

CLEAR PEAK

SUPPLY CHAIN ADVISORY COUNCIL

*Data-Driven Visibility and the Next
Revolution in Supply Chain Management*

Data-Driven Visibility and the Next Revolution in Supply Chain Management

The Clear Peak Supply Chain Advisory Council is a group of thought leaders and practitioners from industry and academia driven to encourage the advancement and deployment of a more connected supply chain through management action, technology and analytics. In January 2017, the council conducted a survey of supply chain experts on the importance of Supply Chain Visibility to next-generation supply chain management (SCM).

The survey explores the drivers of supply chain visibility, such as predictive analytics and demand visibility, security concerns, and emerging technologies like automated delivery systems and 3D printing. It also collected data on the impacts of enhanced visibility on supply chain demand, transportation, manufacturing, distribution and warehousing, and suppliers.

This white paper provides insights derived from the survey results.

“Supply chain visibility revolution impacts every company...”

Executive Summary

Data-Driven Visibility and the Supply Chain

Supply chain visibility, driven by big data analytics, is the hidden force behind the massive disruptions in both B2C and B2B commerce of this decade – and the next.

“The supply chain visibility revolution impacts every company,” notes Margaret Tedlie, leader of Clear Peak’s supply chain practice and chair of its Supply Chain Advisory Council. “It’s hitting some like a freight train, and it’s sneaking up quietly on others. But all must reckon with it, and harness it.”

This survey of supply chain thought leaders and practitioners provides a snapshot of the current state of the next-generation supply chain. It also offers perspective for C-suite managers on ways in which new “supply chain visibility” technologies can be managed to deliver on the promise of the supply chain of the future.

Information technology and data have driven the evolution of the modern supply chain since the invention of the computer. They’ve produced massive improvements in efficient delivery of goods and services. This data-driven supply chain has helped drive enormous gains in manufacturing and service-sector productivity, trade, and global economic growth for the past several decades.

Now, new supply chain visibility technologies are powering the next era of productivity improvements. The emergence of real-time data collection, information management and analytics across open, cloud-based platforms; low-cost, high-capacity data storage; and the acceleration of computational capabilities are transforming the global supply chain yet again.

This survey identifies and quantifies the impact of many of these factors.

The Imperative for the C-Suite: Embrace a Data-Driven Culture

Disruptive new technologies driving the emerging connected supply chain will demand initiation and active management of corporate-culture change for many organizations.

To realize the clearly identified potential of these supply-chain visibility technologies, executives must:

- **Develop a strategy** that focuses on enabling a data-driven culture and encompasses processes, technology, change management, organizational structure, a clear road map, and other key elements. They must establish and support a Center of Excellence around analytics that can become the main change agent.
 - There are significant risks in not implementing strategies based on new supply chain visibility technologies. The major ones include loss of market share, deteriorating customer service, and reduced profit margins.
- **Learn and leverage technology** to automate and accelerate the move to a data-driven culture.
 - Executives must quickly move up the learning curve on multiple new supply chain visibility technologies to make successful investments that leverage them properly.
- Where necessary, **focus on convincing CFOs and COOs** that better analytical capabilities will give CFOs visibility into spend/cost drivers, and empower COOs to drive better efficiencies from operations.
 - With new data and analytics technologies crossing traditional departmental boundaries, executives must be ready to aggressively manage organizational change.

“These are real-life needs,” says one member of the Council, a supply chain executive with an S&P 500 company. “I face these challenges every day.”

“Today, many data-driven corporations have come to regard the supply chain as a critical corporate asset to be optimized and leveraged.”

Other Key Findings

1: Supply Chain Management (SCM) is seen as a strategic asset—but not yet as a driver of profitability and change.

- In the past, the supply chain was often viewed as a corporate cost that needed to be minimized to improve profitability.
- Today, many data-driven corporations have come to regard the supply chain as a critical corporate asset to be optimized and leveraged.
- *However, the supply chain is not yet widely seen as a driver of growth and profitability – or as an effective tool for organizational change.*

2: Big data and analytics are creating a smaller world.

- New analytical tools are harnessing structured and unstructured “big data” from all sources. They’re hastening the transition from employing only last-generation “descriptive analytics” to next-generation “predictive” and “prescriptive” analytics.
- The flood of data coming from emerging sources, especially the “Internet of Things” (IoT), will drive advances in the new science of “prescriptive analytics.”
- Virtual, web-based communication providing real-time visibility into operations halfway around the world will continue to increase efficiency in procurement, manufacturing and inventory management.
- Other new technologies, including 3D printing, custom manufacturing, self-driving vehicles and automated warehouses will shrink supply chains, streamline distribution and shorten order and delivery times.
- *By creating a “smaller world,” this more advanced and connected supply chain will drive profitability improvements and accelerate nimble, responsive global growth.*

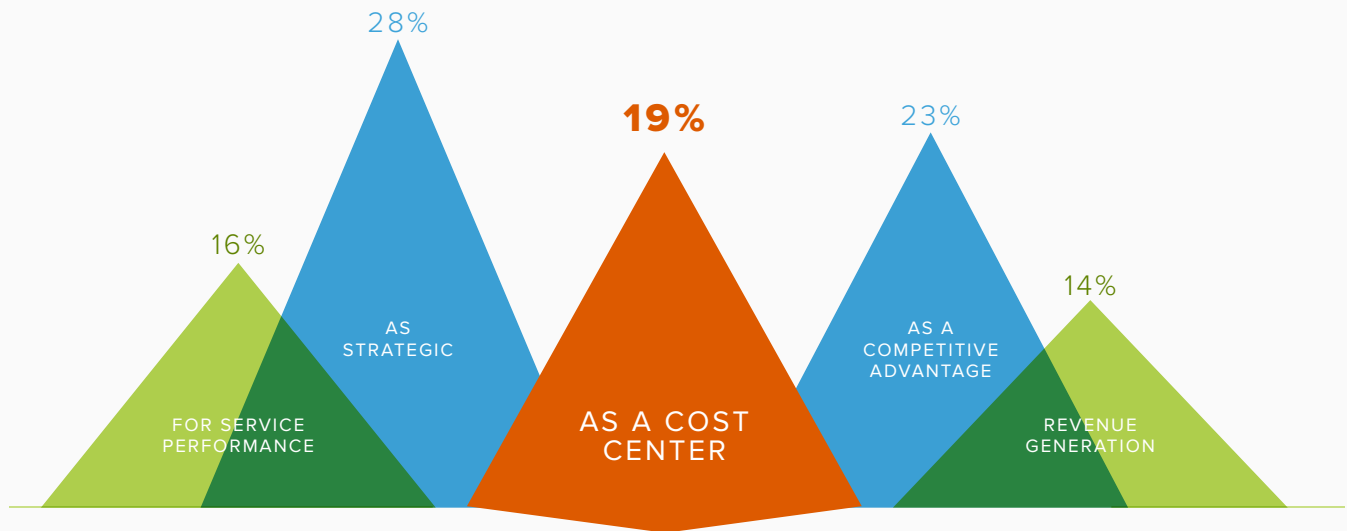
3: Significant challenges remain to be addressed to make SCM a strategic asset.

- Data management and governance are often at the core of the problem. Few companies have access to quality data across all their operations; lacking a “single source of truth,” organizations are hesitant to base strategic decisions on their supply chain data.
- Technology and organizational silos still lead to incomplete or inaccurate views of supply chain data.
- *Lack of strategic planning and budgetary support hinders many companies from realizing the benefits that next-generation supply chain technologies could provide.*

Strategic—But Not Yet a Driver of Profitability or Change

FIGURE 1

Supply Chain Perception In Your Company



“WHICH ONE OF THE FOLLOWING BEST DESCRIBES HOW SUPPLY CHAIN IS POSITIONED/VALUED IN YOUR COMPANY?”

The survey reveals that SCM has grown in stature as a business function, but next-generation, data-driven SCM is still unrealized for most companies. There is a gap between perception and reality.

In the past, SCM was often viewed as a corporate cost that needed to be minimized to improve profitability.

But the advent of new technologies and business models, increasing globalization of supply chains (and its inherent risks), the development of omnichannel marketing and distribution, and the presence of highly disruptive competition has changed all that.

To compete—and, perhaps, survive—it’s now a given that companies must continuously optimize how they manage SCM processes, from procurement to manufacturing to warehousing/distribution to customer contact. Many companies are recasting their supply chain functions “from order-taking cost centers into drivers of profit and competitive differentiation.”¹

¹ Michael DuVall, principal, Curt Mueller, partner, and Thomas Ripsam, partner, Booz & Company Inc., “The Supply Chain Shift: Taking Manufacturing from a Cost Center to a Profit Driver,” *Industry Week*, 2 March 2013

From Cost Center to Competitive Asset

End-to-end visibility can enable corporations to regard the supply chain and SCM as a critical strategic corporate asset which, when managed properly, can drive growth and profitability.

- More than four of five of survey respondents (Figure 1) saw SCM in this light, including those who saw it as strategic (28%), a competitive advantage (23%), a revenue-generator (14%) and a tool for improved service performance (16%). “It’s interesting to note that senior leadership viewed SCM as less strategic than did mid-level managers and operations personnel,” Tedlie says. “Their responses reveal a more tactical, direct relationship to service performance.”
- Only 19% view it as a cost center.

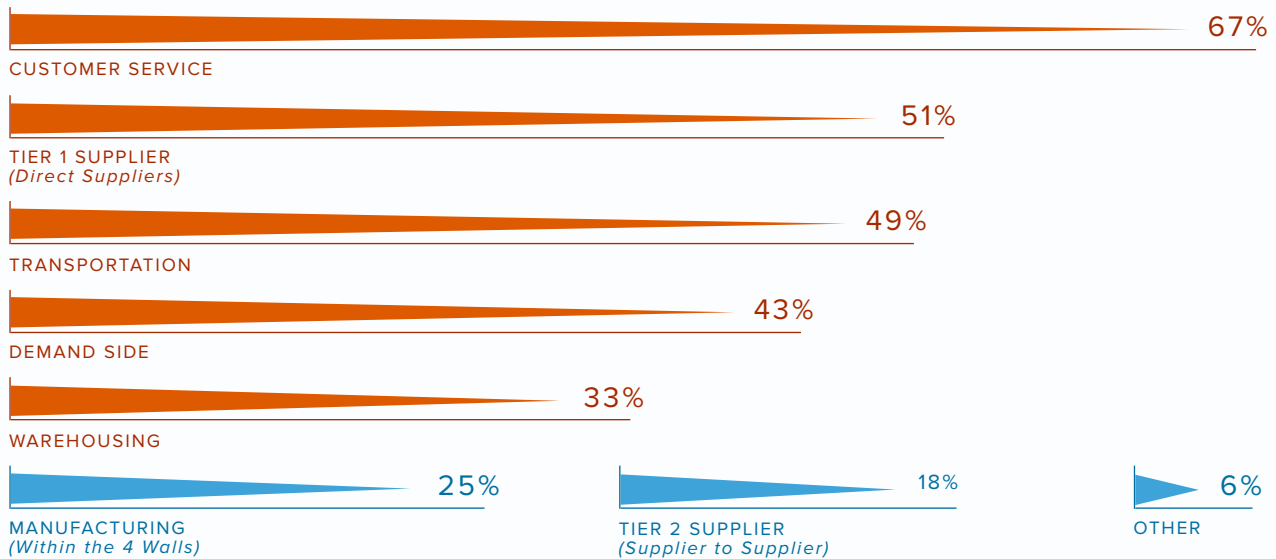
SCM Impacts the Entire Chain

Responses show that survey participants believe that data-driven visibility will have a massive impact on multiple supply chain functions—especially on customer service (67%), Tier 1 (direct) suppliers (51%), transportation (49%), demand management (43%) and warehousing (33%). Manufacturing (25%) and Tier 2 (indirect) suppliers (18%) were also cited, and two of the three write-in selections emphasized “cost savings.”

“Not surprisingly, line managers see more significant impacts on transportation—the closest touch—while leadership looks further down the supply chain for greater impacts on Tier 1 Suppliers,” Tedlie says.

FIGURE 2

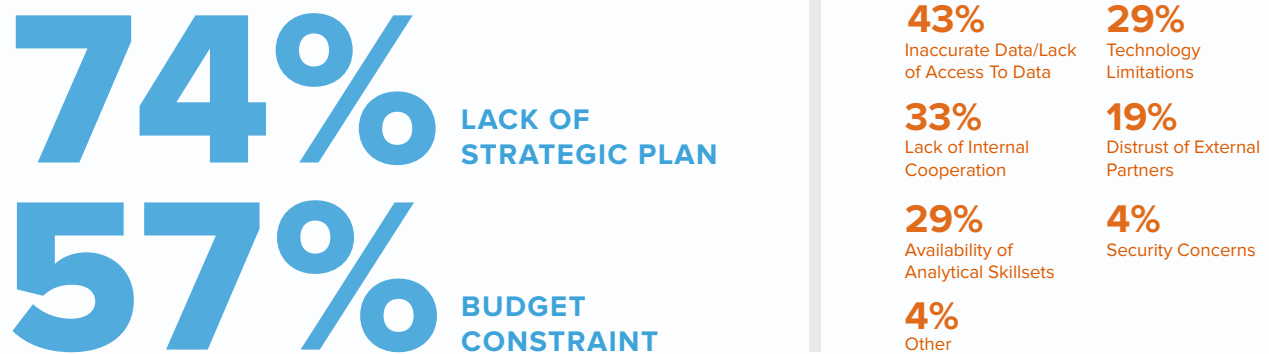
SCM: Areas of Biggest Impact



“WHERE DO YOU EXPECT TO SEE THE BIGGEST IMPACT OF SUPPLY CHAIN VISIBILITY IN YOUR BUSINESS WITHIN THE NEXT 1-5 YEARS?”
(SELECT TOP THREE.)

FIGURE 3

Barriers To Taking Supply To Next Level



“WHICH DO YOU THINK IS PREVENTING COMPANIES FROM TAKING SUPPLY CHAIN TO THE NEXT LEVEL?” (SELECT TOP THREE.)

Perception vs. Reality: Lack of Action Speaks Loudly

But in spite of the overwhelming perception that the supply chain should be a strategic asset that increases competitive advantage and revenue/profitability growth, there’s also compelling evidence that most companies have not yet put in place the strategic framework or financial support to realize its potential.

Three of four responses cite “lack of a strategic plan” and 57% cite “budget constraints” as major reasons companies aren’t taking SCM to the next level, where it becomes a competitive differentiator or top-line contributor (Figure 3, top).

One reason for this contradiction may be that, as supply chain experts, survey respondents have a particularly strong sense of how much potential supply chain visibility technologies have and, correspondingly, how strategic SCM should be.

At the same time, their responses indicate that putting a new strategic focus into action throughout their organization is still difficult and faces multiple constraints. In addition to strategic and budgetary issues, 33% of respondents cited “lack of internal cooperation” as a barrier. Two who “wrote in” their own responses cited organizational issues: “the industrial mindset,” and the tension caused by “[balancing] short-term needs with long-term performance advantage.”

“We need to change the mindset around the value of the supply chain,” notes Council member Melanie Miller, vice president/SCM of Barrick Gold Corporation. “I’m not sure that people today think of it holistically. Many still see it as transactional or administrative in so many areas, but as we move into the data realm, all of the supply chain’s touch points become clear and its value becomes more evident.”

The survey also revealed divergence between mid-level and senior SCM management in responding to this question. Supply chain managers are more acutely aware of how a lack of analytical skills can hinder their ability to perform at a higher level, while leadership sees deficiencies in strategic planning and budget constraints as more significant roadblocks.

Inaccurate data/lack of access to data (43%), lack of available analytical assets (29%), technology limitations (29%) and distrust of external partners (19%) also collectively present a daunting set of challenges to optimization of the supply chain. Given these challenges, and given the high perceived need for more strategic planning, budget resources are correspondingly more difficult to justify.

Big Data Creates a Smaller World

There are numerous technologies available to optimize the supply chain as a strategic asset. The survey respondents indicated high awareness of their potential while acknowledging the need for organizations to invest the time and resources necessary to embrace them, move up multiple learning curves, and integrate them into systems that deliver high returns.

Expanding data volumes, the Internet of Things, machine learning, and the storage and scalable computational power of cloud computing offer the materials and tools for greater visibility into the supply chain. They've enabled the evolution from descriptive to predictive analytics and beyond.

- **Descriptive analytics** summarize what's already happened. As late as 2013, eighty percent² of business analytics was deemed to be largely descriptive in nature.
- **Predictive analytics** apply a variety of modern data science techniques, like modeling, to the recent and historical data of descriptive analytics to offer insight about the probability of future behaviors or events.
- **Prescriptive analytics** are on the horizon. They take descriptive and predictive analytics a step further by generating potential courses of action in response to potential events. Prescriptive analytics engines (for example, the Waze navigation app) cycle feedback about actual outcomes to further optimize the results it suggests.

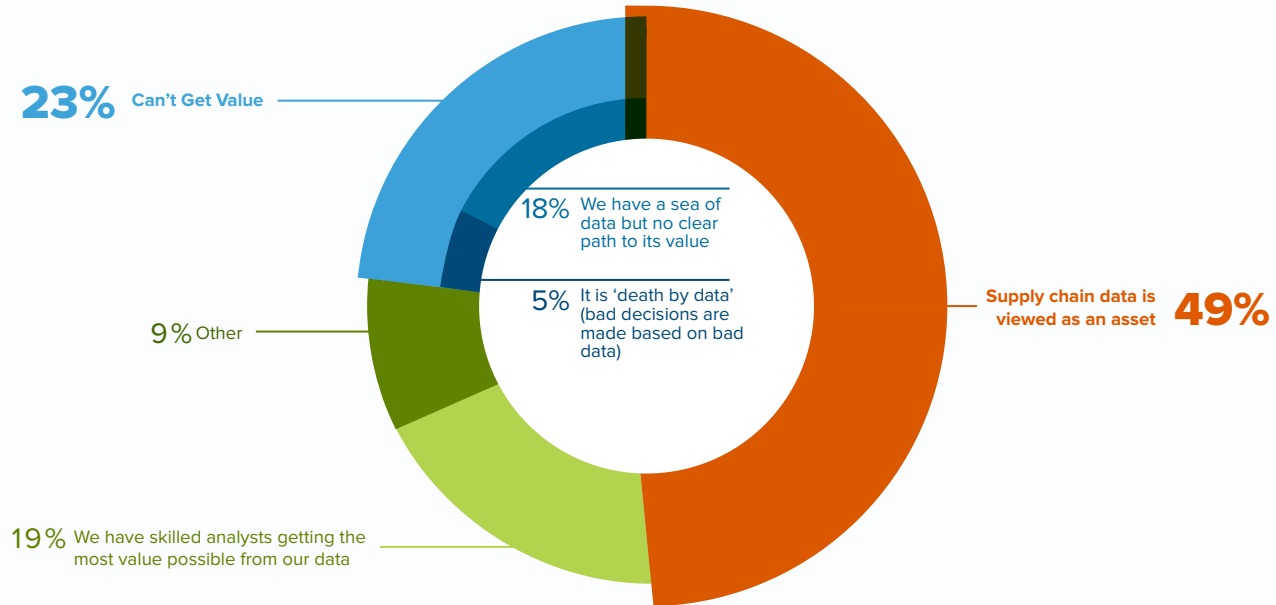
This data revolution enables effective use of transformative new technologies like self-driving vehicles, 3D printing and mass-custom manufacturing, artificial intelligence, and omnichannel personalization of the buying and selling experience.

All of them will “shrink” supply chains, either physically through near-shoring or virtually through gaining a clearer view of far-away global sources of supply. They will optimize management of procurement, inventory, manufacturing and distribution. The result will slash the time from product/service conception to delivery, and empower faster reaction to geopolitical and/or climate change expected to impact commerce.

²Jeff Bertolucci, “Big Data Analytics: Descriptive vs. Predictive vs. Prescriptive,” *Information Week*, 31 December 2013.

FIGURE 4

Supply Chain Data Perceptions



“WHICH ONE OF THE FOLLOWING BEST DESCRIBES HOW SUPPLY-CHAIN DATA IS USED/VALUED IN YOUR COMPANY?”

Supply Chain Data: Mostly Valued, with Room for Improvements

Survey respondents indicated their organizations place a high value on data and analytics (Figure 4). Half say that supply-chain data is viewed as an asset within their organizations (49%) and 19% say their skilled analysts are able to get “the most value” from their supply chain data.

But 23% say they can’t get value from the data they have, or are compelled to make decisions that are based on “bad” data.

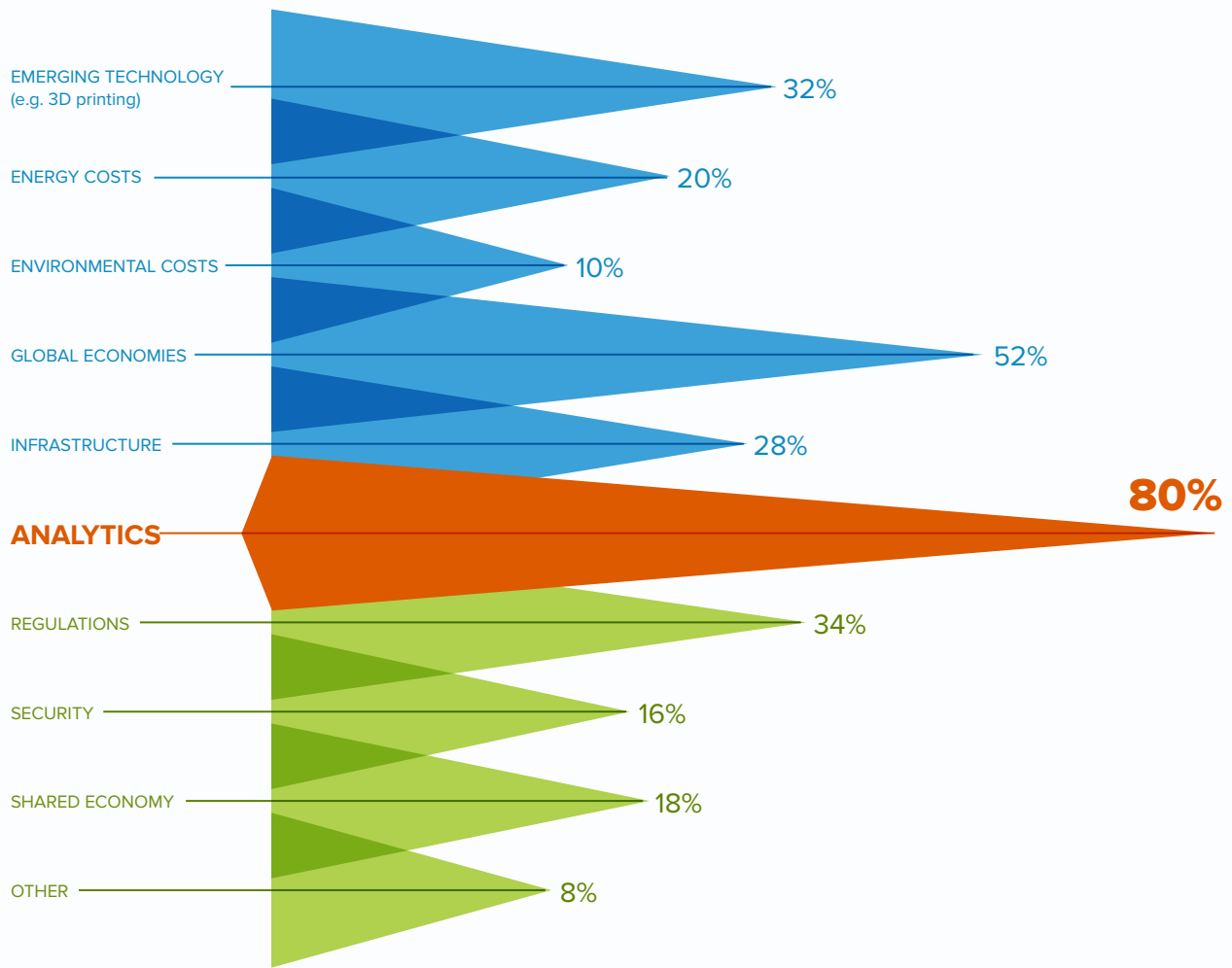
Upper management perspective on the value of supply chain data is significantly different than mid-level managers. Leadership perceives significantly more value in the data as an asset, but has less confidence that analysts are getting the most out of it.

Write-in answers (representing 9% of all responses received) show a level of dissatisfaction with incomplete or unsatisfactory attempts to get at the real value of supply-chain data.

- “[We need to] educate on the use of analytics.”
- “We have a sea of data and we’re working to get our arms around it and make it useful ... [so that it might] become an asset.”
- “[Supply-chain data is seen as] necessary, but not explored.”
- “Technology to compile data is largely absent; manual solutions are all I have.”

FIGURE 5

Biggest Impact on Operation in Next 5 yrs.



“WHICH OF THE FOLLOWING WILL HAVE THE BIGGEST IMPACT ON SUPPLY-CHAIN OPERATIONS OVER THE NEXT 1-5 YEARS?” (SELECT TOP THREE.)

Supply-Chain Data Analytics Viewed as Crucial

The survey indicated a high level of confidence that improvements in data and analytics will be key to realizing the potential of the next-generation supply chain operations. Data analytics was cited as the top influence on SCM operations in four of five responses (see Figure 5).

The impact of global economic conditions was named in more than half. Emerging technologies like 3D printing and regulations were cited as major influences in a third of the responses.

One write-in vote included a comment citing the global political environment—as distinct from global economic conditions—as having a critical impact on supply chain operations.

Leadership views the less tangible drivers (global economics, regulations and the shared economy) as having the most significant impacts on future supply chains. Day-to-day managers are more focused on the impacts of future developments in the physical realm—infrastructure and emerging technologies.

Predictive/Diagnostic Analytics, Demand and In-Transit Visibility to Make Impacts

There is also a high degree of confidence among the supply chain professionals surveyed that the advent of predictive analytics will continue to improve supply chain efficiency. This transition will be supported by multiple data-driven supply chain visibility technologies (Figure 6).

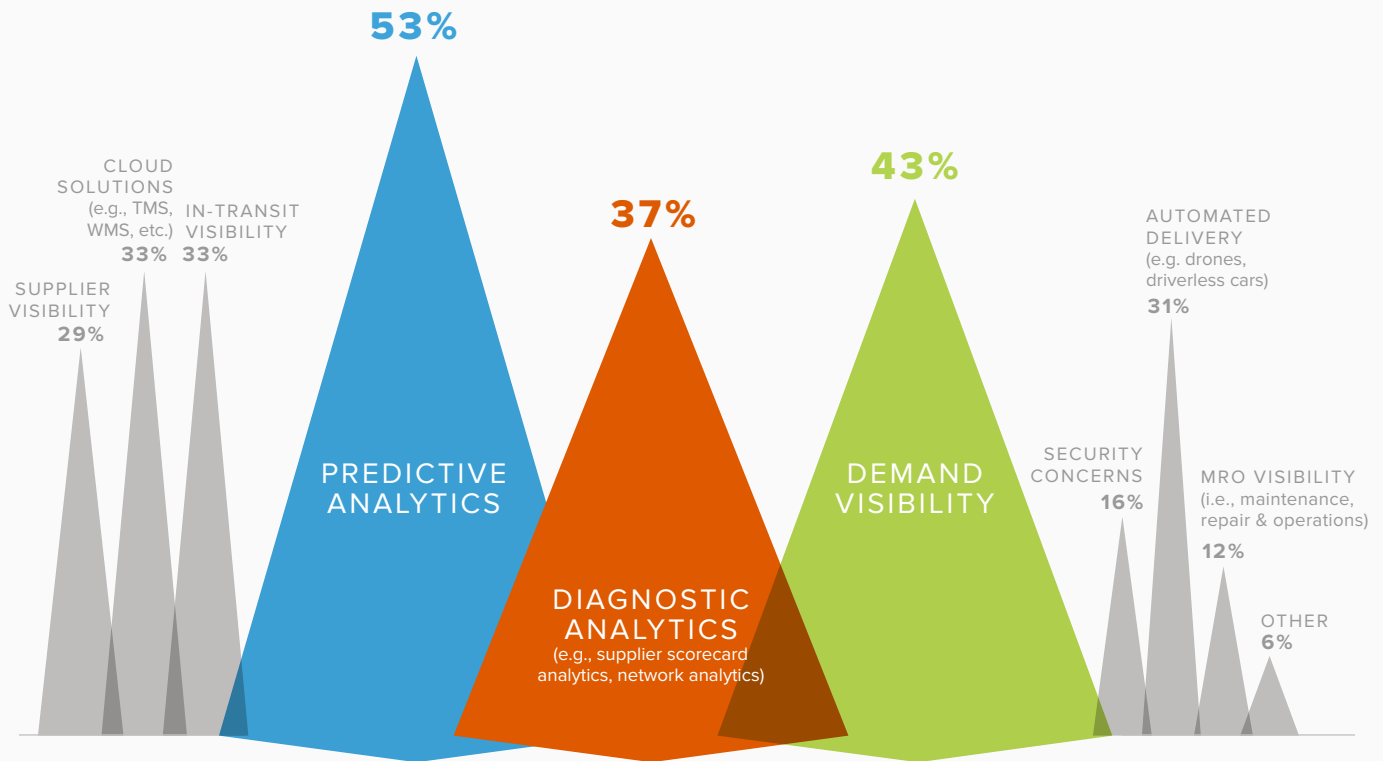
“Trend analysis—to answer the question ‘Where are we heading?’—is only going to get more crucial as we become more dependent on data and real time information and interactions,” says Council member Melanie Miller.

Respondents cited predictive analytics (53%), demand visibility (43%), diagnostic analytics (37%), in-transit visibility (33%), supplier visibility (29%) and MRO (maintenance, repair and operations) visibility (12%) as emerging/improving processes and technologies that will impact the supply chain. “Prescriptive analytics” received one write-in mention as a major impact on future supply chain visibility, and the “changing economics of visibility” was mentioned in another write-in.

Respondents also note the potential impact of security concerns (16%), and advancing technologies like cloud-based warehouse and transportation management solutions (33%) and automated (such as drone-enabled) delivery systems (31%).

FIGURE 6

Biggest Impact on Visibility in Next 5 yrs.



“WHICH OF THE FOLLOWING WILL HAVE THE BIGGEST IMPACT ON SUPPLY-CHAIN VISIBILITY OVER THE NEXT 1-5 YEARS?” (SELECT TOP THREE.)

Major Challenges Must be Met— and Overcome

As we discussed earlier, while the survey results reflect optimism about the benefits of emerging supply chain visibility technologies, they also identified several specific challenges (see Figure 3). Principal among these are inadequate data management and data governance capabilities, the lack of coherent SCM strategies in many organizations and the persistence of strong “silos” in each link of the supply chain.

These limit the benefits that data analytics and supply chain visibility technologies can achieve.

“We’re producing data at astronomical rates, yet the vast majority of that data is seemingly unimportant or of no value to critical decision processes,” says Mark Besser, a member of the Council and VP Customer Success of Savigent Software. “We don’t need more data: we need to get the right data in the right form and context into the right hands at the right time.”

With too much data available from multiple sources without data management and integration, analytics can deliver conflicting results and recommendations. At worst, analytics can become a tool to politically strengthen the hands of individual silo managers to the detriment of overall, integrated SCM effectiveness.

Other challenges include recruiting and organizing appropriate talent for the most important supply chain disciplines, especially analytics and demand forecasting.

“We’re producing data at astronomical rates, yet the vast majority of that data is seemingly unimportant or of no value to critical decision processes.”

MARK BESSER, A MEMBER OF THE COUNCIL AND
VP/CUSTOMER SUCCESS OF SAVIGENT SOFTWARE.

Data-Driven Cultures Are Rare—So Far

While responses show an overall understanding of the value of supply-chain data for optimized SCM, they also reveal that, for many, much needs to be done to transform organizations into data-driven cultures.

SCM professionals often refer to a data system that provides “one source of truth” as optimal for supply chain visibility, but responses indicated it remains an aspirational goal. Only 12% reported their organizations currently have information systems integrating their data to provide consistent holistic reporting (Figure 7, right)

Half—51% of responses received—say they must use multiple systems with varying degrees of data integrity, and 14% say data is often only used to support decisions that have already been made. However, 37% say data lends high confidence to direction and decisions, and one in four say the data they use is accessible, timely and reasonably accurate.

Cost and Technology Will Drive Adoption of Next-Generation Solutions

What are the drivers that would spur companies to develop organizations, cultures and solutions that support the next-generation of supply chain visibility? Responses cited cost (57%) and emerging new technologies (such as the Internet of Things) (51%) as the major factors (See Figure 8). “Automation” was mentioned as a driver in 37% of responses.

Not far behind were two ingredients behind the disruption and opportunity of the omnichannel—eCommerce (33%) and competitive positioning (e.g., free shipping or superior delivery performance) (29%). Managing risk profiles via predictive analytics was mentioned in almost a third of the responses.

FIGURE 7

Data-Driven Culture

51%

THERE ARE MULTIPLE SYSTEMS with varying levels of data integrity

37%

DIRECTION AND DECISIONS are made with high confidence as they are based on the data

25%

DATA IS ACCESSIBLE, TIMELY and reasonably accurate

14%

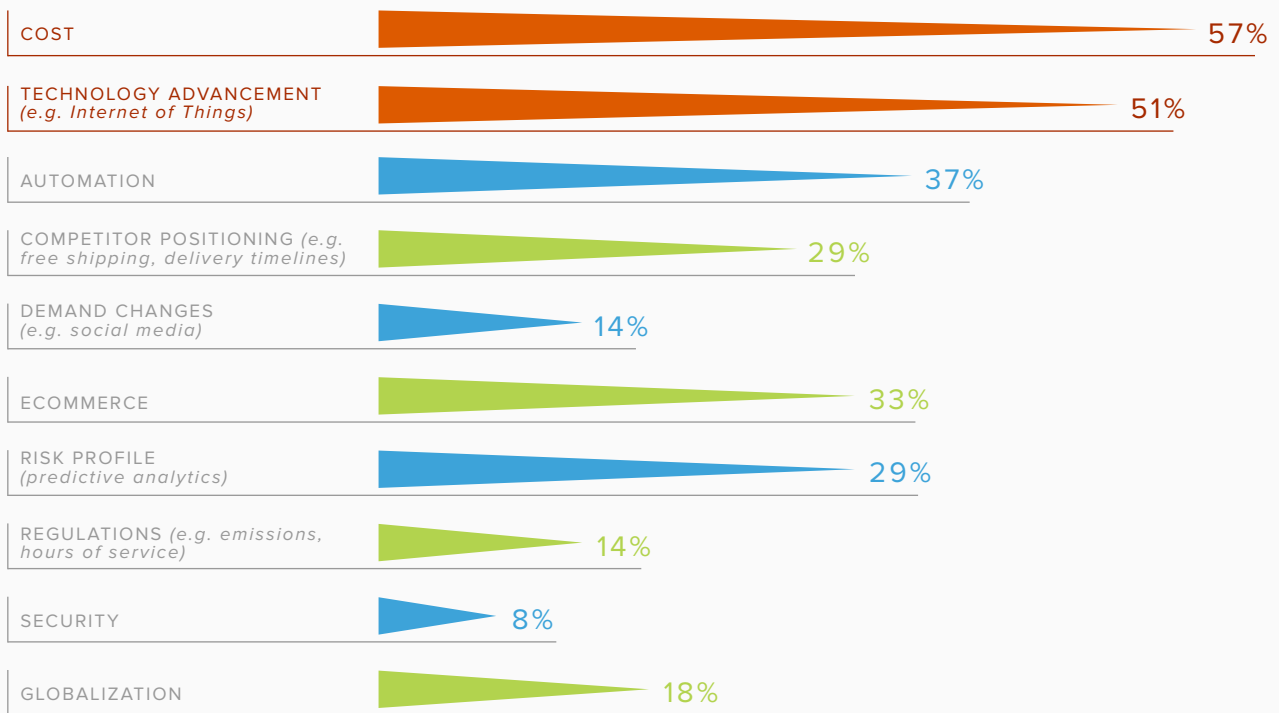
DATA IS USED TO SUPPORT DECISIONS that have already been made

12%

THERE IS ‘ONE SOURCE OF TRUTH’ that company reporting is based on

“WHICH OF THE FOLLOWING WILL HAVE THE BIGGEST IMPACT ON SUPPLY-CHAIN VISIBILITY OVER THE NEXT 1-5 YEARS?”
(SELECT TOP THREE.)

FIGURE 8 Main Drivers of Next-Generation Visibility Development



“WHICH OF THE FOLLOWING ARE THE MAIN DRIVERS AFFECTING DEVELOPMENT OF THE NEXT GENERATION OF SUPPLY CHAIN VISIBILITY?” (SELECT TOP THREE.)

The responses indicate a high degree of optimism about the potential of technology and data-driven solutions in general. Cost may be a limiting factor, especially before technology investment budgets have been justified and approved. However, Moore’s Law driven cost reductions in computing and lower costs associated with emerging secure cloud-based solutions may also indicate confidence in future affordability of strategic data and analytics solutions.

Taken with responses shown in Figure 6 (page 11), it’s clear that the supply chain professionals surveyed anticipate investments in both technology and training required to master multiple new technologies and disciplines.

“Accurate information/data is required to make the best possible decisions. Margins can creep, product unavailability may contribute to market share loss, all of which hits the bottom-line and the vitals of the organization.”

– SAYS ONE RESPONDENT

Implications for the C-Suite and SCM Executives

Laggards May Face Substantial Risk

Given the need for progress on multiple fronts, especially investments in new data-driven analytics and other technology solutions, survey respondents identified a risk in falling behind. They indicated that lack of a strategic plan and lack of budget causing delays in implementing the next generation of supply chain visibility solutions carry significant risks.

The top risks (see Figure 9) associated with failure to implement effective supply chain strategies included loss of market share (74%), shrinking margins/increased costs (67%), and poor customer service (65%). “Going out of business” was named as a significant risk in a quarter of the responses.

Says one respondent: “Accurate information/data is required to make the best possible decisions. Margins can creep, product unavailability may contribute to market share loss, all of which hits the bottom-line and the vitals of the organization.”

Executives Must Focus on Organizational Change Management

Respondents indicate high levels of awareness and concern about the need for new methodologies and culture change within their organizations. New strategies will be required that may challenge conventional management/organization wisdom. The sourcing, implementation and acceptance of data analytics systems capable of providing trustworthy end-to-end visibility into the supply chain may be essential.

FIGURE 9

Risk of Not Developing The Next Generation of Supply Chain

74%

LOSS OF MARKET SHARE

67%

SHRINKING MARGINS (INCREASED COSTS)

65%

POOR CUSTOMER SERVICE

39% Increased Inventory

22% Longer Lead Times

25% Going out of Business

6% Increased Return Rates

“WHAT ARE THE RISKS OF NOT DEVELOPING THE NEXT GENERATION OF SUPPLY CHAIN VISIBILITY?” (SELECT TOP THREE.)

Executives Must Focus on Organizational Change Management... Continued

The verbatim responses to the survey's question about surmounting the barriers preventing adoption of next-generation supply-chain visibility touch on cultural, technology and strategic issues;

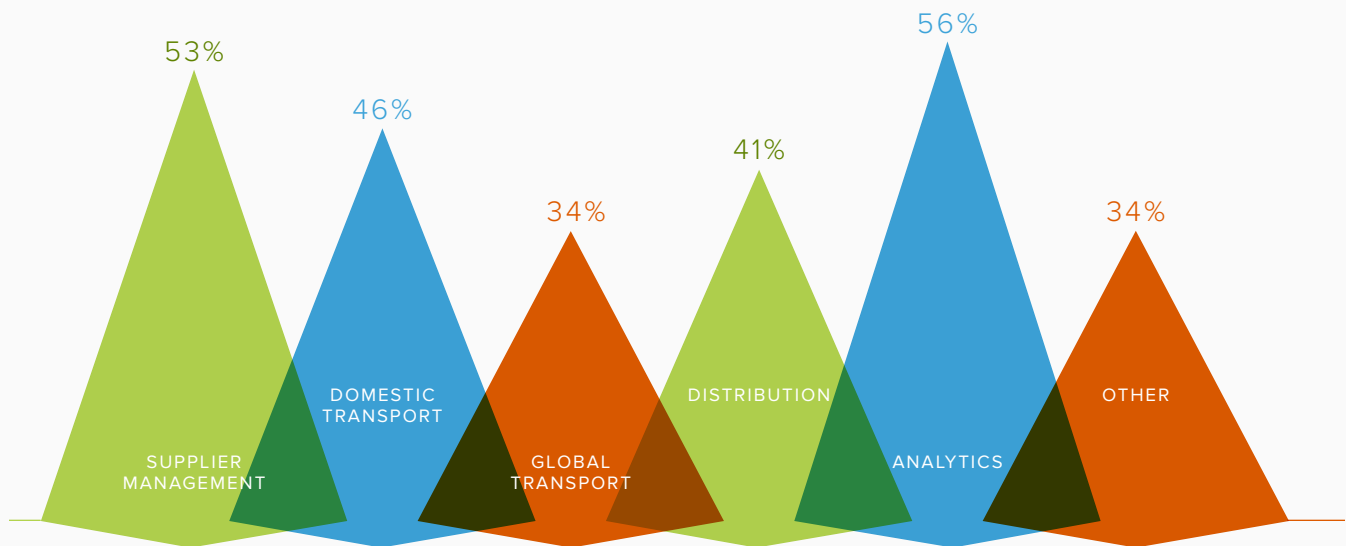
- “Change is difficult,” says one respondent. “We’ve always offered free shipping, although we’re in the red. Analysis is required to determine if free shipping is viable if the margin will not support it.”
- “Everyone [should focus] on the big picture, without political bias or personal interest,” says another. “Do what’s best for the organization.”
- “Data tools are convoluted and not easy to manage,” says a respondent about technology in use at his or her organization. “One-stop shops with ad hoc reporting will be key—quickly accessible data and easy to navigate.”
- “Planning and thinking outside the box [and] new strategies [are needed],” says a respondent addressing strategic issues.

And one final comment reflects the universal agreement that a single common denominator will be the *sine qua non* of supply-chain visibility optimization: “Money must be committed to this effort.”

“One-stop shops with ad hoc reporting will be key—quickly accessible data and easy to navigate.”

Survey Participant Profile

FIGURE 10 Survey Respondent Profile: Areas of Responsibility



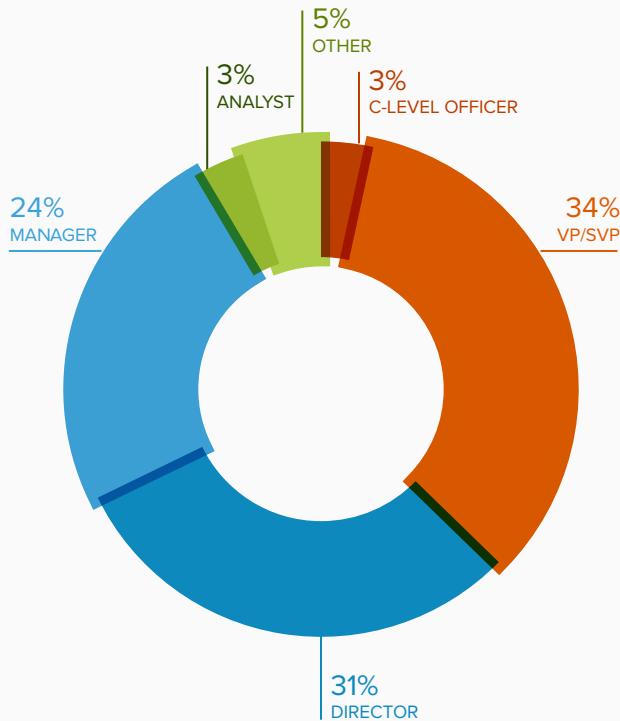
“WITHIN SUPPLY CHAIN OPERATIONS WHAT ARE YOUR AREAS OF RESPONSIBILITY?” (CHECK ALL THAT APPLY.)

The Clear Peak Supply Chain Advisory Council Survey was conducted in December 2016 and January 2017. Fifty-nine supply chain practitioners and professionals, as well as academic researchers focused on supply chain issues, participated.

Self-reported areas of expertise included domestic transport, analytics, distribution, supplier management, global transport and other disciplines (Figure 10). In addition, respondents wrote in domain responsibilities across multiple disciplines: supply-chain technology management; procurement; sourcing, supplier quality and purchasing; manufacturing optimization; logistics and 3PL management; and sales.

FIGURE 11

Survey Respondent Profile: Position



Positions represented included VP/SVP, Director, Manager, analyst and “other” including academic, COO, and consultant (See Figure 11).

The Clear Peak Supply Chain Advisory Council meets on a quarterly basis and will consider additional topics for future white papers.

“WHICH BEST DESCRIBES YOUR POSITION?”

About The Clear Peak Supply Chain Advisory Council

Composed of nine SCM thought leaders from industry and academia, the Clear Peak Supply Chain Advisory Council encourages the advancement and deployment of a more connected supply chain through management action, technology and analytics. The Council members are: **Mark Besser**, vp/services of Savigent; **Corbett Foster**, vp/procurement of Gates Corporation; **John Fowler**, Motorola professor of international management and SCM at Arizona State University; **Jim Haddow**, director of the Center for Excellence in SCM at Howard University; **Jim Heuer**, chief technology officer of EVOS SmartTools; **Peter Krueger**, general manager, A.L. George LLC; **Melanie “Mel” Miller**, vp/supply chain management of Barrick Gold; **Elaine Stephens**, vp/technology and data science of Breakthrough Fuel; **John Thong**, lead of the SCM services and enablement group at Sprint; and **Ms. Tedlie**, who leads Clear Peak’s supply chain practice.

About Clear Peak

Founded in 2000 and based in Denver, Colorado, Clear Peak is an integrated management and analytics consulting firm with focused expertise in Supply Chain and Customer Experience.

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