

RESEARCH PAPER

The Intelligent Supply Chain: A Maturity Model for Digitization and Visibility

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Four trends are fueling a digital supply chain revolution: big data, supply chain instrumentation, computing innovation and robotics advancements. These breakthroughs, and the hype surrounding them, lead many supply chain professionals to view digitization as a competitive necessity. For many, however, implementation steps and the overall strategy are unclear.

It is important to begin by defining digital supply chain and its core attributes, establishing the current state of digital supply chain transformation, pinpointing opportunities and challenges, and creating a road map forward. To determine the best methods for success, we conducted in-depth interviews with senior executives at more than a dozen firms — all of which are leaders in their industries. Our findings revealed where these firms stand on their digital transformation journey, the challenges they face and strategies they are using to succeed.

Defining digital supply chain

While the term digital supply chain is widely used, there is little agreement on what it means. We asked supply chain leaders, “What is a digital supply chain?” and found large variation in their responses. Some focused on a single platform while others looked at demand and supply visibility. We did find one common thread: A digital supply chain maximizes the capabilities of digital technologies for the planning and execution of transactions, communications and actions.

Defining core attributes

Digital supply chains sense, analyze, predict and respond to changes in the operating environment. Essentially, this means using technologies, organizational structures and skills to capture data; convert it into information; analyze it; and adapt to it more quickly, accurately and specifically than conventional supply chains could ever do. The leaders we talked to alluded to these elements, though often indirectly, and rarely holistically. Nevertheless, their combined comments revealed a model of core attributes that provide both a useful description of digital supply chains and the beginnings of a maturity model. (See Figure 1.)

Figure 1: Core attributes of digital supply chains:

Digitized Data	Information Connection	Intelligent Insight	Adaptive Action
Sensing Capturing Standardizing	Combining Filtering Structuring Reporting	Visualizing Diagnosing Predicting Prescribing Cognifying	Alerting Matching Orchestrating Automating Gigging

The first step begins with digitized data. While supply chain professionals have access to lots of data today, typically only a small fraction meets the desired criteria. Accordingly, getting data that has strategic value in a useful form can be a huge first step toward digital maturity. Our interviews pointed out the challenges associated with this first step. No company had all digitized data available in real time (immediately when captured). One leader complained that data provided by their major customer was “not complete, not real time” and, subsequently, “not always used.” Many complained that they are awash in data but lacking in information.

The next step requires creates information through connection. Several leaders we interviewed expressed the aim to make information available to the right people at the right time as an important digital supply chain goal.

Third, a digital supply chain must provide insights and intelligence. This requires applying analytics to diagnose situations and events, using algorithms to predict possible outcomes and risk assessments, and prescribing courses of action with possible alternatives.” As one leader noted, the digital supply chain needs to “develop information and insight so that a supply chain can provide options.”

Lastly, data, information and insights are of little value if they cannot be acted on and adapted to. To realize the full value of a digital supply chain, people must be able to pursue time-sensitive opportunities.

Current state of digital supply chain transformation

Our research examined the journey companies are taking in their digital transformation, where they are along the path and whether they have precise goals and a roadmap. We focused on the supply chain aspect of this process, not product or service design. Somewhat surprisingly, our study revealed that most firms, even leading ones, are not that far along with digital transformation. All the leaders we spoke with stated, somewhat apologetically, that they believed they were behind the curve in digital processes and certainly a long way from reaching maturity. A key finding from our research is that your company is probably not as far behind as you think.

Opportunities and challenges

Another important dimension of digital maturity relates to the degree to which a firm has addressed key enablers and transformation challenges. When asked about the obstacles to change, all interviewees agreed that culture, talent and organizational structure shortcomings are greater impediments to transformation than technological limitations.

An important challenge for many firms is determining where to place transformation leadership within the organizational structure, especially structures that lack chief supply chain officer offices, which offer natural homes for responsibility. In terms of intellectual capital, one interviewee succinctly stated the human resource challenge: "Transformation will require a different skill set for people who are asked to interact with intelligent systems."

Today, data analysts are playing increasingly important roles in the development and use of analytics that make diagnoses and predictions. However, tomorrow's systems will require a more general set of skills, including business domain knowledge, to properly interpret and apply prescriptions made by increasingly intelligent software agents.

Road map

Most companies are far from realizing the benefits of fully digitized, connected, intelligent and adaptive supply chains. Nevertheless, leaders understand the potential, along with the need to develop and follow a road map, rather than merely acquiring technologies to solve problems. But surprisingly few firms seem to have these plans in place.

A good road map guides selection of projects for a transformation portfolio and is shaped by the specific strategies and competences of the firm. Each plan will be unique, as it matches its unique circumstances. Even so, we believe it is valuable for all leaders to keep certain essential capabilities in sight as they work through the details of their transformation.

Capabilities can be viewed along two core dimensions of technology enablement: automation and insight. Strategic leaders can combine automation and insight in ways that create tremendous opportunities for supply chain transformation. This also build capabilities leading to competitive advantage.

When achieved, successful digital transformation will enable the organization to develop automation and insight that radically advance visibility, intelligence, efficiency, customer experience, agility and customization.

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