit with their existing technology footprint.
- Lack of integration of ML insights in business process dissipates the ML-generated business improvements, which, in turn, makes it challenging to continue to secure funding and support for ML initiatives.

User Recommendations

- Gauge ML's incremental benefits, compared with more traditional techniques, such as time series analysis.
- Quantify the technical resources required to develop and deploy ML models. This includes data engineers and scientists to acquire and analyze data, and build and train ML models.
- Dedicate analytics coaches to train supply chain users on using ML output to augment and improve their decision-making process.
- Ensure the availability and readiness of the data that will be used by ML algorithms. Given that ML relies on training datasets to identify patterns and relationships, good contextual, representative data is paramount to the success of these techniques.
- Vet technology providers' claims to offer ML capabilities in their solutions. Due to the high level of interest in ML capabilities, vendors' marketing positions might sometimes outpace current capabilities.

Sustainable Supply Chain

Analysis By: Lindsay Azim, Anne Michelle Avolio

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

Sustainable supply chain is the integration of sustainability principles into how organizations plan, source, make, and deliver goods and services. A sustainable supply chain factors environmental and social impact into strategy development and execution to maximize operational efficiencies, resiliency, and customer satisfaction.

Why This Is Important

In the 2022 Gartner Sustainability Opportunities, Risks and Technologies Survey, 87% of surveyed leaders indicated that their organizations plan to increase their sustainability investments over the next two years. Supply chains represent a significant portion of an organization's environmental impact and social risk. Global legislation and increasing pressure from key stakeholders will require greater transparency and supply chain due diligence.

Business Impact

A sustainable supply chain looks beyond cost, quality and service to increase resiliency, improve labor conditions, reduce environmental impact, and better utilize resources. Nearly three in five leaders in organizations with supply chains reported that their sustainability programs helped to mitigate cost increases associated with supply-chain-related energy consumption. Organizations can go beyond reputational benefits and identify growth opportunities in sustainable products and new business models.

Drivers

- Regulatory environment: Current and proposed legislation is shifting in favor of more sustainable business models. To hit global targets, policymakers are putting in place incentives, taxation, penalties and new market mechanisms. For example, the U.S. Inflation Reduction Act provides a number of incentives for accelerating investment in renewable energy generation.
- Customer expectations: Sustainability is a key requirement for customer retention as concerns about enterprises' transparency on environmental and social impact increase. Many customers are seeking products that align with their priorities and values.
- Supply chain resilience: The unprecedented level of disruption in global supply chains, material availability, and price inflation is changing existing notions of supply chain resiliency. Nearly nine in 10 surveyed leaders agreed that sustainability is an investment that protects their organization from disruption.
- Cost optimization: With tightening economic conditions, CSCOs are pressured to reduce costs and drive resource efficiency through supply chain operations. Sustainability provides a framework for cost savings identification, including initiatives in packaging, sourcing and waste reduction.
- Human rights due diligence: Increasing due diligence regulation requires enterprises to have more visibility into supply chain partners and to cascade labor practices upstream.
- Sustainability goals: Organizations are increasingly setting targets to reduce Scope 3 emissions, with more than 90% of greenhouse gas emissions occurring in the upstream supply chain (see Transparency to Transformation: A Chain Reaction, CDP). Meeting reduction targets requires engagement and collaboration with key suppliers and value chain partners.

Obstacles

- Resources: Limited staff and lack of internal capabilities are barriers to achieving supply chain sustainability goals. In the 2022 Gartner Culture of Sustainability Survey, 52% of supply chain leaders state that employees do not have the right capabilities and skills for sustainability.
- Bolt-on strategy: Insufficient strategy integration leads to fragmented initiatives and leaves employees confused about what their role is in achieving supply chain sustainability goals. Only 28% of supply chain leaders say sustainability goals are embedded into their team's daily workflow.
- Limited collaboration: Sustainable supply chains require many partnerships — from suppliers to regulators and community groups. Key barriers hinder success, including supplier maturity, trust and wariness of data sharing, and lack of ecosystem-level technology and infrastructure.
- Data/Digital tools: Data gathering and comparability remain challenging due to the lack of standardization and the lack of maturity in the vendor space. Visibility into supply chain data is particularly challenging for upstream suppliers.

User Recommendations

- Create a governance framework that enables supply chain business units to set corporate-aligned sustainability goals, targets, KPIs and metrics. Tie sustainability metrics to employee performance, and monitor and report on them consistently.
- Use risk management processes and scenario modeling to define and assess environmental and social risks across the value chain.
- Build in risk considerations to capital investment strategy and product development to avoid stranded assets and to meet evolving customer needs.
- Engage suppliers throughout the supplier life cycle by including sustainability criteria in procurement processes. Monitor and track supplier sustainability performance consistently.
- Leverage industry/cross-industry coalitions and collaborate with ecosystem partners to jointly create and scale sustainability outcomes.

Advanced Analytics

Analysis By: Noha Tohamy

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Advanced analytics are techniques that examine data to predict what is likely to happen and prescribe what action to take to achieve objectives. Advanced analytics span techniques such as regression analysis, multivariate statistics, simulation, business rules and optimization modeling.

Why This Is Important

Advanced analytics span predictive and prescriptive, enabling organizations to predict future scenarios and proactively determine the best action. This allows organizations to move beyond reactive, rearview mirror performance analysis.

Predictive analytics are prevalent in use cases like demand forecasting, predicting supplier lead times and risk monitoring. Prescriptive analytics can be leveraged in inventory management, route planning and asset utilization.

Business Impact

Predictive analytics improve organizations' ability to anticipate further conditions. Prescriptive analytics help organizations understand and execute the best decisions to achieve their objectives.

Anticipating and planning for future events can significantly improve the organization's ability to take advantage of business opportunities, better meet customer expectations and avoid disruption.

Drivers

- Supply chain organizations that have heavily relied on human domain experience are now looking to rely on data and analytics to understand trends and anticipate future environments and to make data-driven decisions.
- Advanced analytics have traditionally targeted problems in the strategic and tactical time horizon, like long-range forecasting or demand planning. Now, advanced analytics can be deployed in real time or the near-real-time horizon in areas such as dynamic pricing, asset performance and demand sensing.
- Due to the complexity of the supply chain, business users face millions of possible choices when taking action. Without advanced analytics, it is infeasible to expect human users to identify the best action to meet supply chain objectives.
- As supply chains become more distributed, spanning functions and regions and extending to external trading partners, business users cannot take into account all priorities, costs and constraints. This drives the need for advanced analytics to anticipate future events, account for potential choices and make the optimal trade-offs to balance conflicting objectives.
- Supply chain talent shortage is driving the need for decision-making augmentation and automation. The goal of automation is to free up human users to focus on qualitative priorities, such as collaboration with trading partners or team communication.

Obstacles

- Data availability and quality: The timeliness and accuracy of the data correlates to the accuracy and usefulness of the output of advanced analytics.
- Lack of analytics maturity limits successful adoption of advanced analytics: Many organizations are still focused on answering “what has happened?” without a forward-looking focus on the questions “what might happen?” and “what can we do about it?”
- Lack of technical talent to build and maintain advanced analytics models: Supply organizations might be challenged to recruit, define an attractive career path and retain advanced analytics talent.
- Low levels of data and analytics literacy: Many supply chain users are still more comfortable relying on Excel and domain knowledge to predict scenarios and make decisions.
- Lack of transparency of more complex advanced analytics models: Oftentimes, this results in users’ resistance to the adoption of advanced analytics.

User Recommendations

- Identify the supply chain processes that can benefit from advanced analytics and clarify how their insights will be embedded in the processes and incorporated in users’ decision making.
- Plan to allocate significant time and resources to capturing, cleansing and harmonizing required data.
- Continue to improve foundational analytics, spanning KPI definition and capture, building reports and dashboards, and providing the business users with data and analytics self-service functions. It is essential to establish a clear baseline of past and current supply chain performance.
- Educate your organizations on available advanced analytics technologies that can handle more dynamic data sources and satisfy requirements for faster response times.
- Secure the internal or external skill sets to create and deploy advanced analytics solutions.

Supply Chain Risk Management

Analysis By: Heather Wheatley, Christian Titze

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Definition:

Supply chain risk management (SCRM) provides a consistent framework for organizations to identify and mitigate supply chain risks. A comprehensive end-to-end approach to SCRM focuses on collaboration to develop and deploy a framework and mindset to both shape disruption to design out risk and manage identified risks across diverse ecosystems of partners — digital and physical. It is strengthened by the technology used for risk identification, holistic impact analysis, mitigation and monitoring.

Why This Is Important

Supply and operational disruptions continue to be front and center for organizations. They are increasingly finding that siloed risk frameworks are ineffective at managing response strategies to a variety of risks, with disruptions leading to commercial, financial, regulatory, reputational, environmental and digital impacts. The importance of balancing available risk mitigations with other objectives such as revenue, growth, availability, cost, innovation, sustainability and competitiveness has taken priority.

Business Impact

Organizations are finding that the cost of responding to each risk after it disrupts the supply chain is prohibitively expensive and exceeds their appetite for risk. A holistic framework to proactively tackle end-to-end supply chain risks aligned to organizational strategy is essential to direct risk management. This framework combines operational risk management with strategic risk management at the organizational level.

Drivers

- The volume and diversity of risks potentially impacting the supply chain have increased. Risks can occur in technology, political, economic, social/cultural, trust/ethics, regulatory/legal and environmental areas. A reactive approach to risk management is not enough in a globalized world where risks are harder to predict, increasingly interconnected, and have further-reaching and longer-lasting consequences.
- The majority of supply chains are globally extended and extremely complex, making them a large target for disruption in an environment that is experiencing more risk. Compounding this, the partner ecosystem has expanded significantly, introducing more entry points for risk to disrupt the organization. Visibility within the partner ecosystem remains challenging.
- In a supply constrained market, management of risk in the supply chain is critical to the achievement of organizational objectives including driving top-line growth.

Obstacles

- Identifying and prioritizing interconnected risks is complicated in organizations with evolving strategies while managing global issues in high uncertainty.
- Organizations must dedicate funds and resources for ongoing end-to-end risk governance and risk mitigation. Demonstrating the return on investment for proactive mitigations remains challenging particularly where priorities are unclear.
- Digitalization and the availability of accurate data on the risks associated with ecosystem partners or level of impact from risk events in far-flung regions can be challenging, requiring emerging technologies such as graph technology, AI and advanced analytics to overcome.
- Gaining visibility into the extended operations is a difficult and important task. With global, complex networks where the partner ecosystem might be continuously shifting, identifying vulnerabilities beyond direct partners can be strenuous.

User Recommendations

- Link risk management activities explicitly to organizational and supply chain strategy to focus on the ability to profitably deliver key activities, products and services.
- Establish processes and governance to identify and prioritize risks, risk appetite, response and escalation. Identify and establish measurement criteria such as time to survive, time to recover and value at risk. Define measurable risk appetite and tolerances.
- Design out risk and reduce the rate of disruption within the supply chain by employing a shaping disruption strategy.
- Employ technology to track interdependencies, and organizational and ecosystem partner potential failure points to baseline and continually monitor emerging risks.
- Perform assessment and seek assurance on the effectiveness of proactive and reactive risk mitigations.

Gartner Recommended Reading

Identify and Assess Supply Chain Risks to Improve Your Capabilities to Respond

Creating a Supply Chain Resilience Framework

Shaping Disruption: A New Strategy for Supply Chain Risk Management

Market Guide for Supplier Risk Management Solutions

Respond to Increasing Supply Chain Risks by Strengthening Risk Governance

Climbing the Slope

Digital Supply Chain Strategy

Analysis By: Pierfrancesco Manenti

Benefit Rating: Transformational

Market Penetration: More than 50% of target audience

Maturity: Adolescent

Definition:

A digital supply chain strategy prepares the supply chain to create a short- and long-term vision that aligns stakeholders behind an integrated set of principles, digitally enabled capabilities and investments. The strategy defines a supply chain digital roadmap that supports the ambitions of the enterprise while balancing both transformation and optimization initiatives.

Why This Is Important

Over the next 10 years, businesses will progressively delegate decision-making authority to technology. As per the 2023 Gartner CEO and Senior Business Executive Survey, around 85% of CEOs in supply-chain-intensive industries plan to increase investments in digital capabilities across their enterprise. Over the next three-to-five years, CSCOs are being asked by their CEOs to support their corporate digital business strategy, by improving customer experience, reducing costs and innovating supply chain services to support growth.

Business Impact

Digital supply chain positively impacts business success by enabling:

- Business growth through digital supply chain operating models supporting digital commerce, connected products, supply-chain-as-a-service offerings and direct to customer.
- Increased customer experience through end-to-end supply chain visibility, track and trace, prediction of risk and demand, control towers and command centers.
- Supply chain optimization by automating repetitive tasks and decision making by using advanced algorithms and hyperautomation.

Drivers

- New digital business models require digitally enabled supply chain operating models to succeed. Examples include services delivered by digitally connecting to customer assets or direct-to-consumer delivery required by changing consumer shopping patterns.
- Customer expectations for information are evolving, such as having increased visibility into the order or transportation status.
- Existing processes are being optimized by using robotic process automation (RPA) to streamline orders to cash or using machine learning to make planning decisions more autonomous.
- Digital ecosystems are emerging to enhance how partners serve customers. Eighty percent of survey respondents in the 2021 Gartner Sustaining a Customer-Centric Digital Supply Chain Ecosystem Survey expect to have a technology platform in place to integrate with partners within two years.
- Hyperautomation will apply a range and combination of advanced technologies to facilitate or automate tasks that originally required some form of human judgment.
- Supply chain risk is an executive concern driven by a steady cadence of unfamiliar and high-impact events. Sixty-seven percent of survey respondents in the 2021 Gartner Supply Chain Signature Series Risk Survey agreed that their supply chains have insufficient time to recover before another high-impact event hits.

Obstacles

- The digital supply chain strategy is not aligned with the overall business priority and the supply chain strategy. This situation, often linked to supply chain executives enamored with the latest and coolest technology, may lead to digitalization for digitalization.
- The digital supply chain strategy is simply a collection of functional-specific digital strategies, leading to a suboptimal and low-pace digital transformation roadmap.
- Digitalizing the supply chain requires not simply adopting technologies but creating a culture of digital acceptance and an increase in employees' digital dexterity.
- Poor data quality impacts the effectiveness of the digital strategy. Data availability, accuracy and timeliness are paramount, along with completeness and credibility.

- Digitalizing legacy business processes with multiple manual touchpoints — such as escalated approvals, experience-based decisions and repetitive tasks — may lead to limited outcomes or failure of digital transformation.

User Recommendations

- Address these three questions related to the digital supply chain strategy explicitly: Why is this change necessary? What is our desired result? How will we get there?
- Communicate to all stakeholders the digital supply chain transformation ambition and its value to both top- and bottom-line business goals. Explicitly align the digital transformation ambition to corporate strategy. Cascade the digital transformation ambition down to clarify how different business units, functions, and individual teams can contribute to achieving the ambition and its value.
- Set up a cross-functional center of excellence to lead the transformation and create a digital supply chain strategy and roadmap in collaboration with different business units, functions and individual teams.
- Design the digital supply chain roadmap by prioritizing a mix of digital initiatives that simultaneously optimize current capabilities and transform the supply chain operating model.
- Implement a governance process that aligns the digital supply chain to business goals and then ensures execution toward the long-term vision.

Gartner Recommended Reading

Design Your Supply Chain Digital Transformation Roadmap With Gartner's Matrix Framework

Supply Chain Executive Report: Pursuing an Autonomous Supply Chain With Hyperautomation

Ignition Guide to Creating a Digital Supply Chain Roadmap

Ignition Guide to Creating a Business Case for Supply Chain Investments

Supply Chain Executive Report: Fostering a Digital Supply Chain Ecosystem

Supply Chain Segmentation

Analysis By: Michael Dominy, Marco Sandrone

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Definition:

Supply chain (SC) segmentation is the design, implementation and management of strategies applied across the end-to-end (E2E) supply chain for distinct customer experiences, from order through services, or targeted to a role, function or process. Each segment has two to five distinct operational outcomes and standard procedures, different targets for relevant metrics, defined flows through the physical and digital SC, and required behavioral changes across and outside SC-owned activities.

Why This Is Important

Segmentation techniques can help SC leaders deliver the best outcome, balancing cost, growth, efficiency and complexity. SC segmentation improves alignment of SC designs, processes and performance to better meet varying customer needs. Segmentation can also enable a shift to an outside-in value focus that is required of high-maturity SCs. Historically, SC segmentation has been ad hoc, not linked to metrics and performance. Successful implementations should have a repeatable, standardized playbook and ongoing segmented governance.

Business Impact

SC segmentation allows organizations to effectively handle complexity via two forms of segmentation:

- E2E segmentation efficiently supports product, market and channel expansions that add to SC complexity. It helps plan change roadmaps, and shift the cultural focus toward customer and business value.
- Targeted segmentations realize near-term value through smaller-scale differentiation within specific functions (such as new product introduction, procurement, planning, manufacturing, inventory, logistics and customer service).

Drivers

The Hype Cycle position represents an average of adoption of the two extremes of segmentation complexity, and has maintained its previous position on the Slope of Enlightenment. This has been driven by:

- **E2E segmentation:** Over the last two years, leading SCs in most industries have successfully embarked on E2E segmentation. SC maturity of Level 3 and above is critical for successfully sustaining implementation. E2E segmentation would be positioned on the Trough of Disillusionment because many organizations struggle to move from functional to E2E segmentation.
- **Targeted segmentation:** Smaller-scope targeted segmentations (categorizing suppliers, ABC inventory categorization, fulfillment channel) are common and feasible for virtually every SC organization. Successful implementation examples can take weeks or months in organizations of maturity Level 2 and above. There are identified use cases for each SC function.
- **Complexity:** Disruptions and growing complexity in customer requirements have increased interest.
- **Standardized approach:** We expect it will be two to five years for a consensus and a formal segmentation approach to be documented that will enable full mainstream adoption with explicit ties to financial and operational metrics.

Obstacles

- **Maturity:** Many implementation attempts fail due to lack of SC maturity. Having an effective sales and operations planning (S&OP) process in place is crucial because segmentation requires more complex trade-offs than basic supply and demand trade-offs. Targeted segmentation can commence at lower maturity, but E2E segmentation entails highly complex changes, taking two to three years to implement.
- **Ineffective design:** Segments are too conceptual, without enough detail or analysis to implement. Segmentations are informal, lack differentiated metric targets or governance by segment. Business dynamics prevent implementation of designs.
- **Stakeholder roadblocks:** Vague discussions create stakeholder fear that needs will not be met. Project teams may lack influence or ability to create incentives that will drive required behavior changes.
- **Inadequate results:** Designs do not identify new sources of value and just rehash existing assumptions.
- **Insufficient cost and profitability analysis:** Constraining the number of segments requires demonstrating which segments are not attractive to establish.

User Recommendations

- Standardize a segmentation playbook by appointing a leader to develop it and drive continuous improvement.
- Create an E2E segmentation aspiration by moving from “one size fits all” to a menu of E2E customer-need-based operating models.
- Develop prerequisites by creating a multiyear roadmap: Level 3 or above maturity, cost-to-serve analysis, common metrics and collaborative decision making.
- Ensure segmentations are relevant and warranted, by identifying and quantifying the impact to financial and operational measures.
- Refine and govern segments by revisiting the service menu, as business and customer needs change.
- Ensure behavior changes by specifying and justifying when, why, and how resources must choose between ways of completing a task.
- Ensure segmentations are sustained by refining and maintaining the number and types of segments during strategic planning and events (such as new product launches, new routes to market, or acquisitions).

Gartner Recommended Reading

Segmentation 101: Apply Supply Chain Segmentation to Serve Diverse Needs and Reduce Waste

Part 1 — Enable Competitive Advantage With End-to-End Supply Chain Segmentation: Segment Based on Customer Order Needs

Create Cost-to-Serve Model in 6 Steps, Part 1 — Scope Data Analysis for Action

Cost-to-Serve Analysis

Analysis By: Marco Sandrone

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Supply chain cost-to-serve (CTS) analysis refers to the capability to allocate costs of supporting customers and products based on the complexity they drive in supply chain operations. This cost transparency allows organizations to calculate their true profitability along multiple dimensions, such as customer, product, product category or market.

Why This Is Important

Companies recognize the current allocation of supply chain costs to customers and products is not well-tied to the actual drivers, such as product attributes or customer behaviors. A lack of understanding of true cost leads to less-profitable products and services being offered. As a result, many supply chain strategy leaders, in partnership with finance, are creating analytical models that more closely reflect these relationships.

Business Impact

CTS models enable a deeper understanding of the complexity-related costs of supporting customers and products. Many business leaders use these models to set more targeted policies for which services are offered to specific customers. They can then develop differentiated approaches for how products are sourced, made and delivered through the supply network. Our conversations with clients suggest this can reduce cost and inventory levels by more than 10%.

Drivers

- In the current situation, characterized by high inflation and growing concerns about a slowdown in customer demand, the need to protect business profitability has led to an increased importance of CTS capabilities.
- As many supply chains have struggled to secure logistics services and keep their operating costs under control, CTS has proved the right tool to enable trade-off decisions between inventory levels, service levels and cost.
- As a response to constrained supply, Gartner found that some leading companies have or are launching CTS initiatives to support their S&OP processes. Also, CTS can be used to identify opportunities to enhance the profitability of the organization and enable an informed decision process to close gaps with year-end objectives.
- Companies partaking in Top 25 briefings have talked about the importance of CTS as a tool to direct focused investments in resilience strategies. By doing so, they can protect sales of high-profitability products, controlling costs related to supply chain resilience.
- Additionally, some retailers are now considering leveraging this capability to create a marketplace. This allows external vendors to leverage an existing online platform and/or logistics service to sell their own products.
- The past few years have seen an increase in vendor-based solutions and consulting resources offered to assist companies with building the CTS capability.
- Some CTS vendors are extending the use of CTS capabilities to monitor the production of a supply chain's CO2 emissions. This new capability is referred to as "emission to serve."

Obstacles

- **Availability of quality data and adequate technology architecture:** Gaps in the ability to accurately summarize and group logistics spending in a timely fashion are common hurdles to proposing consolidation and other efficiency changes.
- **Lack of engagement from the finance function:** This may delay time to decision, based on insights from the model, and limit the depth to which organizations can develop the model.
- **Lack of organizational appetite:** Companies may see resistance to exposing operational costs and performance levels, both internally and from outsourced providers.
- **Decentralized organizational structure and reporting lines:** This hinders the ability to drive efficiencies through spend consolidation and other changes that require accountability and responsibility for overall spending across the organization.

User Recommendations

- Kick off a CTS initiative by enlisting an exploratory team to discuss and understand the highest-value areas of opportunity for leveraging CTS analysis.
- Engage your partners in finance and commercial functions by crafting a business case that draws a clear connection between the profitability of customers and/or products and the most important corporate strategic goals.
- Take a phased, pilot-based approach to implementation by creating a model that focuses on a defined geographic region, a particular business group or product line.
- Evaluate where skills and system gaps exist, and whether to use an external partner to assist with data infrastructure and model creation, by calculating the investment ROI and assessing risks and connected opportunities.

Gartner Recommended Reading

Market Guide for Supply Chain Cost-to-Serve Analytics Technology

Create Cost-to-Serve Model in 6 Steps, Part 1 — Scope Data Analysis for Action

Create Cost-to-Serve Model in 6 Steps, Part 2 — Unveil the True Profitability

How to Meet Gross Margin Targets Using Cost to Serve to Reconcile S&OP and Financial Plans

Performance Metrics

Analysis By: Marco Sandrone

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Definition:

Metrics, also referred to as KPIs, are measures of quantitative assessment commonly used for comparing and tracking supply chain performance. This involves defining the right balance of leading and lagging metrics, setting targets for each end-to-end supply chain and monitoring performance against targets.

Why This Is Important

Tracking metrics allows organizations to improve results and align people and processes with organizational objectives. Initiatives to improve supply chain performance are gaining momentum, and while well-defined metrics are a critical tool to achieving that, they are not sufficient. Success requires changing processes, people, culture and tools. Some of these changes can take six months, but more fundamental change can take up to 24 months, and ongoing improvements are needed after that.

Business Impact

Selecting a balanced mix of lagging and leading metrics allows companies to keep their business outcomes under control, while identifying and correcting the root causes of disappointing performances. Companies that align the different parts of their supply chain with a consistent set of metrics and a clear overarching goal (e.g., profitable service) are better placed to make informed trade-off decisions. This helps them reduce costs and improve working capital while enhancing the service level.

Drivers

Supply chain leaders are driven by the following recent developments when defining their metrics' sets:

- Organizations striving to develop circular economy initiatives need new ways to measure progress and performance. Often, supply chain leaders struggle to define circular-economy-related metrics because they lack a framework of standardized measurement.
- In the last few years, many organizations have accelerated their efforts to digitalize their supply chains. The leaders of these supply chains are now asked to monitor the progress of these initiatives and assess their effectiveness.
- Supply chains have started adapting their metrics to highlight organizational needs for DEI improvements and demonstrate current DEI progress.
- To improve their ability to respond to an increasing number of disruptions, most supply chains rely on visibility, resilience and agility strategies. As supply chains play an instrumental role in realizing these strategies, they need to define measures to track initiatives' performance and progress.

Obstacles

- The increased complexity of supply chains leaves supply chain leaders unconfident that they measure strategic and operational performance properly. This interferes with their ability to make trade-off decisions.
- Supply chain leaders aim to manage an excessive number of metrics that do not necessarily add to their understanding of the supply chain's contribution to achieving corporate objectives.
- Metrics are often used in isolation, which makes it hard to prompt consistency across functional initiatives.
- The difficulty of establishing and adhering to consistent metric definitions across the organization prevents a standardized approach to managing performance.
- Strategic and operational metrics are often treated as equal, even if they should cover different time horizons and drive decisions at separate levels of the organization.

User Recommendations

- Develop a performance management plan by outlining the current and future state of the performance management strategy. This includes the supply chain metrics, the technology to help access the data and the processes that will use the metrics to manage supply chain performance.
- Develop governance structures by clearly defining roles, responsibilities and ownership for the metrics and how performance will be managed. These metrics need to balance the need for global consistency and visibility with the need for local differentiation.
- Ensure cross-functional alignment by embedding the use of metrics in your supply chain strategic planning, S&OP, S&OE and day-by-day operation execution processes.
- Set supply chain targets by starting with the desired end-to-end outcome of each supply chain segment; then optimize the functional metric targets to achieve that outcome, consciously managing the trade-offs of each end-to-end supply chain.

Gartner Recommended Reading

Hierarchy of Supply Chain Metrics: Focus on Key Metrics to Improve Operational Trade-Off Decisions

Setting Supply Chain Targets: A Holistic Approach to Align With Business Priorities

Improve Supply Chain Planning Performance by Differentiating Metrics Based on 4 Planning Horizons

Define and Align Metrics to Accomplish Business and Supply Chain Objectives

Quick Answer: Decisive Metrics for Supply Chain Control Towers

Network Design

Analysis By: Vicky Forman

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Network design is the creation of a supply chain model to optimize the network for chosen strategic objectives. These efforts may include a network that is highly responsive to changing customer needs, cost-efficient, flexible to handle demand variability, rationalized after an acquisition or one that is resilient. Developing pragmatic scenarios defined on known network attributes and testing for sensitivity to changes in key variables are necessary to successfully execute on a design.

Why This Is Important

Today's volatile business environment, marked by rapid shifts in demand, supply and logistics constraints and geopolitical upheaval, is one where network configurations of the past are being questioned. Organizations that invest in an analytics-driven approach to supply chain design can better assess the trade-offs between cost, service-level requirements, resilience and sustainability, among other factors, to optimize footprint, capacity and network flows for these conflicting priorities.

Business Impact

As supply chains balance customer experience, capacity constraints, shifts in demand channels and geopolitical challenges, the role of supply chain network design has grown in prominence. Intentional design of the physical footprint can fine-tune trade-offs between cost efficiency, growth and resilience. Optimizing product flows through a network of suppliers, factories, warehouses or retail outlets can improve utilization of existing capacity while prioritizing the customer experience.

Drivers

- Organizations looking to move away from low-cost models to risk-balanced and cost-optimized ones are being pummeled by ongoing uncertainty in global supply chains. Balancing near-term cost efficiency against resilience and long-term total cost to serve is complicated by inflation and other disruptions.
- The need to respond to repeated demand and supply disruptions across ecosystems, manage transformative growth in online sales and remain agile while doing so.
- Aligning footprint, capacity and product flow with business model changes, such as a regional manufacturing model or optimizing the network for growth in multichannel fulfillment.
- Given the shifts in trade policies around the world, optimizing global manufacturing capacity and extended supplier networks in response to trade policy fluctuations is an essential capability.
- Investments in analytics to democratize insights and improvements in decision making through better scenario-planning capabilities are critical to help organizations respond to fast-moving trends. Pragmatic scenario analysis can help with placing considered strategic bets amid uncertainty.
- Creating a suitable design early in a product life cycle, before functional constraints are in place, allows for better optimization of the total costs.
- Ensuring a physical configuration that enables appropriate trade-offs between inventory, cost and service-level requirements through period testing of fulfillment options and policy settings.

Obstacles

- Designing supply chains requires a focus on long-term objectives that are often not easy to decipher and can be obscured by immediate operational challenges.
- Given the specialization and geographic concentration of many supplier ecosystems, diversifying the network may be a task of enormous cost, complexity and time.
- Implementation risk driven by lack of buy-in for network alternatives that weigh cost benefits against network impact and execution complexity.
- When there are multiple conflicting priorities for the network, determining the relative importance and gaining buy-in can be complex and time-consuming.
- For organizations deploying in-house network design solutions, the availability of skilled resources that understand business objectives can be a limiting factor.
- Complexity presents a need for dedicated analytical resources, and the learning curve for technology limits mainstream adoption of software tools.

User Recommendations

- Make network design a mainstay of analytics initiatives within the supply chain. For large projects, define network objectives, project scope and delivery expectations in a robust early planning phase.
- Align scenarios and prioritize for the network to meet business objectives and the ability to change.
- Design and shortlist scenarios with stakeholders. Create the baseline and provide trade-off analysis for selected scenarios. Conduct sensitivity analysis to explore creative options around the optimal solution.
- Select the final “to be” design on its expected performance to the chosen objectives, as well as on qualitative criteria. These criteria include complexity of implementation, social and environmental impact of policies, and brand value of the ability to mitigate or avoid disruptions.

Gartner Recommended Reading

Market Guide for Supply Chain Network Design Tools

Global vs. Regional Supply Chains — Identifying the Right Approach for Your Network

How to Build a High-Performing Supply Chain Network Design Team

Tool: The Case to Embed Network Design in Supply Chain Decision Making

Successful Supply Chain Design Reviews Begin With a Well-Defined Scope

Entering the Plateau

Center of Excellence

Analysis By: Caroline Chumakov

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Definition:

A center of excellence (COE) is a physical or virtual center of knowledge, concentrating on existing expertise and resources in a supply chain function, capability or process to attain and sustain world-class performance across the supply chain. COEs operate adjacent to groups that execute core business functions. They find, design and implement changes to business processes, people or technologies.

Why This Is Important

Adapting capabilities and infrastructure to the emerging realities of the business is central to the success of supply chains. Shifting economies, competition and the digital business evolution challenge organizations to continually adapt to the quick pace of change. Change is the new normal, and COEs are common organizational structures that enable the supply chain organization to navigate uncertainty and prepare for the future.

Business Impact

COEs are leveraged for five major use cases:

- Providing governance to refine decision making
- Transforming processes and systems
- Enhancing supply chain's people capabilities
- Providing expertise as a service to the organization
- Disrupting legacy ways of working

Data shows that organizations using one or more COEs are two to three times more likely to report exceeding their goals (revenue growth, margin and return on assets [ROA]) in the prior fiscal year than organizations that do not have COEs.

Drivers

- Gartner research indicates that 93% of supply chain organizations surveyed have one or more COEs. COEs find and develop best practices to support functional excellence (such as planning, manufacturing); process excellence (such as sales and operations planning, product life cycle management); and enabling capabilities (such as talent, technology).
- COE teams deploy these best practices across global, regional and local units to achieve strategic and operational supply chain objectives. For example, a COE might have a responsibility to improve service, lower costs, engage talent or increase the visibility of inventory. They are often developing specific ways in which supply chain can improve operational execution or better orchestrate decision making across the organization.
- COE team members are thought leaders in the business, looking to innovate and find new ways of working that can be operationalized to improve the growth and profitability of the business. For example, COEs are often created to define or execute digital supply chain initiatives. We find that 27% of supply chain COEs have “IT systems design or technology enablement” as a top three priority for their organization, which was also the most-selected option of all priorities.
- Despite the inflationary pressures, we predict that the use of COEs as a method for driving change in supply chain will continue. We believe that supply chain organizations will likely proceed to bring new COEs on board, add additional COEs or work to improve the effectiveness of existing COEs.

Obstacles

- A significant number of lower-maturity organizations that would benefit from supply chain COEs are still not using them.

- COEs are challenged to engage the organization and maintain funding for their ongoing operation. Much of this has to do with the lack of structure built within and around COEs, including weak mandates, uncertain missions, unsuccessful stakeholder relationship management, unclear governance and no repeatable methodology. This all occurs within the context of large global organizations where the business units tend to reject initiatives that create global standards, consolidate IT systems or shift decision making.
- In response to an economic downturn, the development of new COEs may be put on hold and existing COEs may be challenged to validate their existence and contributions to business performance.
- COEs can struggle to evolve and provide new capabilities that the business needs from them (for example, changing from technical implementation to enabling people).

User Recommendations

- Clarify the problems the COE is meant to address, the core objectives it intends to deliver and the services it will provide.
- Develop a business case communicating the value the COE will deliver to the organization in terms of business impact.
- Articulate the balance of power, decision-making authority and process ownership between the COE and its network of partners in the business.
- Build a team with the right set of capabilities, enthusiasm and credibility in the business to deliver on COE objectives. Develop clear role profiles and performance metrics for COE positions.
- Design and deploy a methodology that helps the team scale and drive repeatable outcomes. The team must have a set of processes and tools with which to engage the business.
- Develop a roadmap of initiatives that map to those things most critical to the supply chain strategy and issues within the business.

Gartner Recommended Reading

The Supply Chain Center of Excellence Director's First 100 Days

Toolkit: Develop a Clear Charter to Launch or Reinvigorate Your Supply Chain COE

Best Practices in Organizing Supply Chain Centers of Excellence

How to Demonstrate the Value of Supply Chain Center of Excellence Activities

Appendixes

See the previous Hype Cycle: Hype Cycle for Supply Chain Strategy, 2022

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2: Hype Cycle Phases

(Enlarged table in Appendix)

Phase	Definition
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
Trough of Disillusionment	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the innovation to reach the Plateau of Productivity.

Source: Gartner (August 2023)

Table 3: Benefit Ratings

Benefit Rating ↓	*Definition* ↓
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (August 2023)

Table 4: Maturity Levels

(Enlarged table in Appendix)

Maturity Levels	Status	Products/Vendors
Embryonic	In labs	None
Emerging	Commercialization by vendors Pilots and deployments by industry leaders	First generation High price Much customization
Adolescent	Maturing technology capabilities and process understanding Uptake beyond early adopters	Second generation Less customization
Early mainstream	Proven technology Vendors, technology and adoption rapidly evolving	Third generation More out-of-box methodologies
Mature mainstream	Robust technology Not much evolution in vendors or technology	Several dominant vendors
Legacy	Not appropriate for new developments Cost of migration constrains replacement	Maintenance revenue focus
Obsolete	Rarely used	Used/resale market only

Source: Gartner (August 2023)

Document Revision History

Hype Cycle for Supply Chain Strategy, 2022 - 17 August 2022

Hype Cycle for Supply Chain Strategy, 2021 - 9 August 2021

Hype Cycle for Supply Chain Strategy, 2020 - 6 August 2020

Hype Cycle for Supply Chain Strategy, 2019 - 15 July 2019

Hype Cycle for Supply Chain Strategy, 2018 - 13 July 2018

Hype Cycle for Supply Chain Strategy, 2017 - 20 July 2017

Hype Cycle for Chief Supply Chain Officers, 2016 - 11 July 2016

Recommended by the Author

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Understanding Gartner's Hype Cycles

Tool: Create Your Own Hype Cycle With Gartner's Hype Cycle Builder

Top Trends in Strategic Supply Chain Technology 2023

The Gartner Supply Chain Top 25 for 2022: Insights on Leaders

Supply Chain Executive Report: Improve Decision Quality With Reciprocal Human-Machine Augmentation

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Table 1: Priority Matrix for Supply Chain Strategy, 2023

Benefit ↓	*Years to Mainstream Adoption*			
	Less Than 2 Years ↓	***2 - 5 Years*** ↓	***5 - 10 Years*** ↓	***More Than 10 Years*** ↓
Transformational		Customer Experience Management Digital Supply Chain Strategy Ecosystem Partnerships	Circular Supply Chain Digital Supply Chain Twin Digital Twin of a Customer Diversity, Equity and Inclusion Generative AI Supply Chain Resilience	Artificial Intelligence Machine Customer
High	Center of Excellence	Agile Teams Data Literacy Hybrid Work Network Design Performance Metrics Product-as-a-Service Supply Chains Supply Chain Cybersecurity Supply Chain Risk Management Sustainable Supply Chain	Advanced Analytics Cost-to-Serve Analysis Machine Learning Supply Chain as a Service Supply Chain Blockchain Supply Chain Cost Optimization Supply Chain Segmentation	
Moderate				
Low				

Benefit	Years to Mainstream Adoption			
↓	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓

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Source: Gartner (August 2023)