Analytics: Laying the Foundation for Supply Chain Digital Transformation

By Sanjiv Mahajan, Sandip Saha and Alfonso Macias

As supply chain leaders set objectives and strategies for 2018 and beyond, digital transformation should be top of mind. While 94% of organizations say digital transformation will fundamentally change supply chains, only 44% have a strategy for getting there, according to The Hackett Group's recent supply chain trends study. Analytics and insight-driven decision making should be focus areas for supply chain leaders, as they are foundational to digital transformation. This article highlights the increasing importance of using analytics to drive improved supply chain performance and includes key trends, an analytics framework, an analytics capability maturity model, ways business objectives are enabled by analytics, and key considerations for a roadmap for implementing advanced supply chain analytics as the first step of digital transformation.

The role of analytics in supply chain digital transformation

The Hackett Group has developed a digital transformation framework for supply chain that incorporates analytics and insights as its underlying foundation (**Fig. 1**). Establishing an effective analytics and insight-driven enterprise enables the other four digital supply chain capabilities included in the framework: digital customer engagement, digital workforce, digital service optimization and digital ecosystem. Effective execution of analytics and an insight-driven enterprise requires three critical components:
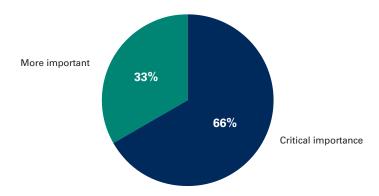
- Capture and integration of large, complex data sets.
- Deployment of big data technology to manage the data effectively and efficiently.
- Use of descriptive, diagnostic, predictive and prescriptive analytics to uncover insights from diverse, complex and large-scale data sets.

FIG. 1   Digital transformation framework for supply chain

Digital supply chain capabilities

2   Digital customer engagement
- Omnichannel access
- Engagement from anywhere (corporate, field, home and mobile)
- Real-time information and status on all requests and transactions

3   Digital workforce
- Cross-functional, end-to-end process collaboration
- Iterative and networked collaboration among teams
- Easy access to unified information

4   Digital service optimization
- Automated processes based on business rules
- Pervasive, real-time flow of information
- Workflow and information sharing tools

5   Digital ecosystem
- Omnichannel order and distribution networks
- Direct to consumer and B2B commerce
- Connected information and analysis to identify/mitigate supply risks

1   Analytic-driven business insight
- Large, complex data sets captured
- Big data technologies deployed to manage data
- Descriptive, diagnostic, predictive and prescriptive analytics performed to uncover hidden values from diverse, complex, and large-scale data sets

Source: The Hackett Group

Supply chain leaders are 100% aligned on the increased importance of deploying advanced analytics over the next two-to-three years to drive decision making per The Hackett Group's recent supply chain trends study – in fact, over two thirds of them deemed it to be of critical importance (Fig. 2).

FIG. 2   Projected level of importance of advanced supply chain analytics in the next 2-to-3 years
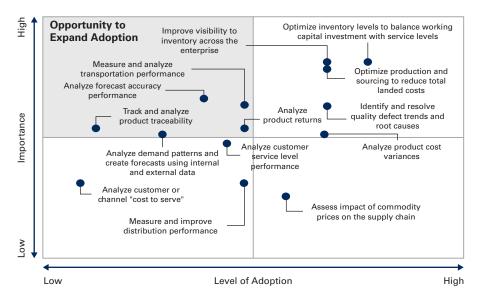

Source: Supply Chain Trends Study, The Hackett Group, 2017

However, there appears to be an opportunity to close the gap in adoption of a number of supply chain analytics use cases that supply chain leaders deem to be important (Fig. 3). Examples of these are:

- Forecast accuracy.

- Demand patterns and forecast creation, using internal and external data.

- Product tracking traceability.

- Transportation performance.

- Analysis of product returns.

FIG. 3   Supply chain analytics use cases: adoption vs. importance ratings

Source: Supply Chain Digital Transformation Study, The Hackett Group, 2017

The benefits of supply chain analytics are too great to be ignored. Based on The Hackett Group's experience, key benefits drawn from measuring supply chain performance using analytics include:

- Better outcomes driven by using a performance baseline: A majority of organizations that complete formal business cases with cost and benefits realize better results.

- Results driven by accountability and visibility: Significantly higher productivity levels are realized in organizations that routinely measure transactions per FTE, compared to organizations that do not have this measurement practice.
- Visibility of global data: Top performers consistently say global visibility of customer information and business volumes are very important to realizing their strategies.
- Putting teeth behind performance goals and align incentives to the metrics: A majority of top performers link incentive compensation with achievement of key improvement objectives, with metrics aligned to the business goals.
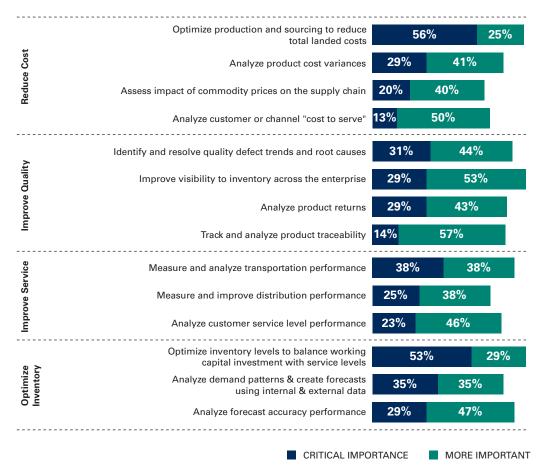
Trends in the application of advanced supply chain analytics

So, what types of analytics use cases are on the agenda for supply chain leaders over the next two-to-three years?

The Hackett Group's recent study of supply chain trends identified analytics use cases that are increasing in importance to supply chain leaders across four key dimensions: reduce cost, improve quality, improve service and improve working capital (optimize inventory) **(Fig. 4)**. Examples of analytics use cases gaining in importance across these dimensions are:

- Reduce cost: optimizing production and sourcing to reduce total landed costs (81% of respondents).
- Improve quality: identifying and resolving of quality defect trends and root causes (75% of respondents).
- Improve service: measuring and analyzing transportation performance (76% of respondents).
- Improve working capital (optimize inventory): optimizing inventory levels to balance working capital investment with service levels (82% of respondents).

FIG. 4   Projected level of importance of supply chain analytics use cases in the next 2-to-3 years

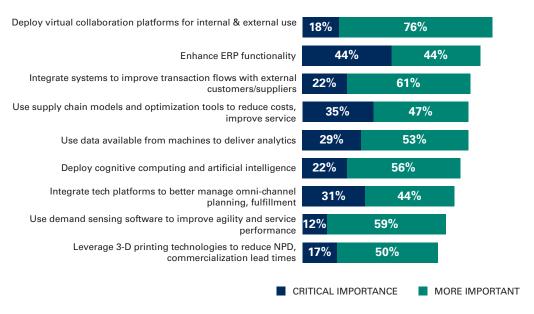|	CRITICAL IMPORTANCE	MORE IMPORTANT
Reduce Cost		
Optimize production and sourcing to reduce total landed costs	56%	25%
Analyze product cost variances	29%	41%
Assess impact of commodity prices on the supply chain	20%	40%
Analyze customer or channel "cost to serve"	13%	50%
Improve Quality		
Identify and resolve quality defect trends and root causes	31%	44%
Improve visibility to inventory across the enterprise	29%	53%
Analyze product returns	29%	43%
Track and analyze product traceability	14%	57%
Improve Service		
Measure and analyze transportation performance	38%	38%
Measure and improve distribution performance	25%	38%
Analyze customer service level performance	23%	46%
Optimize Inventory		
Optimize inventory levels to balance working capital investment with service levels	53%	29%
Analyze demand patterns & create forecasts using internal & external data	35%	35%
Analyze forecast accuracy performance	29%	47%

Source: Supply Chain Trends Study, The Hackett Group, 2017

What are the trends in technology and organization enablers being used to support supply chain analytics?
To enable these analytics use cases, supply chain leaders need to consider how their technology tools and organizations need to evolve as they develop their roadmaps. With regard to technology, supply chain organizations are prioritizing technology related to analytics (**Fig. 5**) – supply chain leaders are focused on:

- Virtual collaboration that enables analytics across various geographies.

- Improved ERP functionality and greater integration of systems to produce more holistic, end-to-end data for analysis.

- The development of models, optimization tools and dashboards.

FIG. 5 Projected level of importance of supply chain-related technology in the next 2-to-3 years

	CRITICAL IMPORTANCE	MORE IMPORTANT
Deploy virtual collaboration platforms for internal & external use	18%	76%
Enhance ERP functionality	44%	44%
Integrate systems to improve transaction flows with external customers/suppliers	22%	61%
Use supply chain models and optimization tools to reduce costs, improve service	35%	47%
Use data available from machines to deliver analytics	29%	53%
Deploy cognitive computing and artificial intelligence	22%	56%
Integrate tech platforms to better manage omni-channel planning, fulfillment	31%	44%
Use demand sensing software to improve agility and service performance	12%	59%
Leverage 3-D printing technologies to reduce NPD, commercialization lead times	17%	50%

Source: Supply Chain Digital Transformation Study, The Hackett Group, 2017

With regard to the organization and enterprise talent, supply chain organizations are looking to develop their talent pool in lockstep with their internal and external data capture and integration and technology initiatives in their implementation roadmaps. Supply chain leaders are focused on talent that:

- Understands underlying data concepts to effectively communicate decisions to senior leadership and to their teams

- Understands how to integrate analytics into everyday decision making processes

- Can design and develop robust analytics solutions through data science and application development

- Views analytics as a tool to build competitive advantage relative to competitors in the marketplace

Despite positive momentum, The Hackett Group's experience indicates that many supply chain leaders continue to face challenges that impede their ability to capitalize on these trends. These challenges (opportunity areas to address) include:
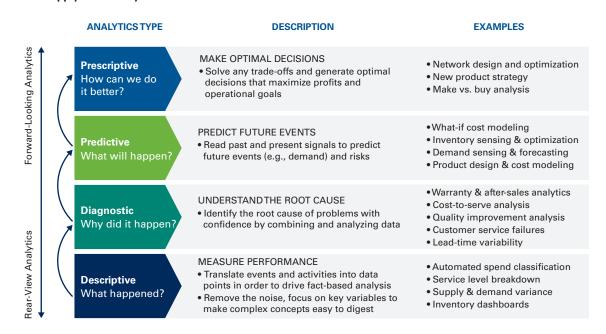
- Disparate processes across functions and geographies

- Information silos, preventing the sharing of information across functions

- Measurement minutiae – measuring every component of the detail in numerous ways distracts focus from the most meaning key performance indicators

- "Islands of excellence" – essentially, focusing on optimizing sub-components, but not the big picture for the organization

Continuum of supply chain analytic capabilities

Supply chain leaders consume analytics ranging from descriptive, rearview-facing reports to prescriptive and forward-looking analytics to drive meaningful decision making (Fig. 6). The Hackett Group has defined the types of supply chain analytics that differentiate based on insights sought and how they feed decision-making processes:

- Descriptive analytics (What happened?) use historical data to report performance but provide limited, if any, insights on how to improve business performance.

- Diagnostic analytics (Why did it happen?) layer deeper, root-cause-based analysis onto historical, fact-based descriptive analytics to explain why certain events took place (e.g., attribution of key variables).

- Predictive analytics (What will happen?) transition from rearview, root cause analysis to forward-looking, future-based predictions based on key events and their attributions. Predictive analytics provide organizations with the ability to be proactive rather than reactive.

- Prescriptive analytics (How can we do better?) look to optimize how the organization operates (e.g., next best action, artificial intelligence) through machine-driven rapid translation of insight into action.
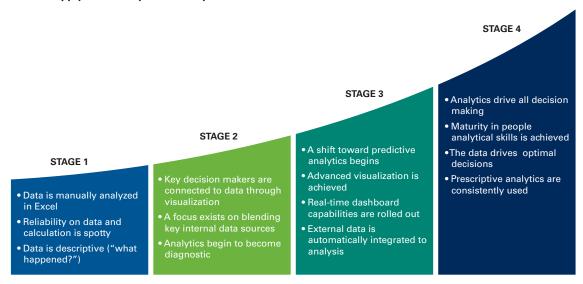
FIG. 6 Supply chain analytics framework

ANALYTICS TYPE	DESCRIPTION	EXAMPLES
Prescriptive How can we do it better?	MAKE OPTIMAL DECISIONS • Solve any trade-offs and generate optimal decisions that maximize profits and operational goals	• Network design and optimization • New product strategy • Make vs. buy analysis
Predictive What will happen?	PREDICT FUTURE EVENTS • Read past and present signals to predict future events (e.g., demand) and risks	• What-if cost modeling • Inventory sensing & optimization • Demand sensing & forecasting • Product design & cost modeling
Diagnostic Why did it happen?	UNDERSTAND THE ROOT CAUSE • Identify the root cause of problems with confidence by combining and analyzing data	• Warranty & after-sales analytics • Cost-to-serve analysis • Quality improvement analysis • Customer service failures • Lead-time variability
Descriptive What happened?	MEASURE PERFORMANCE • Translate events and activities into data points in order to drive fact-based analysis • Remove the noise, focus on key variables to make complex concepts easy to digest	• Automated spend classification • Service level breakdown • Supply & demand variance • Inventory dashboards

Forward-Looking Analytics ↑ (Prescriptive, Predictive)
Rear-View Analytics ↓ (Diagnostic, Descriptive)

Source: The Hackett Group

Implementation of this range of supply chain analytic types requires organizations to assess their current capabilities and desired future-state model so they can define their analytics journey. To support that, The Hackett Group has defined four stages of maturity for analytics capabilities (Fig 7).
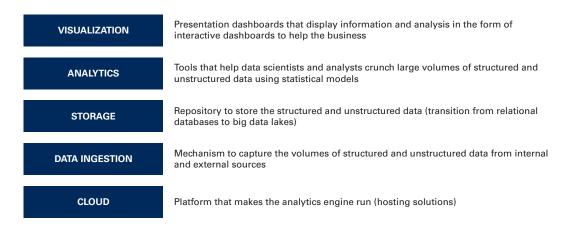
FIG. 7   Supply chain analytics maturity model

STAGE 1
- Data is manually analyzed in Excel
- Reliability on data and calculation is spotty
- Data is descriptive ("what happened?")

STAGE 2
- Key decision makers are connected to data through visualization
- A focus exists on blending key internal data sources
- Analytics begin to become diagnostic

STAGE 3
- A shift toward predictive analytics begins
- Advanced visualization is achieved
- Real-time dashboard capabilities are rolled out
- External data is automatically integrated to analysis

STAGE 4
- Analytics drive all decision making
- Maturity in people analytical skills is achieved
- The data drives optimal decisions
- Prescriptive analytics are consistently used

Source: The Hackett Group

Most companies operate in stage 1 and stage 2, with small pockets building toward stage 3. The organizations in the early stages of the maturity model (stages 1 and 2) may interpret having a visualization tool or an advanced statistical analytics suite as having analytics. However, there is an ecosystem of required technologies that needs to be assembled underneath the visualization tool to perform as a comprehensive end-to-end analytics solution (**Fig. 8**).

FIG. 8   Key elements of a supply chain analytics solution

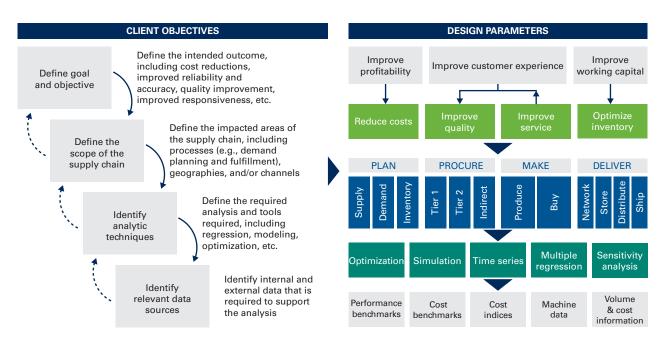|	
VISUALIZATION	Presentation dashboards that display information and analysis in the form of interactive dashboards to help the business
ANALYTICS	Tools that help data scientists and analysts crunch large volumes of structured and unstructured data using statistical models
STORAGE	Repository to store the structured and unstructured data (transition from relational databases to big data lakes)
DATA INGESTION	Mechanism to capture the volumes of structured and unstructured data from internal and external sources
CLOUD	Platform that makes the analytics engine run (hosting solutions)

Source: The Hackett Group

Organizations in stages 3 and 4 have the analytical maturity to understand the importance of each of these elements and include them in their supply chain analytics solutions. In addition, a stage 4 organization leverages analytics across the analytic type continuum to align them based on the requirements for supporting respective decision making.

Aligning your analytics with your goals and strategies

Based on The Hackett Group's experience and best practices in designing an advanced analytics roadmap, it is important to first define your strategic objectives. Building on your strategic objectives, you can then design your analytics pathway (Fig. 9):

- Define the scope of the supply chain to include in your analytics.
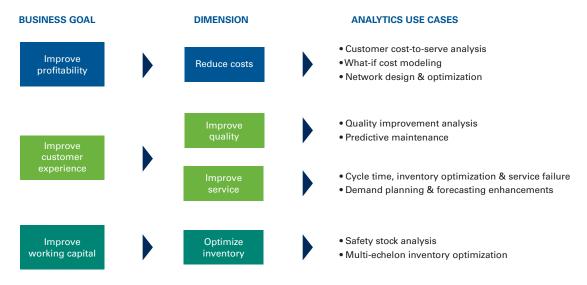- Identify the required analyses and tools and technology required.
- Identify the internal and external data requirements.

FIG. 9 Using advanced analytics to achieve supply chain objectives

Source: The Hackett Group

Once business goals and scope are defined, the supply chain analytics use cases and associated metrics can be identified that will provide required insights to drive decision making. The Hackett Group's experience has identified specific supply chain analytics use cases to deploy to achieve various business goals (Fig. 10).
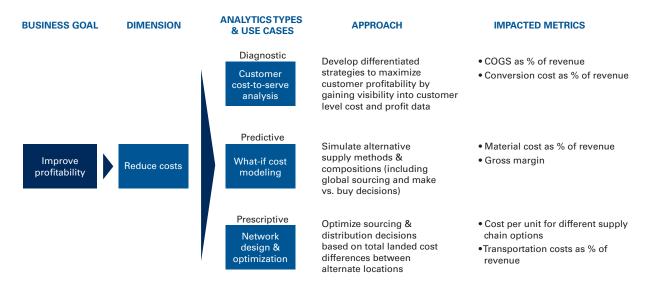
FIG. 10 Aligning supply chain analytics use cases to business goals

Source: The Hackett Group

Depending on the insight sought to drive decision making, these supply chain analytics use cases fall across the diagnostic, predictive and prescriptive analytic types depicted in Fig. 6, the supply chain analytics framework. An example of recommended approaches and metrics to include for analytics use cases tied to improving profitability, specifically cost reduction, is included in **Fig. 11**.

FIG. 11   End-to-end framework to link metrics to supply chain analytics use cases to business goals

BUSINESS GOAL	DIMENSION	ANALYTICS TYPES & USE CASES	APPROACH	IMPACTED METRICS
Improve profitability	Reduce costs	**Diagnostic** — Customer cost-to-serve analysis	Develop differentiated strategies to maximize customer profitability by gaining visibility into customer level cost and profit data	• COGS as % of revenue • Conversion cost as % of revenue
		Predictive — What-if cost modeling	Simulate alternative supply methods & compositions (including global sourcing and make vs. buy decisions)	• Material cost as % of revenue • Gross margin
		Prescriptive — Network design & optimization	Optimize sourcing & distribution decisions based on total landed cost differences between alternate locations	• Cost per unit for different supply chain options • Transportation costs as % of revenue

Source: The Hackett Group

The Hackett Group's perspective

The supply chain analytics revolution is under way as part of the journey to digital transformation, driven by more easily accessible technology, a strong talent pool and numerous and rich data sources. If implemented effectively and run efficiently, supply chain analytics provides a powerful tool for driving vastly improved, insight-driven business results and creating a sustainable competitive advantage.

As supply chain leaders define their roadmaps for the next two to three years, based on The Hackett Group's experience, critical considerations for successful implementation include:

- **Deliver value early:** Understand that realizing value requires investment, and the earlier that initiatives can justify the investment, the higher the likelihood of continuing to receive executive-level sponsorship.

- **Use pilot programs to demonstrate value:** Testing and learning in an iterative and safe environment through a pilot can accelerate the value creation process.

- **Build team of "power users" and data scientists:** A team that works within the business enhances the organization structure to take advantage of developing and interpreting the analytics insights and to translate them into action.

With the right approach, companies can develop a roadmap that ties the analytics back to the organization's goals, drive insights to continually drive toward improved performance and set the stage for the rest of the digital transformation journey.

About the Authors

Sanjiv Mahajan

Associate Principal, Strategy & Business Transformation

Sanjiv is an associate principal in The Hackett Group's Strategy & Business Transformation practice. He has over 20 years of industry and consulting experience delivering solutions in business strategy, supply chain transformation, business process reengineering and continuous improvement, and productivity improvement.

Sandip Saha

Manager, Strategy & Business Transformation

Sandip is a manager in The Hackett Group's Strategy & Business Transformation practice and has over 11 years of consulting experience, centered on helping clients in developing strategies to retain customers, designing superior customer experiences, enabling through technology and digital assets and measuring impact through advanced analytics. Sandip has a diverse set of industry experience, including high tech, software, wireless, wireline, healthcare, pharmaceuticals, automotive, electronics and financial services.

Alfonso Macias

Senior Consultant, Strategy & Business Transformation

Alfonso is a senior consultant in The Hackett Group's Strategy & Business Transformation practice. He has over three years of experience focusing on process optimization, technology assessment, and systems implementation. Alfonso has worked across various industries including financial services, insurance, pharmaceuticals, consumer packaged goods and industrial manufacturing.

For more papers, perspectives and research, please visit: **www.thehackettgroup.com.** Or to learn more about The Hackett Group and how we can help your company sharply reduce costs while improving business effectiveness, please contact us at **1 866 614 6901 (U.S.)** or **+44 20 7398 9100 (U.K.).**

The Hackett Group (NASDAQ: HCKT) is an intellectual property-based strategic consultancy and leading enterprise benchmarking and best practices implementation firm to global companies, offering digital transformation and enterprise application approaches including robotic process automation and cloud computing. Services include business transformation, enterprise performance management, working capital management and global business services. The Hackett Group also provides dedicated expertise in business strategy, operations, finance, human capital management, strategic sourcing, procurement and information technology, including its award-winning Oracle EPM and SAP practices.

The Hackett Group has completed more than 13,000 benchmarking studies with major corporations and government agencies, including 93% of the Dow Jones Industrials, 87% of the Fortune 100, 87% of the DAX 30 and 58% of the FTSE 100. These studies drive its Best Practice Intelligence Center™ which includes the firm's benchmarking metrics, best practices repository and best practice configuration guides and process flows, which enable The Hackett Group's clients and partners to achieve world-class performance.

The Hackett Group
World Class Defined and Enabled

Email: info@thehackettgroup.com
www.thehackettgroup.com

Atlanta +1 770 225 3600   London +44 20 7398 9100   Sydney +61 2 9299 8830

Atlanta | Chicago | Frankfurt | Hyderabad | London | **Miami** | Montevideo | New York | Paris | Philadelphia | Portland | San Francisco | Seattle | Sydney | Vancouver