



Supply chain again a CEO agenda

Global life sciences companies are trying new approaches to respond to hidden risks within supply chains.

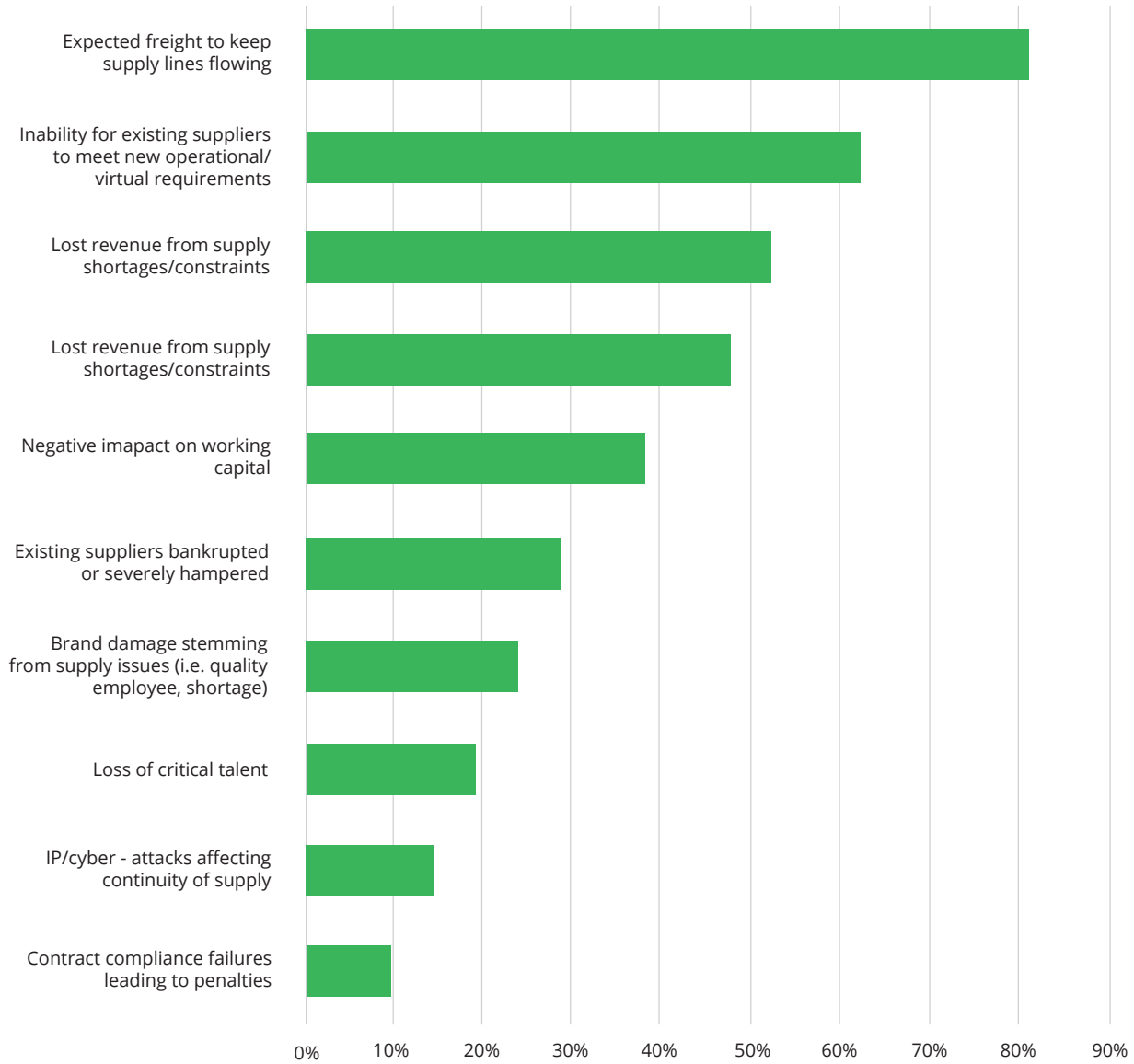
Supply chain management has long relied on static assumptions. In this deterministic view, organizations create forecasts using historical data to design specific scenarios likely to result from familiar circumstances. For enterprises using an array of suppliers for a particular product, the deterministic view dictates that the business can absorb a shock if one of its suppliers abruptly halts production – with the understanding that another provider can take up the slack. When unanticipated emergencies arise, such as a massive breakdown of supply and distribution channels, having a range of suppliers might not be enough to overcome the disruption.

Amid the volatility of the pandemic, geopolitical unrest affecting shipping and logistics, and inflation at a four-decade high, an alternate view on supply chains is emerging in the global life sciences industry. This model, known as the probabilistic approach, aims to increase flexibility, streamline manufacturing processes, and enhance real-time tracking. Within this framework, biotechnology and pharmaceutical companies are shifting away from planning for inflexible accuracy to designing agile supply chains that can bend and adapt quickly to changing conditions – and multiple scenarios.

This complex picture includes a rapidly diversifying portfolio of next-generation treatments such as personalized cell and gene therapies that require specialized manufacturing facilities, ultra-low temperature requirements, and last-mile delivery to treatment centers and patients. To keep pace with such changes, leaders at life sciences companies are prioritizing advanced digital processes such as artificial intelligence within production systems.

Accordingly, supply chain concerns have moved to the top of the CEO agenda: A Fortune/Deloitte survey reveals that the majority of life science and healthcare chief executives say supply chain disruptions have raised the cost of doing business and cut into margins. A total of 88 percent of respondents cited production or logistics issues, and reduced logistics capacity, as key challenges. What's more, the CEOs predicted continuing challenges will disrupt business strategy during the next 12 months (Figure 1).¹

Figure 1. Have you experienced any of the following disruptions to your overall supply chain in the last 12 months?



Source: "The Semiconductor Chip Shortage Hits MedTech: Strategies to built resilient Supply Chains," Advamed Deloitte, 2021

To better understand vulnerabilities in their supply chains, life sciences companies are exploring an array of practices to enable proactive scenario planning and risk mitigation. Among the emerging and transformative trends include the acceleration of digital investments, the deployment of human-centered and AI-enabled digital automation, trust-based supply chain systems that are responsive and agile to changing stimuli in the business environment, the embedding of sustainability into supply chains, and the expansion of connected networks to reinforce system-wide supply chain cohesiveness.

Enabling end-to-end visibility

Enhanced visibility into suppliers and investments in digital sensing capabilities helps life sciences companies avoid costly missteps.

Today's supply chain professionals potentially have access to thousands of suppliers—each with their own supply chains, corresponding digital platforms, and risk management approach within this second tier of suppliers. For life sciences companies, one barrier to adoption of a high connected, agile supply network is a lack of visibility into participants beyond the first tier.

Some of this may occur by design, as suppliers withhold information about their own vendors because of contractual restrictions.² Life sciences companies also risk becoming beholden to a single provider. For example, one major global biotechnology company has pinpointed the risks of having a sole provider for products used in conducting clinical trials. If this supplier suffered a shutdown, it would jeopardize the biopharma company's innovation activities.

Prioritizing digital governance is one way life sciences companies are attempting to avoid such delays. For example, smart sensors can provide timely feedback on operations and help companies react to supply chain bottlenecks and disruptions. The devices include onboard technologies such as microprocessors, diagnostics, and connectivity tools.³ The sensors, which can be leased to companies through a software-as-a-service (SaaS) model, allow global medical technology companies for example, to rapidly flag a downtime event that threatens timely manufacturing and distribution. Thanks to the alert from the sensing technology, companies can initiate advance purchases of supplies, and benefit in savings off typical rates by getting ahead of the production delay.

Sanofi, a French pharmaceutical and health care company, has launched an initiative to digitize its supply chain and related processes. Its Digital Accelerator effort develops products using digital, data, and AI—further proof that life sciences companies are accelerating data management strategies to integrate, unify, and standardize data from different sources.⁴

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“You generate so much data, but you have to bring the capability to transform that data into something that's useful,” says Roberto Silveira, Senior Vice President, Global Technology and Engineering at Pfizer. “The path forward is not even predictive, it's adaptive. It's transforming data and using AI and machine learning to make data control your process. That's the ultimate vision.”

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Converting data intelligence into actionable insights is how Amgen, another biopharmaceutical company, is using technology to enhance collaboration among suppliers. The organization is sharing demand signals, adding visibility and production status to function as an in-house aggregator of supply chain information, improving the understanding of risks across its value chain. Specifically, the company has implemented high-grade product barcoding and tracking devices for greater monitoring throughout the cold chain journey, allowing for the shipping of biosimilars, which are copies of patent-expired biologic drugs.⁶

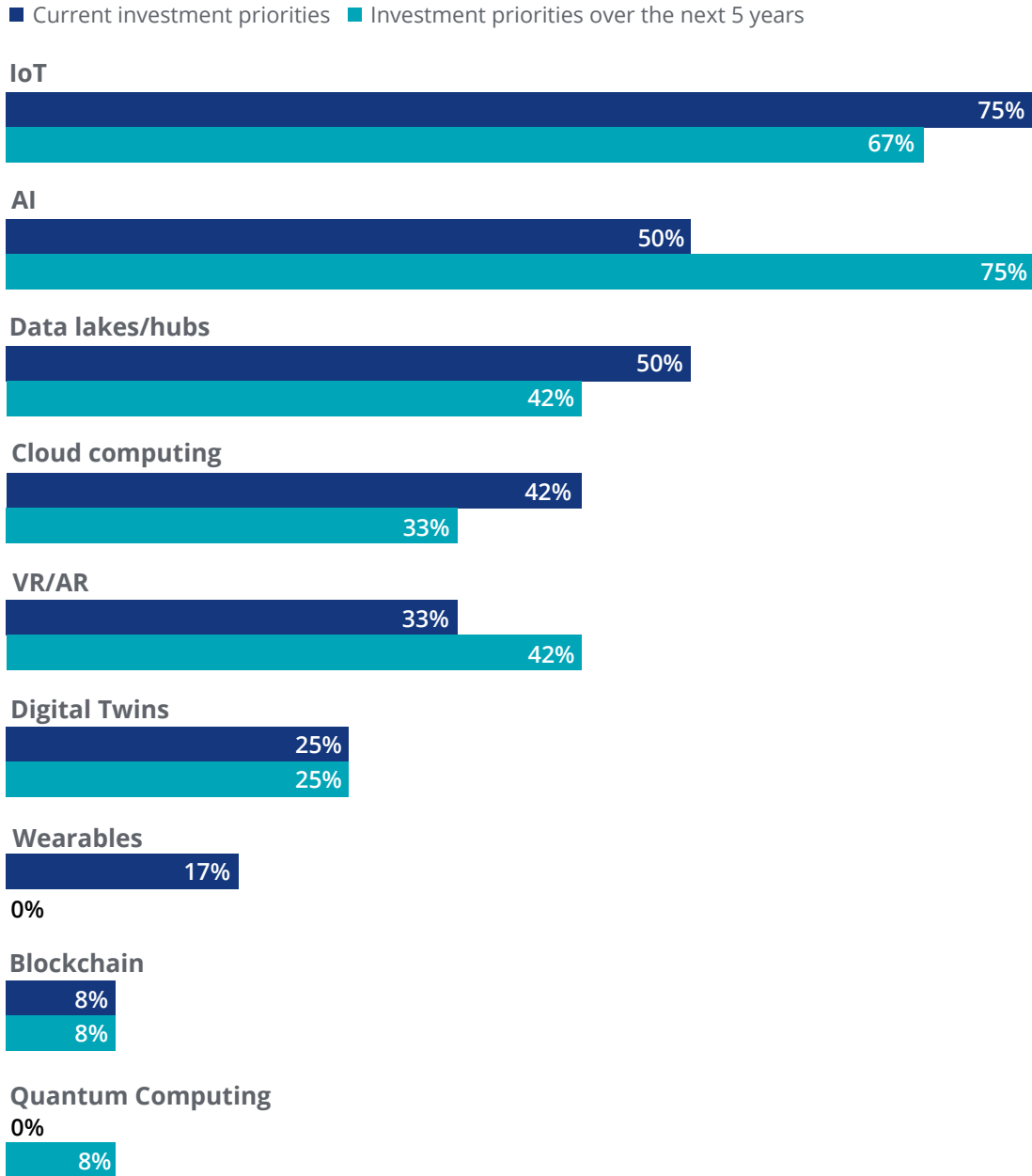
Additional supply chain challenges such as increasing cost pressures, evolving requirements for advanced therapies, and the increasing reliance on external partners in the clinical development process, offer areas of innovation that life sciences companies can address with the application of digital twins.⁷ A digital twin is a virtual model of a physical process, allowing companies to simulate conditions, contemplate what-if scenarios, and create instructions to manipulate the physical world.⁸

A potential use of digital twins among biopharma companies is the simulation of clinical trials to include budgets, patient selection, and probability of success.⁹ Digital twins can form part of a strong digital core housing relevant data allows life sciences companies to create a supply chain that can efficiently assess the current state—and make informed decisions during clinical trial execution.¹⁰

Still, the technology still ranks relatively low among planned investments for life sciences companies, a signal that many are still in the pilot phase when it comes to connectivity within the manufacturing ecosystem (Figure 2).¹¹

Figure 2. Manufacturing: Current and planned investments in digital technologies

Respondents were asked to rank the most innovative technologies in which their function is currently investing and plans to invest in the next five years.



Note: Percentages indicate options ranked among the top 3 by survey respondents.
 Source: Deloitte's Biopharma Digital Innovation Survey 2021.

Human-centered design: Boosting success on the production floor

Life sciences companies that focus on high-value, relationship-driven investments in their people create more resilient supply chains.

Even with accelerating investments in digital capabilities, managing a supply chain is a human-driven endeavor. When Deloitte interviewed more than 50 supply chain leaders including life sciences companies, academic institutions, and technology companies, interviewees overwhelmingly cited people accepting and adopting the new ways of working — more than digital investments — as a key factor to boost supply chain resilience.¹²

One of the key threats to resilience is difficulty of talent retention, an issue that predates the pandemic: In a 2018 [survey by global shipping company DHL](#)¹³ on the supply chain profession, 70% of respondents said that the profession lacked status and opportunities for career growth. Research in 2022 by the recruitment firm Hays shows that 59% of UK professionals working in supply chain and logistics said they planned to switch jobs within a year, while 77% of US respondents said they planned to quit.¹⁴

These headwinds make it more critical for life sciences companies to enhance the value proposition for current workers and potential ones. As a complement to digital investments, some life sciences companies are making their operations more people-centric, empowering real-time decision making, and enhancing value chain efficiency. To meet these goals, biopharmaceutical and biotechnology companies are emphasizing human-centered design.

As a matter of quality control, life sciences organizations have had continuous improvement programs in place for some time to increase efficiency. But newer dimensions of human-centered design help companies rethink how the work gets done – from deciding how to digitize one step in a process or unit operation to pinpointing the precision output or outcome of a step in the supply chain.

Overcoming unplanned deviations can achieve these goals - while increasing trust in the supply chain. Companies that adopt this approach are attempting to flag common human errors – or identify when a similar error occurs in isolation across multiple sites. A review of deviations from standard production procedures aims to spot a deviation, determine how it happened, and develop action to prevent it from occurring again at any location.

Likewise, life sciences companies are taking smaller successes to scale. One leading biopharma manufacturer conducted digital immersion sessions, assessed its existing capabilities, and quantified the benefits of expanding two pilot sites into a company-wide smart factory approach. The company projected approximately US\$50 million in year-over-year operational expense reductions on a US\$700 million baseline.

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The US pharmaceutical company Eli Lilly and Company has five manufacturing plants under construction endowed with highly automated systems that learn and self-tune throughout the production processes, offering automatic notifications to technical support, says John Neal, associate vice president, manufacturing strategy. The company hired 1,800 people for its manufacturing operations in 2022 with a digital-first focus governing the recruitment process.

Neal says the smart factories approach demonstrates how life sciences companies are taking an end-to-end approach to embed next-generation technology in different parts of their supply chains.

“Utilizing the latest manufacturing technology throughout the supply chain enables Lilly to impact more patients at speed,” Neal says. “We use that sentiment as our north star for recruiting, hiring and educating our workforce to ensure we’re meeting the needs of patients who rely on our medicines.”¹⁵

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Sustainability: The long-term view

Circularity is becoming a prerequisite for supply chain design among life sciences companies.

The global supply chain network of life sciences companies includes the R&D facilities, manufacturing plants, and transportation channels that eventually help products reach patients and consumers. To put this massive network into perspective, consider that the estimated market for pharmaceutical drug delivery is expected to grow from US\$1.17 trillion in 2022 to US\$1.45 trillion by 2028, representing a compound annual growth rate of 3.6% during the forecast period.¹⁶

Leaders at life sciences companies are actively discussing how to move growing quantities of goods while maintaining supply-chain sustainability over the long-term. There is broad industry consciousness on the issue as seen through the Science Based Targets initiative (SBTi), which seeks to limit global warming through corporate commitments. As of February 2023, 88 pharmaceutical, biotechnology, and life sciences companies had submitted targets.¹⁷

To fulfill such commitments, life sciences companies are embedding sustainability as a supply chain advantage. They're starting by focusing on Scope 3 emissions – those that result from activities or assets not owned or controlled by the organization, such as waste, end-of-life treatment of sold products, or business travel.¹⁸ Transportation and distribution, which also fall under Scope 3, are driving some life sciences companies to consider shifting from air freight to ocean travel. An MIT study found that based on emissions generated by moving one ton of goods per mile, long-haul air freight generates 47 times as many emissions per ton-mile as ocean freight.¹⁹ What's more, Life Sciences companies are building in sustainable supply chain material, network and manufacturing choices earlier in the development process so that the impact is measurable by the time pipeline reaches commercial manufacturing and distribution.

Merck, the global pharmaceutical company, is attempting to move 90% of health care shipments from air transport into ocean freight to reduce carbon emissions. Between 2019 and 2020, switching from air to sea freight helped the company to reduce CO₂ emissions by 5,000 metric tons.²⁰

AstraZeneca also incorporates sustainability as a key component of their supply chain. The company is reducing its water footprint and total waste by leveraging a circular economy approach and implementing lean manufacturing techniques, such as limiting freshwater use for drug development to sources within site boundaries whenever possible.²¹ As part of the company's Sustainability Partner Guide and Framework, it assigns sustainability assessment scores to suppliers that meet certain thresholds such as the use of renewable energies such as biomass, solar, or wind across global operations.²²



"We're taking bold action on climate because there's a strong connection between a healthy planet and healthy people", says Arun Krishnan, Global Supply Chain Planning, AstraZeneca.²³



Industry-wide efforts are also underway to improve supply-chain transparency. The Pharmaceutical Supply Chain Initiative (PSCI) is a global coalition of more than 45 pharmaceutical and health care companies focused on safety, environmental, and social outcomes across supply chains. Meanwhile, the Energize collaboration of global pharmaceutical companies seeks to boost renewable energy access for hundreds of pharmaceutical suppliers – equipping the companies with expertise and resources to vie for electricity purchase power agreements.²⁴

The push for sustainability is also driving life sciences organizations to avoid inventory imbalances when available supply doesn't match demand. Some inventory management applications rely on "base stock" policies in which inventory of a certain product triggers an order – potentially creating excess inventory if demand drops after an order is processed.²⁵

When demand is uncertain, companies can consider a replenishment model in which products are made to stock and manufacturers check inventory levels of finished goods on a continuous basis, schedule production to prevent shortages, and keep raw materials on hand as needed.²⁶ This type of strategic inventory process allows life sciences organizations to ensure the supply of their critical medicines while also avoiding excess inventory.²⁷

Geopolitical security

Geopolitical conflicts are necessitating vast new security capabilities among global life sciences companies.

Achieving supply chain resilience in the face of complex global disruptions is a far greater challenge than solving for economics or logistics. The existence of geopolitical threats such as trade wars, cyber risk, and inflation have made supply chains more interdependent and critical to national security.²⁸

In response, some life sciences companies are using blockchain – a digitally distributed, decentralized, public ledger system – for anti-counterfeiting, genomic, and clinical data sharing, revenue management, and materials transfer. For instance, Novartis and Merck are exploring blockchain to improve supply chain security and improve communication by ensuring that patients receive more accurate, up-to-date information by supplanting the paper inserts with digital ledgers.²⁹

Promoting supply chain visibility, industry partnerships, and distribution agility across national and regional markets is another key goal of life sciences companies. Consider that approvals of one medicine in a particular market may encounter regulatory challenges in another. Multiple countries are expected to phase in requirements for pharmaceutical barcoding, serialization, and reporting through 2025.³⁰ By inserting these new requirements into the supply chain in the present, life sciences companies can increase compliance and efficiency over the long term.

Supply chain considerations for life sciences organizations

- How are you capturing changes in demand, delivery, and consumption across your supply chain?
- What upgrades can you make in the short term to realize immediate value?
- How have you incorporated principle of trust in supply chain systems?
- How are you balancing human and machine inputs in your digital supply chain systems?
- What are the biggest training gaps that are holding back your team?
- How can you institute more circular practices within the supply chain starting from product development stages?
- Are you deploying effective strategies in order to integrate, unify, and standardize data from different sources?
- Is your talent strategy flexible enough to keep up with rapidly changing needs?
- Where can you easily scale supply chain innovation for system-wide impact?
- How would you grade your supply chain governance strategy?

Contacts

Lieven Comeyne

Partner
Deloitte Belgium
lcomeyne@deloitte.com

Laks Pernenkil

Principal
Deloitte United States
lpernenkil@deloitte.com

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