



Whitepaper

Navigating the Future

Three Paradigm Shifts in Supply Chain Design You Can't Ignore



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Supply chain network design has never been more critical than in today's uncertain global landscape. Disruptions continue to rise—natural disasters, labor disruptions, and geopolitical conflict highlight how fragile traditional supply chain designs have become. Outdated networks were conceived in stable, predictable conditions that no longer exist in today's VUCA environment.

Prioritizing network design in your supply chain is essential for staying competitive in the face of continued uncertainty. To ensure the flexibility needed to stay agile, companies must regularly

examine the design of their supply chain. This analysis allows businesses to configure their network and establish policies to guide planning and operations effectively. Rejecting the "set it and forget it" approach enables swift reactions in rapidly changing conditions. Well-designed supply chain networks quickly ramp up production and distribution during demand surges, minimizing delays and maximizing opportunities. Conversely, they can quickly scale down to help avoid unnecessary costs when demand decreases.





The Importance Of Supply Chain Design In Today's Volatile Market

Supply chain design is beyond just setting up facilities and mapping out transportation routes—it's an ongoing process of constant evaluation, adjustment, and improvement. Occasionally, checking in on your designs and policies won't cut it; without regular attention, performance will slip, and your designs will quickly become outdated. Companies need to regularly reevaluate key decisions, like sourcing strategies, the location of manufacturing and distribution centers, transportation options, and inventory management. All the while considering how best to serve different customer segments.

These decisions can't be etched in stone but must be regularly revisited and fine-tuned to align with shifting business goals. Think of your

network as a 'living, breathing organism' that must constantly adapt to survive and ultimately thrive in its ecosystem. Advances in technology to model different scenarios using real-time data is a game-changer—making it easier to limit uncertainty, identify vulnerabilities, and develop contingency plans than ever before. Businesses that practice the principle of continuous improvement are poised to seize opportunities, no matter what the future brings.

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The Paradigm Shift: Redefining Supply Chain Design In The Business Landscape

Traditional planning and forecast methods no longer work. To find success in our ever-evolving world demands, Supply Chain leaders design systems that are both effective and efficient. Businesses need to fundamentally rethink their approach to supply chain design.

This paradigm shift consists of three elements that challenge conventional approaches to managing supply chain design:

1. Supply Chain Design must explicitly consider variability and uncertainty
2. Understanding real performance of a design transcends mere optimization techniques, necessitating a blend of sophisticated mathematical approaches
3. The democratization of supply chain design empowers organizations to build and maintain models without relying solely on design experts

The conventional strategic approach of reacting and then responding to disruptions, changes in demand, cost, and lead-time drivers has proven inadequate in an environment of high variability and uncertainty. A reactive stance forces companies into a mad scramble, resulting in inefficiency and lost opportunities. Transitioning to a proactive mindset is more than just a change in thinking; it is an essential evolution for supply chains to flourish in the current level of volatility and uncertainty.





You Can No Longer Architect Supply Chains without Considering Variability

Aristotle said, “Knowing yourself is the beginning of all wisdom.” Recognizing the inherent variability in your network is the beginning of supply chain success. Variability ranges from unpredictable consumer demand to potential disruption, ongoing geopolitical strife, natural disasters, and logistical challenges. This unpredictability necessitates evolving supply chain designs beyond static frameworks towards more dynamic, resilient strategies.

Variability and uncertainty are no longer obstacles to address after the fact but become the guiding elements of the supply chain design process. This more sophisticated proactive approach acknowledges the unpredictable nature of business as a constant rather than an anomaly, representing a fundamental transformation in how supply chains must be conceived and constructed. Embracing this perspective from the outset is essential for achieving consistent performance.

This proactive strategy requires integrating the anticipating of variability and uncertainty from the onset of supply chain design. Companies should view potential disruptions and changes in costs, lead times, and other drivers as opportunities to mitigate risk and build resiliency into their networks from the start. This requires a deliberate departure

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from “traditional” methods based on deterministic inputs, which force a multitude of scenarios that are never fully explored. Some long-established methods often produce conflicting results requiring reconciliation and sub-optimal decision-making, with no real consideration of risk. A stochastic planning approach considers the variability and uncertainty of drivers and suggests a single design based on a level of acceptable risk.

By adopting this forward-thinking mindset, organizations should examine their supply chain through a lens of variability and actively plan for it. This requires a thorough exploration of the “what-ifs” of your operations, asking not just how a supply chain should function under ideal conditions but how it can respond and continue to operate under all possible situations and conditions. The focus of building a supply chain shifts from merely designing a supply chain that can perform in a perfect world to composing a robust design well-equipped for its future states under various levels of uncertainty.

Embracing this approach means investing in advanced analytical tools and methodologies that simulate a wide array of scenarios, from the most common to the extreme. This requires a philosophy that views uncertainty not as a threat but as an opportunity to build resilience and flexibility into supply chain operations. Through this perspective, companies can design supply chains that are not just prepared to handle today’s challenges but are equipped to adapt and thrive amidst tomorrow’s uncertainties.

Combining Multiple Mathematical Techniques Under A New Framework Is Required To Understand Anticipated Performance Of A Design

Incorporating variability and uncertainty into the early stages of supply chain design bakes in a resilient strategy that anticipates and mitigates risks proactively. This allows companies to move beyond traditional linear models and embrace a more innovative dynamic framework. Underutilized in conventional supply chain design, these techniques often adapt swiftly and efficiently to change.



Center Your Supply Chain Design Approach On Simulation

By using simulation in the design process, companies can better navigate the more unpredictable elements of the supply chain, ensuring their strategies remain effective, flexible, and ready for what lies ahead.

Discrete-event simulation (DES) is an essential tool in resilient supply chain design. DES operates by breaking down a system into events that occur at specific times and cause change. If nothing happens between these events, the simulation jumps directly from one event to the next, highlighting only the moments that drive the system's evolution. By allowing for the creation of a detailed, accurate model of your operations, DES enables companies to better understand customer service levels—such as order, line, and case fill rates—and develop more effective policies for managing operations. This includes

refining order routing strategies, optimizing inventory sharing and transfer guidelines, and making more informed decisions about buying to meet demand or stockpile larger quantities for future needs.

Using discrete-event simulation, companies can meticulously test and analyze diverse strategies and outcomes with precision and foresight. Due to the fidelity of the models, organizational buy-in increases as leaders begin to see their supply chain designs in action day-to-day, processing line-level customer orders, generating, moving, and receiving replenishment orders, all while respecting facility shipping, receiving, and storage capacities. These simulated environments become a sandbox for experimentation to test hypothetical situations ranging from minor disruptions such as labor or material shortages



to major crises like a coastal port strike during a hurricane that can be played out without real-world repercussions. Proactively exploring the impact of various scenarios is essential in identifying vulnerabilities, understanding potential bottlenecks, reducing costs, improving service, and pinpointing areas where flexibility can be seamlessly integrated into the supply chain.

Simulation should also play a pivotal role in strategic decision-making, offering invaluable insights for engineering supply chains efficient under today's conditions but robust enough to adapt to tomorrow's potential challenges. Through the application of simulation technologies, supply chain leaders are empowered to make data-informed decisions, optimizing their networks for resilience, agility, and continued performance.

Build Uncertainty And Variability Into Your Supply Chain Model By Incorporating Probabilistic Elements

When designing a supply chain, accounting for uncertainty and variability from the start is critical. This is where **stochastic optimization** becomes critical for solving problems by accounting for uncertainty and its effects. Stochastic optimization seamlessly incorporates the inherent randomness of complex supply chains, ensuring a more resilient and adaptable design. This differs from traditional, fixed approaches, where it is assumed that everything is predictable. Instead of relying on fixed assumptions and testing how well they hold up under unpredictable conditions, a stochastic approach builds uncertainty into the model from day one, allowing companies to create an adaptable and resilient supply chain for the real world, not just efficient on paper.

With stochastic optimization, you can define how much risk and variability you are willing to allow within your supply chain. This gives you a better balance between robustness, financial performance, and service levels, helping you prepare for whatever curveballs come your way.

Probabilistic modeling takes things a step further by predicting the likelihood of future events using an approach that leverages historical and forecast data. By assigning a probability to potential scenarios on a scale from 0 to 1, this approach helps to build a supply chain that isn't just about keeping things moving smoothly but also prepared for disruptions. It's all about ensuring your supply chain is ready to thrive in the real world, no matter what challenges arise."



Identify The Causes Of Supply Chain Disfunction With Advanced Analytics

The current approach to decision-making often focuses on short-term outcomes because it fails to account for uncertainty from the outset. This reliance on single-point solutions—essentially, single numbers—leads to reactive measures when actual performance deviates from these expectations. Consequently, there is an overemphasis on establishing control towers and command centers to respond quickly to unplanned events.

A more effective approach starts with better monitoring of the supply chain environment. By factoring in variability and uncertainty early in the planning phases, companies will be better prepared

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to handle the challenges that can potentially impact financial performance and service levels. One powerful tool for this is **sensitivity analysis**, which

helps you see how changes in key inputs affect overall outcomes. This type of analysis enhances risk management and increases operational optimization by giving you a clearer understanding of the factors that drive decisions and how much flexibility you have before adjustments are needed.

Sensitivity analysis can be applied across multiple areas, whether it's demand forecasting, facility capacity, or transportation costs. By understanding how sensitive your network is to shifts in these variables, you can make smarter, data-driven decisions, increase resilience to disruptions, boost overall efficiency, and keep your customers from falling into 'The Zone of Indifference.'



Supply Chain Design User Experience Will Undergo A Significant Shift In How Companies Can Build And Maintain Supply Chain Design Models

Prioritizing user experience in your network design significantly boosts the efficiency and effectiveness of operations. As supply chains become increasingly complex the demand for rapid, accurate decision-making grows, providing tools and technologies accessible to a wide user range is crucial. The future of supply chain design includes technology that is easily usable by supply

chain business analysts and leaders, eliminating the need for deep expertise in data manipulation or abstract modeling. This innovation is set to revolutionize how organizations plan inventory, make strategic supply chain decisions, improve service levels, and understand future demand impacts, with expert assistance always within reach as needed.

Simplifying The Modeling Process For All Users

In the realm of designing supply chains, the complexity of the modeling process and the associated learning curve presents a formidable challenge and barrier to the ongoing incorporation of this crucial business process often necessitating advanced modeling expertise to abstract and simplify for effective navigation. However, there lies a transformative opportunity in streamlining this process to be more intuitive, thus opening the doors of supply chain design to users across all levels of proficiency. This pivotal shift toward simplification does more than just democratize access; it invites a collective pool of knowledge and expertise into the design process, enriching the strategic fabric of organizational operations.

Most supply chain design technologies require users to be power modelers. This means that users must be proficient in data manipulation and abstract

modeling, have significant supply chain domain expertise, and understand the process methodology of developing a design. The need for this expert



knowledge is in part a byproduct of how supply chain design software has been designed and who



has been the target user. This category of software has historically been designed with unparalleled generic flexibility to model every possible supply chain condition with a multitude of data tables and columns to manage which required expertise to navigate and employ.

The future of supply chain design focuses on the capability to make it accessible to business end-users without sophisticated data manipulation and

modeling skills. The transformation of supply chain design into a more inclusive and accessible domain signifies a major leap forward in operational strategy. By effectively lowering the experience barrier, the field becomes open to a broader spectrum of participants, each bringing their unique perspectives and insights. This inclusivity enriches the process, fostering a breeding ground for innovation and enhanced optimization strategies.

Building Tools With The End User In Mind

Sophisticated software, designed with the business-user in mind, stands at the forefront of this transformation. These tools are intuitive, making the intricacies of supply chain design comprehensible to individuals without a deep background in data manipulation or abstract modeling formed through years of specialized training. With features that streamline the creation and analysis of complex models, these platforms empower users to contribute meaningfully to the design and optimization of supply chains.

Software is being designed through the incorporation of a variety of advanced AI techniques to more effectively help end-users automatically build models, analyze model feasibility, support the analysis of results, suggest scenarios to execute, and provide ongoing

support for model maintenance. Ultimately, the learning curve is so minimized that supply chain design software can be used by supply chain business experts, as opposed to supply chain design experts. Understanding how to model and ultimately design your supply chain becomes more intuitive than ever before.

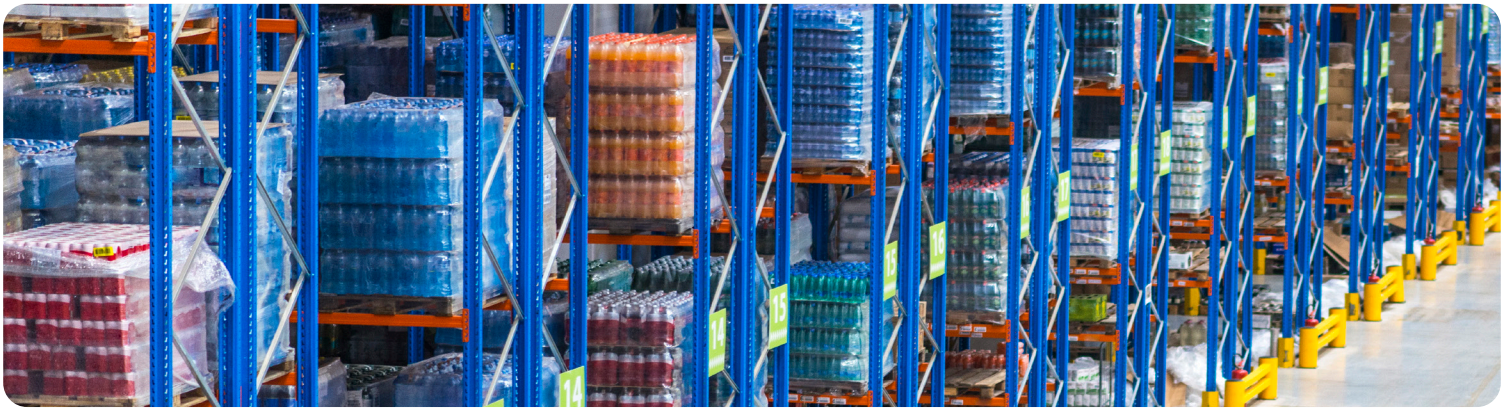
Furthermore, generative AI capabilities will further support end-users by enabling a self-supporting capability where supply chain business users can ask critical questions such as “Where are the bottlenecks?”, “Where am I exposed?”, and “What material flow offers the lowest cost-to-serve?” and receive guidance on how to analyze output and what scenarios to test to help achieve expected outcomes.

Supply Chain Performance Including Agility And Resiliency Is Dependent On Embracing The Supply Chain Design Paradigm Shifts

To navigate the intricate waters of supply chain management with agility and insight, organizations should embrace paradigm shifts and pave the way for a more anticipatory and resilient approach. Transforming supply chain design decisioning requires seamlessly integrating uncertainty and variability into the design process, utilizing multiple mathematical techniques, and equipping the supply chain business owner to build and maintain robust designs. These are foundational steps companies must take. This fortification against unpredictability transforms uncertainty into a manageable component of strategic planning, ensuring a sophisticated and innovative approach to supply chain management.

Ongoing disruptions and fluctuations in financial drivers and service levels have exposed significant vulnerabilities in some notable supply chain networks. As businesses face continual and abrupt changes in demand, material shortages, and logistical issues. For some, these issues were dramatically amplified during the pandemic, highlighting the indisputable need for agile and resilient supply chains. Companies must prepare themselves to quickly adapt to disruptions, proactively develop their infrastructure to meet performance goals, develop policies capable of handling known sources of variability, and keep promises to their customers.

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About GAINS

GAINS is the supply chain performance optimization company helping companies fulfill their customer's promise. Our first-in-class, best-in-breed composable GAINS Decision Engineering and Orchestration Platform transcends traditional silos of ERP, supply chain planning, and network design, enabling integrated, smarter, faster, and composable decisions across the time to plan horizons from strategic design to order execution. Specifically designed to manage volatility, uncertainty, complexity, and ambiguity, GAINS customers are able to focus on prioritizing the right decisions at the right time at the right speed and scale to optimize supply chain performance, improving profitability and customer confidence. For more information, visit www.gainsystems.com.



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