DIGITAL SUPPLY CHAIN TRANSFORMATION:

ALIGNING OPERATIONS AND STRATEGY

Digital transformation is a supply chain imperative. But too many companies take too long to accomplish their goals only to be disappointed by the results. Here, we present a supply chain-based framework that helps companies avoid these common pitfalls.

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The supply chain is no longer perceived as a cost center. Now, it's considered a critical component of a company's business strategy, and digitalization is reinforcing supply chain's importance as a strategic resource. Digital technologies enable the supply chain—and hence the company—to meet the needs of increasingly demanding digital customers. And these technologies are transforming relationships within enterprises and externally with partners by increasing transparency and collaboration across the end-to-end supply chain.

These changes are yielding new business opportunities including enhanced productivity, deeper links with customers, mass customization and cost reduction. Studies show that digital supply chain transformation, or DSCT, can improve customer service by 30% and reduce costs by up to 20%. However, even companies that give DSCT a high priority face major hurdles to realizing this goal.

According to the research firm Gartner, "the transformation journey is taking large enterprises at least twice as long and costing twice as much as they originally anticipated." Many companies seem dissatisfied with the pace and impact of their digital transformations, as mounting investments are stubbornly slow to yield breakthroughs in supply chain performance. As was noted in an article by Paul Leinwand and Mahadeva Matt Mani in the *Harvard Business Review*, many executives express concerns that they are falling behind on making the important choices that lead to supply chain differentiation.

Recent studies, such as one from supplychaindigital.com, show that while 70% of companies say they have started a formal DSCT effort, less than half have defined or plan to implement a supply chain digital transformation roadmap. And most importantly, more than 30% are "dissatisfied" with their progress so far.

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In this article, we describe some of the main reasons why companies are experiencing a mismatch between expectations and reality in their DCST efforts. And we present a supply chain-based framework that helps companies new to DSCT, or that are struggling with its complexity and magnitude, to avoid these common pitfalls. The framework is derived from research work we carried out in this area with more than 40 companies, some of them leaders in their segments. Additionally, we show how the framework has been successfully deployed as part of the DSCT strategies of two leading companies, Dell and Coca-Cola Femsa.

Flawed approaches

In our research work, we observed three common flaws in corporate approaches to DSCT. We name them the Frankenstein effect, technocentrism and unscalability.

1. The Frankenstein effect. The Frankenstein effect refers to digital efforts that are scattered and disconnected rather than holistic and based on a long-term vision of the company's entire value chain. Supply chains are complex ecosystems made up of many moving parts and partner organizations. Fulfilling product orders requires a remarkable degree of coordination between these various entities. Also, while each link in the chain may operate like a well-oiled machine, there can be wide differences between individual links, so the end-to-end supply chain is likely to be far more disjointed.

In such a fragmented environment, many companies try to address specific isolated problems with specific isolated technologies, instead of looking at the end-to-end opportunities and implications. To try to unify this patchwork, they often employ middleware or integration applications to connect the parts. However, such a disjointed approach fails to optimize end-to end supply chains and usually results in impaired product flow visibility and weak linkages between partners.

In other words, these DSCT efforts lack a holistic vision and employ quick fixes where long-term solutions are required. Also, the benefits of digitalization are often undervalued in these situations, and individuals without the requisite expertise and vision are given responsibility for driving DSCT initiatives.

For example, companies in the retail arena implemented isolated digital technologies to diversify the channels for

collecting orders from their diversified customers. At the same time, they invested in disconnected technologies to support omni-channel logistics and distribution channels that were meant to provide an integrated solution to order delivery. A better approach is to ensure that the processes, technology, and supporting vision that underpin DSCT efforts are connected and implemented in a holistic fashion.

Fifty-seven percent of the companies that participated in our research were hampered by the lack of a holistic approach to DSCT described above. They often failed to identify the unique value propositions that should drive DSCT. One aerospace company said that addressing this challenge required departments to think outside of their individual functional or departmental boxes and to sense the opportunities much more broadly.

2. Technocentrism. The second flaw, technocentrism, refers to the tendency of most companies to become overly focused on technology when starting their digital journey. Consequently, they hunt for places to apply tech-based solutions across their supply chains. For example, some companies think that creating a digital supply chain means automating a single task, such as forecasting demand or optimizing the production schedule. However, there is a lot more to consider than just the implementation of discrete initiatives based on technology. Starting the transformation journey with a technology focus limits the value of digital approaches and may even make it more difficult to capture larger improvements over the longer term.

One example is a supply chain function in a pharmaceutical company that relied on the IT department's guidance in its digital transformation efforts. To start their journey, the team landscaped all the technologies that their competitors recently implemented. After one year of work and conflicting discussions, they had to start over, focusing first on defining their supply chain vision for a customer-centric business in e-health.

Another example is a retail textile company in the fast fashion industry. A couple of decades previous, the company had successfully defined responsiveness as its main supply chain vision; a strategy that enabled it to grow exponentially and become a worldwide leader. A key supply chain capability in support of this vision is end-to-end visibility. Hence, for more than a decade the company pioneered the implementation of IoT technology and advanced warehouse automation along every SKU in its supply chain.

When a major competitor wanted to emulate this success, it started by exploring whether it too should implement the same IoT and automation solutions—rather than the value proposition of its supply chain. After some analysis and a number of projects that achieved little, the company realized that copying its rival's tech strategy was not the right course. Its business model was based on basic products—not fast fashion items—with an emphasis on cost-cutting and manufacturing capabilities that enabled it to anticipate sales campaigns months in advance. The second company did not need the same level of visibility and tracking granularity that had brought its competitor so much success in the fast fashion market. If the emulating company had started with its value proposition, it could have avoided this false start.

3. Unscalability. Unscalability is the name we give to the third challenge some organizations face when pursuing DSCT. Technology is part of this problem too, but in a different context. In unscalability, tech projects prove successful at the pilot stage, but falter when they are scaled up to capture economies of scale. Pilots and prototypes typically succeed locally with a small group of motivated people working in a controlled environment, but may not be robust enough to deliver the projected value across a dynamic, end-to-end supply chain or even along the synergies achieved when combining several supply chains. Additionally, there may be too many entities in the supply chain whose requirements differ fundamentally from those of the pilot unit to allow a simple copy-and-paste approach. Such failures breed skepticism and drain precious momentum from the transformation effort.

Coming back to the fast fashion industry leader, it avoided this flaw while other companies didn't. It quickly scaled up its digital transformation efforts while supporting the alignment of core supply chain capabilities (responsiveness and flexibility) behind the company vision, thus allowing it to progress its digital capabilities. In particular, the company scaled up after capturing the benefits of automation in warehouse processes and expanded toward augmentation. This was due to the improvement in quality and the availability of data, enabling the company to predict demand more accurately, and plan process lead times with more precision.

For example, by measuring progress with new key predictive indicators (KPI), the company was able to assess how it might leverage these newfound capabilities to expand end-to-end responsiveness. The improvements in responsiveness might be analyzed to detect the most relevant factors and then learn how and when to improve (key learning indicator; KLI). This transition was very natural for this company because its responsiveness culture made it adept at challenging the status-quo in every assumption of the end-to-end value chain.

Based on the applied research we have carried out with supply chains from many different industries and in various stages of DSCT maturity, we have developed a framework that helps companies avoid the three common pitfalls described above. Applying the framework can also accelerate the implementation of a successful DSCT strategy.

A framework for DSCT success

The digitalization of supply chains implies an overarching transformation that requires the application of digital technology and data to transition toward a value- driven supply chain. Hence, the key question for companies embarking on this journey is how will they embrace the end-to-end opportunities yielded by a digital supply chain? Also, how do they create dynamically the right digital capabilities to retain the flexibility to change with the evolution of markets?
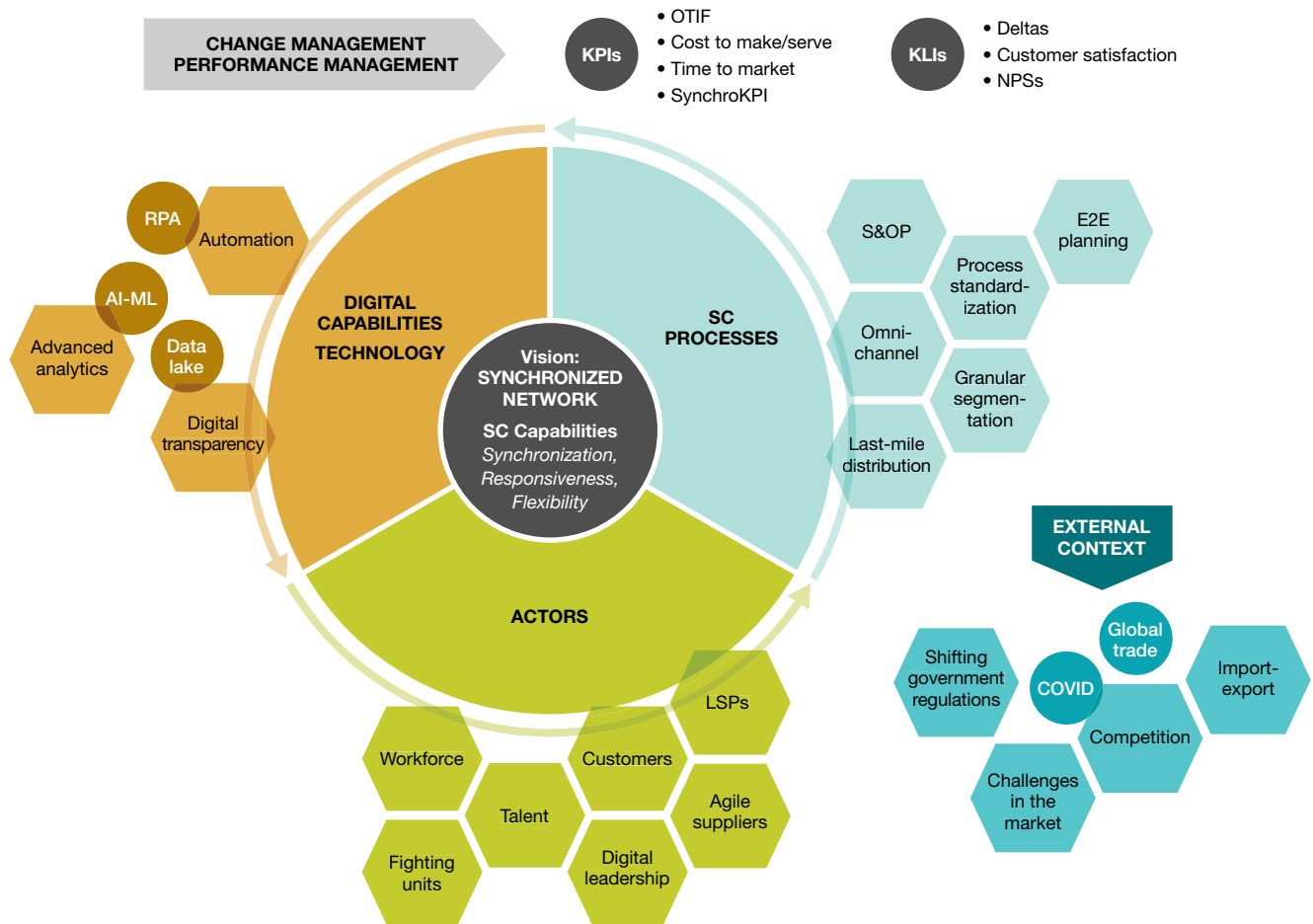
Once these questions are addressed, technology solutions can be brought into play as an enabler of these capabilities—not earlier in the process. The framework presented below helps companies to answer these questions and map a way forward.

The framework serves as a foundation for developing and implementing a DSCT strategy in any company—but it is not a silver bullet. Every company's supply chain is different and requires a specific approach to digitalization. However, we believe that a general framework can put companies on the right track and significantly increase the likelihood of successful in their DSCT efforts. Moreover, such a framework is needed given the number of companies that require guidance as they take their first steps toward digitalization.

Our framework (Figure 1) consists of three main elements: The vision, the structural levers and the drivers of change. We will use two case studies, electronics manufacturer Dell and beverage company Coca-Cola Femsa, to illustrate the execution of the framework. These are particularly instructive cases because of the challenges the companies faced in their supply chains.

FIGURE 1
Drivers of change: KPIs, KLIs

CHANGE MANAGEMENT PERFORMANCE MANAGEMENT

KPIs
- OTIF
- Cost to make/serve
- Time to market
- SynchroKPI

KLIs
- Deltas
- Customer satisfaction
- NPSs

DIGITAL CAPABILITIES TECHNOLOGY
- RPA
- Automation
- AI-ML
- Advanced analytics
- Data lake
- Digital transparency

Vision: SYNCHRONIZED NETWORK
SC Capabilities
Synchronization, Responsiveness, Flexibility

SC PROCESSES
- S&OP
- Process standardization
- E2E planning
- Omni-channel
- Granular segmentation
- Last-mile distribution

ACTORS
- LSPs
- Workforce
- Customers
- Talent
- Agile suppliers
- Fighting units
- Digital leadership

EXTERNAL CONTEXT
- Shifting government regulations
- Global trade
- COVID
- Import-export
- Competition
- Challenges in the market

Source: Authors

Step 1. Create the vision

Because DSCT enables the transition to a value-driven supply chain, the first step is to clarify how the company envisions the supply chain's contribution to its strategic goals and the deficiencies that hinder the achievement of these goals. The vision should delineate the digital supply chain it wishes to create and how this entity connects to the organization's goals and overarching strategy.

This vision will serve as a long-term guide for the DSCT process and will help the company to set specific goals that may evolve over time as digitalization progresses and matures.

For example, one critical contribution supply chains make to business goals is to guarantee the availability of products in the right place at the right time. Also, there is increased emphasis on timely, reliable service in today's intensely competitive markets. These demands require supply chains to be flexible and responsive. They must deliver easy, intuitive order placing options, ready availability of accurate information on order status and the ability to adjust orders on the fly and offer alternatives if there is a glitch. Needless to say, end-to-end supply chain orchestration is a prerequisite for delivering on these service features and digitalization can provide a path to a closely coordinated supply chain.

Before starting their DSCT journey, Dell was facing some challenges to serve big orders due to a lack of visibility along its complex supply chain. The manufacturer saw potential in digitalization to improve order fulfillment and on-time deliveries, and these objectives became one of the main pillars of its digital transformation.

Dell's vision, "*Make the Right Commitment*," translated into providing more reliable commitments and more realistic expected delivery dates to customers, while providing feasible alternatives/options when the selected product was not available or a disruption provoked a change in supply chain planning. Having this vision helped the company to focus on what

was important to achieve its business goals, instead of falling prey to technocentrism and getting lost in a myriad of digital technology implementations.

In contrast, Coca Cola Femsa had started competing in the direct-to-consumer space when its DSCT efforts began. The company wanted to create a modern omni-channel customer experience, in which a portfolio of available products and several delivery options were provided to improve customers' convenience but also to optimize the company's own operations. Coca Cola Femsa's vision, "*Ensure a Seamless Omni-channel Experience*," involved segmenting customers according to their expectations and needs, in order to offer a service that delighted customers while keeping costs under control. Their main challenge was the Frankenstein effect; different initiatives had been launched by different departments and parts of the supply chain. The lack of a cohesive and coordinated approach meant that the envisioned omni-channel experience could not be achieved.

Step 2. Integrate the structural levers

Once the vision is set, the work to transform the operations begins. We have identified three structural levers that companies should pull in order to start this transformation.

Processes. Processes that support the supply chain vision must be identified, mapped and analyzed in order to pinpoint the problem areas, ascertain which technologies are in use, the availability of data and identify the actors involved. Often, these processes must be reconfigured to enable the digital transformation and make the most of the new digital tools. It may be necessary to design new supply chain processes because digitalization does not simply involve the implementation of new technology, but a new digital mindset for running operations.

Dell quickly realized that the key supply chain process required to achieve its vision, "*Make the Right Commitment*," was planning. The company's supply chain planning ability had to be improved to enable more realistic expected delivery dates and increase efficiency through better connected, nimble plans. Its supply chain planning

process was very complex, involving a variety of products, geographies and fulfilment models. Demand and supply planning, S&OP, forecasting and order management were among the processes that had to be more integrated and flexible.

Coca-Cola Femsa's vision, "*Ensure a Seamless Omni-channel Experience*," required strong coordination of various logistics and ordering channels. The company decided to orchestrate new omni-channel processes from order to delivery. This vision helped Coca-Cola Femsa focus its efforts on creating an integrated response to every order, improving forecasting, sales and operations and planning processes along the way. It also created new ways of working,

TABLE 1

Framework elements for Dell and Coca-Cola Femsa DSCT

	VISION	STRUCTURAL LEVERS	DRIVERS OF CHANGE
DELL	*Make the right commitment:* Sell what is available or offer supportable alternatives, promise it when it can be delivered with certainty	*Processes:* SC planning *Digital capabilities:* Visibility, automation *Ecosystem:* Rapid prototyping culture, change management with HR	Forecast accuracy Lead time accuracy Backlog level Perfect order index
COCA-COLA FEMSA	*Ensure a seamless omni-channel experience:* Create a best-in-value experience for our customers, from order entry to delivery, through diverse channels at the right time, cost and quality	*Processes:* Sales and operations planning (S&OP) *Digital capabilities:* Visibility, predictive analytics *Ecosystem:* Integration with commercial and LSPs	Forecast accuracy Customer out of stock Cost-to-serve

Source: Authors

breaking down silos between departments and partnering with logistics service providers to enable a more flexible and responsive execution of the omni-channel experience along the company's last-mile logistics network.

Digital capabilities. Digital capabilities are the key competencies that a company requires to achieve its supply chain vision through the application of digital technologies. Some examples of digital capabilities are automation, transparency, advanced analytics, predictive capabilities and end-to-end visibility. Each company needs to develop a different set of digital capabilities to realize its vision. Also, developing each digital capability requires certain digital technologies to be deployed and the right kind of data. However,

it is important to be technology agnostic when evaluating the necessary capabilities, and to bring in technologies and data as enablers of the vision.

For Dell, end-to-end visibility was a key requirement to moving the company closer to realizing its supply chain vision. The supply chain planning process used some digital solutions, but analog band-aids were in place for data analysis and integration among different platforms; a typical example of the Frankenstein effect. Inspired by the company's vision, Dell realized that digital transformation was not about digitizing current processes, but about rethinking the supply chain planning process to take full advantage of what digital technologies could provide. The company prioritized identifying process gaps and critical business needs before selecting the required supporting technology. Dell ended up prioritizing predictive business planning and execution, order visibility, lead time prediction and Robotic Process Automation.

A prerequisite to this work was building the data foundations. Ensuring data availability and integrity across many legacy systems and many different stakeholders while achieving an end-to-end reach was a challenge. Data standardization and data gathering activities consumed much of the time and resources available for digital transformation at the start of Dell's journey.

Coca-Cola Femsa's vision required the company to increase transparency and visibility and improve predictive analytics capabilities along its end-to-end supply chain. Sharing forecasting, inventory positions, information on projected warehouse inflows and outflows, capacity utilization and the price of logistics service providers was key to deploying the holistic omni-channel experience it envisioned while maintaining reasonable operating costs. Factors such as the levels of data latency and granularity required was part of the debate around what transparency meant and how much detail was required to achieve the company's goals.

Ecosystem. DSCT programs are implemented and influenced by people and departments. To succeed, digital transformation project teams need to consider the ever-changing ecosystem of actors involved.

A combination of top-down and bottom-up approaches is usually the most successful path for DSCT teams to follow. In all likelihood, senior managers trained in digital transformation will lead the strategy's deployment. These leaders need to inspire and promote a new agile culture of working and remove any boundaries and silos that impede progress. Meanwhile, achieving buy-in from the operational actors whose work and

processes will be affected by the transformation is essential. The right motivation and incentives need to be deployed. A culture of psychological safety in how the teams are empowered to explore and exploit their own digital initiatives must be encouraged to promote bottom-up engagement and innovation. Other organizational challenges to anticipate are shortages of digital talent in certain areas and potential difficulties in coordinating the supply chain and IT departments.

Dell reinforced its DSCT team with analysts and strategists. The company created a DSCT team that rapidly prototyped and tested new ideas. The successful ideas were passed to the company's IT team to develop, connect and scale. Change management was a fundamental piece of the company's digital transformation story. For example, HR provided key support: Corporate culture needed to move away from the implementation of ad-hoc solutions and toward integrated ones; expectations regarding which technologies or applications to deliver and how fast needed to be managed; operational resources had to be leveraged (especially where the transformation increased individual workloads).

The widespread adoption of new tools and planning processes across business units, regions and countries became a challenge. These issues are associated with the unscalability challenge, and Dell addressed them using two strategies: (1) rapid prototyping to identify and test successful solution followed by close coordination with IT to standardize and scale, (2) focus on change management to facilitate adoption.

Coca-Cola Femsa wanted to create a seamless, best-in-value customer experience across multiple channels, which required a high level of integration between the supply chain and commercial departments because they were in charge of order management and demand forecasting. This need led to interdepartmental discussions, the creation of new processes and the establishment of shared goals. For example, the commercial department wished to provide customers with everything they asked for, while supply chain was more mindful of the costs involved and the operational implications.

After discussing the issues and gaining an understanding of each other, they reached consensus on defining an omni-channel experience. The experience strikes a balance between two dimensions: what the company can commit to, based on criteria including inventory availability, capacity utilization, and what it should commit to, based on criteria such as cost to serve, customer segmentation, and channel prioritization.

Step 3. Activate the drivers of change
DSCT usually starts in a serendipitous way, with scattered

digital initiatives casually initiated by digital champions across the organization. These well-intentioned individuals inadvertently contribute to the Frankenstein effect. The digital transformation should be envisioned as a lifelong journey; a journey of continuous discovery and reconfiguration. Companies may transition from early adopters to mature digital entities through a series of loops that reinforce and improve their digital capabilities. These feedback loops are represented in the framework by the circle in which the structural levers are integrated along

consecutive rounds, enabling the company to become proficient in the "digital language" enabled by the data.

Having acquired a digital language, the company can select KPIs to measure the progress of its DSCT efforts and develop KLIs to refine the set of KPIs as needed. This combination helps the company maximize the benefits derived from digitalization, especially when harnessing AI and Machine Learning to detect operational patterns that indicate opportunities for improvement. Each feedback loop may require different KPIs and KLIs, and these measures might have to be modified as the DSCT program evolves. Project teams should also keep in mind that KPIs are intended to measure their progress toward realizing the

supply chain vision—not the level of implementation of digital technologies. Some companies are inclined to take the latter path to justify their ROIs.

To illustrate these effects, lets focus on Dell's vision of "*Make the Right Commitment*." The company selected forecast accuracy, lead time accuracy, backlog level and perfect order index (POI) as some of their KPIs. Dell used several KLIs to achieve improvements in operational efficiency in certain areas such as dealing with product shortages recoveries and ensuring on-time deliveries. More specifically, Dell improved the accuracy of its long-range part forecasts by 15%, reduced hard drive parts shortages by 77% and achieved a 5% improvement in on-time shipments.

Both Dell and Coca-Cola Femsa attached tremendous importance to forecasting, order fulfillment and customer satisfaction to activate their feedback loops and achieve their respective visions. Coca-Cola Femsa's vision, "*Ensure a Seamless Omni-channel Experience*," led the company to focus its performance efforts on forecast accuracy (short and long term), customer out of stock and cost-to-serve. The company is now implementing this particular DSCT vision through 10 pilot projects, with the core objective to align the channels of orders with the company's delivery distribution channels. To this end, Coca-Cola Femsa closely monitors order fulfillment (OTIF), and how clients and final customers understand the perception of this value proposition via the net promoter score (NPS) measure. To keep the effort moving in the right direction, the company's KLIs were just the deltas of its KPIs that measure in fine detail the rate of progress or lack thereof in each specific area.

Supply chain's core role

The lessons learned from following the DSCT framework described above can be used by any company, but there is no single recipe for success. Each enterprise has its own strategic vision and set of priorities, and a unique supply chain. Hence, companies need to customize the application of the framework's elements. Also, they need to be aware that the digital mindset is incompatible with traditional economic, strategic and operating models because the economies of scale of digitalization present new drivers.

Executives should not underestimate the increasing momentum of digitalization, and the importance of supply chains in providing a solid platform for making the required connection between strategy and operations. ∞∞