The Shaman's Journal 2020

Lora Cecere

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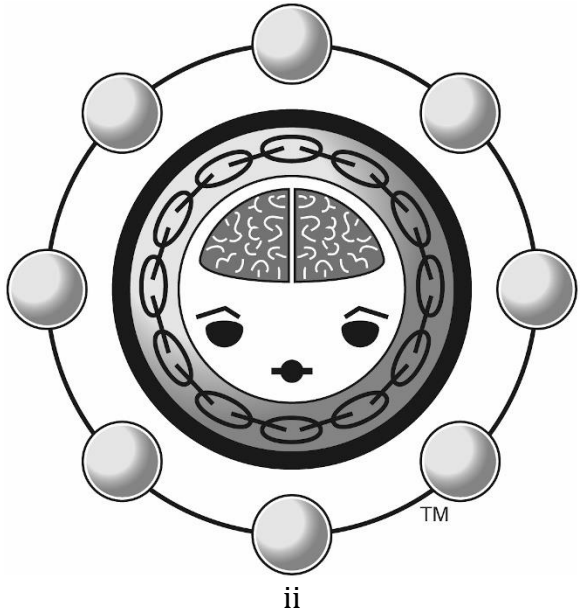

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Lora Cecere

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DEDICATION

2020 was a turbulent year, and supply chain leaders need answers. Through this research, we try to help. We dedicate this book to supply chain professionals on the front line driving supply chain success in the face of unprecedented disruption.

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Foreword

The Shaman's Journal, now in its seventh consecutive year, is a compilation of best-read blog posts from the prior twelve-month period.

The Supply Chain Shaman blog, now in its tenth year, is read globally by over 20,000 readers. Humbled, I give thanks for business leaders' confidence in my work in driving research on supply chain excellence.

a.k.a. *"The Supply Chain Shaman"*
Founder of Supply Chain Insights

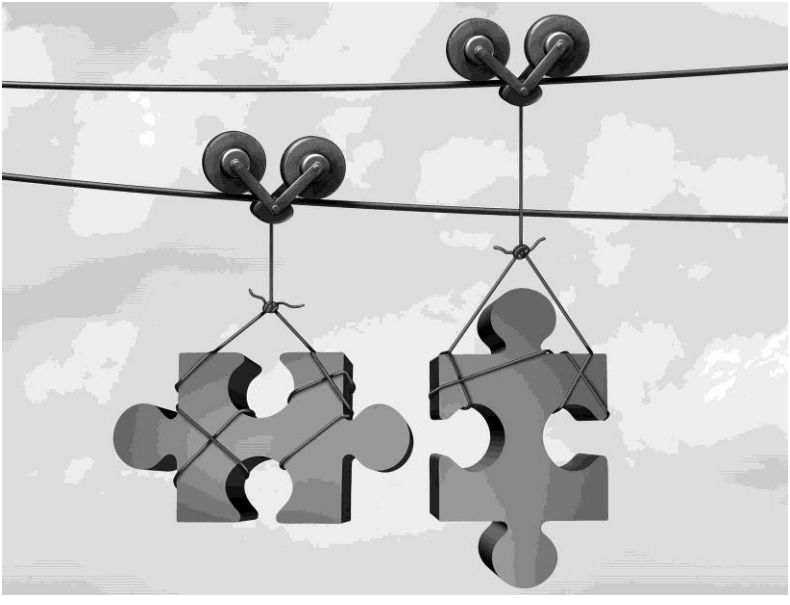
Section 1

Winning Organizations

Winning Organizations

Opportunities abound. Each company defines the supply chain differently. What drives excellence? What can we learn from the structure of supply chain organizations? Here we share from the research.

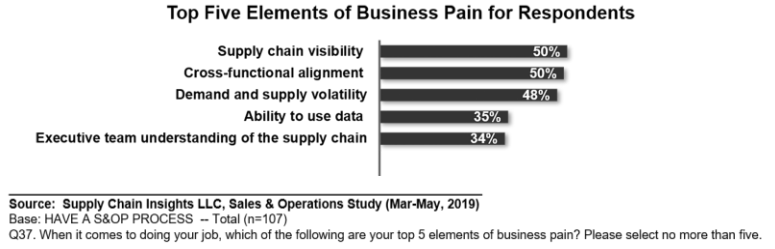
Driving Organizational Alignment



Yawn.

For the past fifteen years, as an industry analyst researching trends in supply chain management, I ask the same question, and I get the same answer. Supply chain visibility and organizational alignment are barriers to improving supply chain performance. So, my new question is, *"Why are we not making more progress in these two areas?"*

Figure 1.1. Top Five Elements of Business Pain for Supply Chain Leaders



Here, I attempt to answer this question.

What Is A Supply Chain?

Let's start with a discussion of *"What is a supply chain?"* The answer is not apparent, nor is it consistent across companies.

As a first-generation supply chain pioneer, in the early 1980s, I fought hard to build a supply chain organization. With a deep background in high-performance manufacturing processes, I found the concepts stimulating. Quickly, I became a zealot.
At that time, conceptually, the supply chain definition was a process stretching from the customer's customer to the supplier's supplier. It was a bold new idea. The concepts were far-reaching; and about much, much more than trucks and sheds.

Slowly, over thirty-five years, I observed a shift. The organization became more functional, and sadly, the supply chain became another function sandwiched between customer service and logistics. While companies speak of building end-to-end processes, the implementation of technologies is building walls between the operating functions: a barrier to cross-functional process alignment. *Why? Was it the*

implementation of transaction systems like ERP? The movement of regional to global supply chains? The size of the company? Acceleration of M&A activity? I think each was a factor.

Over the past two decades, the supply chain became just another function within a functional organization. With the implementation of technologies like ERP and analytics for Customer Relationship Management (CRM) and Supplier Relationship Management (SRM), the walls between functions grew. As a result, cross-functional processes became more difficult.

Efficient silos do not build effective supply chains. At a balance sheet level, 95% of companies are stuck, and 65% of industries are moving backward at the intersection of operating margin and inventory turns. Is this success? I don't think so.

The Role of the Customer in the Supply Chain

Recently, a large chemical company asked me to speak at an annual strategy session on building the customer-centric supply chain. I found it ironic because they were not clear on who their customer was or the business pain for their customer. The individuals in the room, like most supply chain leaders, envisioned the supply chain from raw materials and manufacturing. As a result, the concept of a customer-centric supply chain could only be inspirational.

In preparation for the session, I found it fascinating that the customer service team pushed back on attending the two-day workshop. The reason? They did not believe that they were a part of the supply chain. Need I say more? Yes, this was a sizeable and a functional organization focused on trucks and sheds waving their hands on the need to be a customer-centric organization. Laughable,

but sad. There was a lack of alignment with its customer service organization.

Figure 1.2. Drawings of the Supply Chain by Supply Chain Leaders

Each year, I teach a boot camp. In this training, I ask students to draw a supply chain. In Figure 1.2, I share some examples.

When I kick-off the activity to draw the supply chain, everyone feels uncomfortable and stares blankly at their crayons and paper. It is tough to get business leaders to draw and be creative. Sometimes, a person will ask, *"Isn't this redundant? Doesn't everyone know what a supply chain is?"*

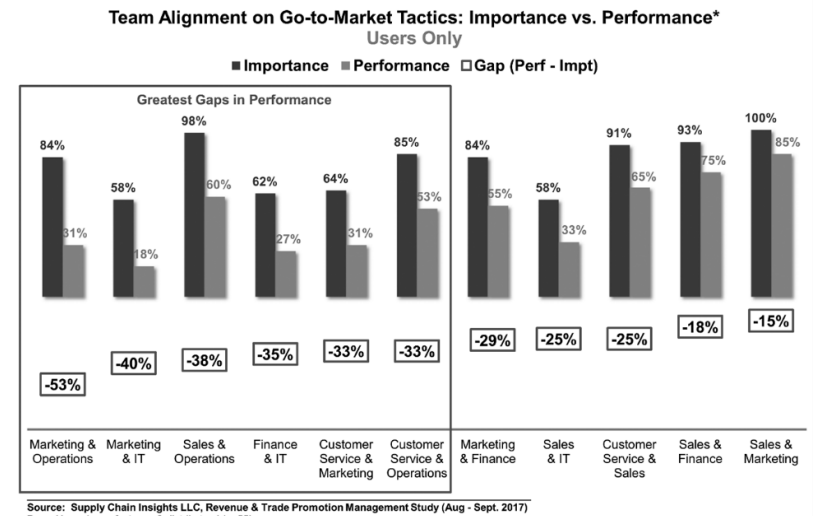
This discussion prompts me to laugh. Over the last three years, one-hundred and fifty students completed the course. No two drawings were alike, and only ONE person put their customer on their supply chain picture. In short, as companies advanced the concepts of efficient supply chains, organizations became more functional and less effective. There was less focus on the customer.

Current State

Organizations that are more aligned perform better: balance sheet performance on growth and margin is better. It is a journey of leadership and metrics, but the aligned organization does not just happen. It only

happens through coordination and design. For the past six years, I include this question in several research studies. The results remain the same: commercial and operations teams lack alignment with a growing gap. The higher the fissure, the more significant the barrier to growth. The result? The customer usually suffers.

Figure 1.3. Organizational Alignment



Source: Supply Chain Insights LLC, Revenue & Trade Promotion Management Study (Aug - Sept. 2017)
Base: Users (manufacturers & distributors) (n=55)
Q15. Now think about [your][a typical consumer products] company's internal TEAM ALIGNMENT in terms of go-to-market tactics (sales and marketing tactics used to improve sales and drive incremental volume.) How important do you believe it is for the following teams to be aligned around [your][their] go-to-market tactics? SCALE: 1=Not at all important, 5=Very important; Q16. Now, how aligned do you believe these same pairs of teams actually are at [your][a typical consumer products] company when it comes to [your][its] go-to-market tactics? SCALE: 1=Not at all aligned, 5=Very aligned; *Showing those rating 4-5 on 5-point scale

How to Improve Alignment?

Improving organizational alignment requires taking a different tack. What to do? Take these steps:

Lead. Map the supply chain from the customer back. Recognize that this will be difficult. For most supply chain leaders, this is a paradigm shift.

As you do this, enlist the help of marketing leaders to drive growth by designing the supply chain from the

customer's customer. (Getting the different groups in a room to discuss a goal is a win. I find many companies' marketing teams do not know their supply chain organizations. And, when they do, the impression is not favorable. Why? The supply chain team speaks in technical jargon and usually shares obstacles, not opportunities.)

Evaluate the requirements for the brand at the buyer level and align to improve value and supply chain performance. Most companies do not have one supply chain: there are usually four-to-five. Map these and help the marketing team to understand the rhythms and cycles. James Foster, Chief Supply Chain Officer at Clorox, did this well.

Table 1.1. Supply Chain Rhythms and Cycles

Rhythms	*Cycles*
Demand predictability	Material lead time(s)
Supply volatility	Finite capacity planning scheduling
Production reliability	Delivery lead time (s)
Seasonal demand	Product lifecycle (s)
Consumer sentiment	Cure time (s)
Bottlenecks	Order cycle time (s)

Ideate. One of the most successful strategy workshops in my career was a joint session with the marketing department and a supply chain leadership team to evaluate how to design the supply chain outside-in and better use marketing data. This meeting was part of a digital transformation effort. In the process, the team discovered that a vast amount of data that was unused. Together, the two teams redesigned to drive growth. As a result, they developed a list of metrics to align the organization to better serve the customer.

Measure. A focus on functional metrics sub-optimizes the supply chain. Instead of incentivizing procurement on purchase-price variance (PPV) or manufacturing on lowest cost, focus the organization on total cost, and

incent the organization to focus on reliability. Moving to this journey requires work. Even though 92% of companies have Enterprise Resource Planning (ERP), Only 29% of companies can measure total costs today.

Over the last decade, we are moving in the wrong direction, and I want to encourage people to stop and reflect.

In closing, let me leave you with some thoughts from C.S. Lewis, a famous author of fantasy stories:

We all want progress, but if you're on the wrong road, progress means doing an about-turn and walking back to the right road; in that case, the man who turns back soonest is the most progressive.

The best supply chains start and serve the customer. When this happens, alignment improves, driving increases in business results. Traditional approaches are divisive. Technology implementations of CRM and ERP drive gaps. The answer? Leadership and metrics alignment.

The Stuck Supply Chain Needs Your Help

UGH!

Don't you hate sitting behind the steering wheel on a long commute facing bummer-to-bumper traffic? When I lived in southern California, I averaged three hours a day commuting. I hated sitting behind the wheel, as shown in the caption picture, inching along feeling like I was going nowhere while spewing exhaust into the polluted air. I vowed never to do it again.

For the past ten years, I work from home. I like the commute to my upstairs office. As I ascend the stairs, I have a visceral response as I think about the days behind the wheel on a long commute.

The Supply Chain Is Stuck. Unable to Make Progress?

Last week, I spoke at an event. The group, formed in 2006, strives to improve contract manufacturing processes in food, beverage, cosmetic and household product supply chains. This invitation is the fourth time of speaking at this event over the last fifteen years.

At the end of each speech, I feel like the Arab at the Passover dinner. Each time, as I leave the room, I am sure that this is my last speech at this event. The reason? I am asking companies to stretch and rethink their processes. I make them feel uncomfortable, and I struggle with how to resolve the issue.

Unsticking The Supply Chain

Today's supply chains are stuck unable to power balance sheet improvement at the intersection of growth, inventory management, cost, and Return on Invested Capital (ROIC). The people in the room at F4SS believe in the traditional processes that got us here.

With the COV-19 pandemic, supply chain processes need rethinking to better balance customer service, cost, and risk. As the global warming debate continues, we must confront that we have created supply chains that are incredibly effective in creating waste, but not aligned to serve customers to drive value.

In this post, I give insights into a practice for contract manufacturing in the consumer products industry, which is an example of a process requiring rethinking to unstick the supply chain.

Preparing for the Conference

In the early days of conference planning, the event team asked me to speak on the efficient supply chain. The group was surprised when I declined.

The problem? The efficient supply chain is usually not the most effective.

Companies have multiple supply chains. One size does not fit all. There are numerous flows; the best supply chain designs align rhythms and cycles to outcomes.

Aligning on Definitions

What defines supply chain excellence? An effective supply chain is fit for function. The design focuses on the delivery of results based on a clear outcome. Examples include:

-*The Efficient Supply Chain* delivers the lowest cost per sellable unit.
-*A responsive supply chain* focuses on cycle reduction.
-*An agile supply chain* achieves the same cost, quality, and customer service with demand and supply variability.

These are three basic; yet, very different supply chain designs. A supply chain cannot be all three. While many companies deployed an efficient supply chain for the last decade, during the pandemic, there is a need to shift to a responsive and agile supply chain model.

Classifying Supply Chain Types

To identify and classify supply chains, analysis using the Coefficient of Variation (COV). Let me explain. Product portfolios with high volume and predictable demand are best-served by an efficient supply chain design. With the elongation of the tail of the supply chain--personalization, customization, and promotions--more and more products sold have lumpy and less predictable demand. These products are more suitable for an agile supply chain design. As companies attempt to implement new growth models --e-commerce, social commerce, distributor sales--demand is less predictable, and the efficient supply chain model is less effective.

The struggle is to drive improvement of contract manufacturing processes for consumer products. The battle? Parent companies/brand owners outsource new products and promotions to contract manufacturers to improve internal asset utilization; yet, their goal is to drive growth. The two are incongruous.

Let's examine the logic. The sourcing decision for the brand owner is to improve internal OEE (Operational Effectiveness Efficiency). The attendees for the conference report to manufacturing or procurement function. As a result, customer service and new product launch effectiveness take a back seat.

New product launch items have greater than 70% error. In consumer goods, product outsourcing of new product launch increases variability. Outsourcing increases the cycle for a product with uncertain demand. Usually, in other industries, cycles shorten to improve customer service of highly variable products. As a result, in

consumer products, shortages increase for the new product launch.

Metrics matter. Operational Equipment Efficiency (OEE) is directionally wrong as a manufacturing metric for a growth strategy driven by new product innovation. Instead, the focus needs to be on functional reliability: alignment of cycles and improvement of the first-pass yield. However, tradition reigns, and organizations struggle to move from an efficient to an effective supply chain mindset.

Meanwhile, brand owners ask contract manufacturers to manufacture a product with high demand variability with long cycles at a low cost. There are two probable outcomes: out-of-stock products with high demand and a fire sale for the over forecasted product.

Reflection

Will I be asked back to speak? I don't know. In this world, where we are starting to question the traditional supply chain response, I hope that someone in the audience will return home with a new approach.

My goal? My wish is that someone after the conference will pull up a chair at the boardroom table and spark a new discussion. I blissfully think about a debate on executives discovering that the supply chain is stuck and the efficient supply chain is not the answer. Sadly, the efficient supply chain is more effective at polluting the planet than serving customers.

Help Supply Chain Planners to be Successful In This Trying Time

As I flew to Dallas, I worked on this post. Before boarding the plane, I watched a traveler pull a diet Coca-Cola from the bin and thought about the struggle to source sweetener with the rise of COVID-19. In the morning, as I poured the dog food into the bowl for my pups, I wondered if the looming issues of sourcing taurine—a health additive in many pet foods—would cause me to switch kibble. Over the weekend, as I shopped at Lowes, it was hard for me to not think about the pending shortage of Titanium dioxide—a key ingredient in white paint.

Earlier that day, Lenovo delayed the shipment of my new laptop. The delivery date is unknown. As I shopped at Best Buy for office supplies, I struggled to not think about the massive disruption of the electronics supply chain. Sam's Club and Costco shortages of water, toilet paper, and laundry products signal one thing for me: the spread

of the coronavirus will disrupt every supply chain. The only constant will be a continual surprise.

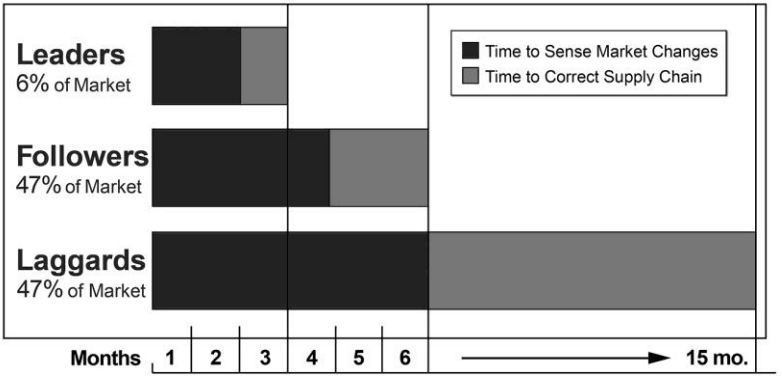
As markets shift, supply chains struggle to adjust. The order is a poor proxy for demand, and few supply chains have access to consumption data. While good news travels quickly in an organization, bad news travels slowly. With the downturn in the financial markets, the looming recession, and the fundamental shifts in demand—less travel and stay at home work policies—demand is changing.

Supply chains operate blindly on order data. In the downturn of the market in 2017, it took the average supply chain six months to adjust, and I expect alignment for this shift to be worse. Why? The gaps in functional organizational alignment are more significant than a decade ago, and the historic investments in the supply chain are inside-out but not outside-in.

Companies need to sense and use data based on shifts in consumption. Instead, the changes in demand need to translate changes in order patterns—driving replenishment across multiple tiers—before organizations start to align. Demand latency is the translation of market consumption to an order signal.

The public markets struggled today with the plunge in oil prices. Today was the worst day in the S&P since August 2011. A decline in consumer sentiment, increasing market turmoil, and pending supplier shortages means one thing for the supply chain: disruption. The result will be more work for planners. The answer is to increase modeling, evaluate sourcing strategies, and build the right push/pull decoupling points. The problem? Today, the supply chain planner cannot be successful.

Figure 1.4. Time to Sense Market Shifts in the 2007 Recession



The Struggle for Supply Chain Planners

In-flight, I struggled to find the right words for the title of this week's post. Was it, *The Death of the Supply Chain Planner?* I blinked at the starkness of the words. This title seemed too harsh and perhaps a better fit for a mystery novel. This title also could easily be confused with the hype circulating on the elimination of the supply chain planner with the evolution of the autonomous supply chain. Neither statement reflects my beliefs.

Could the title be, *"How to help supply chain planners be more effective?"* Nope. Wrong focus, I thought. My struggle is how to help organizations create an environment to enable planning effectiveness. By definition, in the current state, supply chain planners work in a lose/lose environment.

I find that most organizations fail to step back and define a work setting to enable planning effectiveness. Due to the lack of design of work processes, the output from the

technology is sub-optimal. Planning effectiveness will become worse as the health and financial issues increase.

I settled on a title on helping the supply chain planner to be more successful in completing work during this cycle of risk management. The goal is to help organizations more successful with planning over the long-run.

It's ironic, isn't it? Companies spend millions of dollars to implement supply chain planning technologies to drive insights for better decisions; however, there is a failure to design a work environment to enable success. Here I share three strategies to consider to eradicate some of the barriers.

Overview

As I visit companies and interview supply chain leaders on the effectiveness of supply chain planning, I realize the failed promise for supply chain planning technologies to drive better results.

As a supply chain pioneer in the 1990s, I was vested in the concept of using optimization to make better decisions. However, in my travels, I find that most organizations fail to use the tools effectively. The reasons? I find three:

-organizational design
-executive understanding of supply chain
-the lack of a clear definition of an optimization to drive supply chain excellence.

Here, I share three recommendations and hope that you will share yours as you read my blog.

Step #1. Organizational Design. In over 90% of manufacturing organizations, planners struggle in

an entry-level job. They average two-three years tenure. Fresh from college bristling with strong data skills, they lack an understanding of a supply chain. As they nestle into their new jobs, they are uncomfortable. The average tenure of a supply chain planner is two years.

Technology training is often too little and too late. The work is hard and labor-intensive. In our annual survey, supply chain planners rate low on job satisfaction. The planner's frustration is that they work hard, and the plans are not followed.

The reason? Organizations tend to be political—not data-driven—continually questioning the validity of the answers coming from planning technologies.

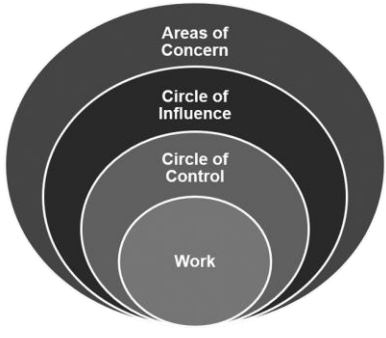
In many cases, the organization is right to question the answer from planning systems. (Ironic since the company spent millions of dollars on the technology.) Companies deploy planning technology without testing the optimizers. As a result, no one knows if they are getting better answers. As a result, the organization questions become circular.

Recommendation. Create a career path for planners. In the process, don't make the job an entry-level position. (The average tenure of a P&G demand planner is twelve years.) As a part of the organizational redesign, widen the planner's circle of influence, and align the reporting to a higher level within the organization.

Today, a planer's level of responsibility (circle of control) does not align with the earned or given (title and reporting-based) level of influence. A

low-level employee with one-to-two years of experience will never be successful at the helm of driving a large corporation's planning strategy. It is just too easy to discount the plan. Planning is about the prevention of "surprise" and aligning the organization to improve outcomes. The problem? The organization is not naturally aligned. As a result, without the right organizational design, the planner is buffeted about like a piece of paper in a wind storm.

Figure 1.5. Aligning Work to Ensure the Right Balance of Work and Influence



Step #2. Increase Supply Chain Leaders Understanding of Supply Chain. Supply chain management, as a cross-functional process, to align source, make, and deliver strategies, evolved in 1982. The first supply chain management academic programs began in the 1990s. Less than 10% of supply chain business leaders completed formal supply chain training, yet, all believe that they know the definition of supply chain excellence.

The problem? Most companies use words like efficient, responsive, or agile without a clear definition to make the process actionable in

software implementation. (Optimization engines need clear objective functions.)

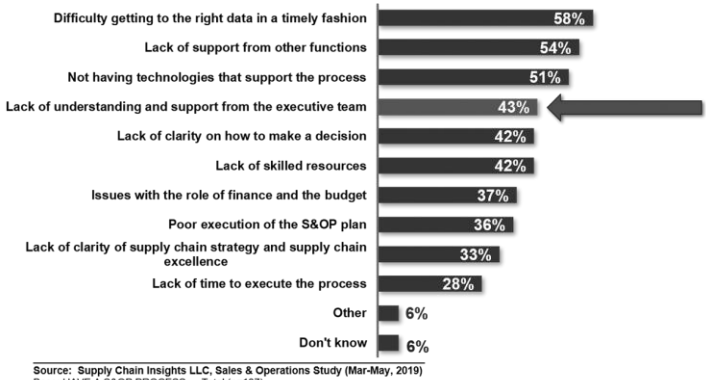
The second issue? Times have changed. For the last three decades, supply chains grew more complex. Simplistic thinking of trading-off customer service, inventory, and cost became much more complicated with the shifts in asset strategies. As companies outsourced—greater dependency on third parties for manufacturing and transportation—and asset utilization grew from 10% to 35% ROIC, the management of the supply chain becomes more complicated.

In parallel, as demand variability increases, simple volume analyses like A, B, and C based on units sold are insufficient. Instead, design the supply chain based on both variability and volume.

In the process, tailor lead times. In the last decade, order cycle times decreased by 50-75%. Only 9% of companies redesigned their supply chain to serve the customer quicker. With pressure on shorter cycles and more asset constraints, it is even more critical to get good at inventory management.

In the supply chain, there are potential buffers—excess capacity in manufacturing work centers and inventory. The problem is that many teams have eliminated the asset buffer without redefining inventory strategies. As a result, they are unknowingly trying to pursue an infeasible plan. To resolve the issue, they need to test the plan through simulation to ensure that the right buffers are in place.

Figure 1.6. Current Barriers



Recommendation: Use the modeling of supply chain risk management as an opportunity to drive cross-functional organizational learning. Put your best models front and center of board room discussions. Now is the time to help board members understand the world of a complex non-linear supply chain using design analysis, simulation, and what-if modeling.

Step #3. Align and Clarify the Definition of Supply Chain Excellence. Optimization engines are the backbone of supply chain planning. The engines require testing, the availability of clean data (planning master data is an ongoing issue), and goal clarity. For success, an optimization engine must have a clear objective function. The first step is for companies to align functional metrics to balance sheet goals based on strategy. The second is to identify/type supply chains based on variability and volume. Each supply chain type could have a different objective function.

The problem? Most companies are not clear on their goal, and they lack the understanding of what is possible. Most want it all, and foolishly believe that they can push an optimization engine against an objective function of efficiency, responsiveness, and agility simultaneously.

Leaders do not realize that the goal of the lowest cost supply chain is distinctly different than the goal of maximizing customer service while minimizing costs. Spending time to tune engines is essential to drive success; yet, most companies have not tested their planning technologies to ensure success.

Recommendation: Type your supply chain based on volume and variability and clarify the objective function for supply chain optimizers. Then test the optimizers in supply chain planning to see if they are improving outcomes. Many are not. Don't assume that they are.

As the world issues on the COVID virus reach a crescendo, model the supply chain, and test the feasibility of solutions using *"what-if"* analysis and simulation. Test but verify.

Wrap-up

With COVID-19, we are living in the middle of a risk management supply chain case study. To help make work asier for supply chain planners consider aligning their job levels to balance control and influence while designing/simulating the supply chain response.

Announcing the Supply Chains to Admire for 2020

In 2014, I wrote my first book on supply chain excellence. In chapter four of the book, I wrote extensively on the need for the supply chain leader to shift their focus from saving money to driving value. In the peer review of the book, Keith Harrison, the prior leader of Global Supply at P&G, said, " *In your a*rticle, you write on shifting the focus in the supply chain from *cost to value. I agree conceptually, but you do not define value. I don't know the answer, but how should a supply chain leader define value and align with peers within the business to deliver against the right goals?"*

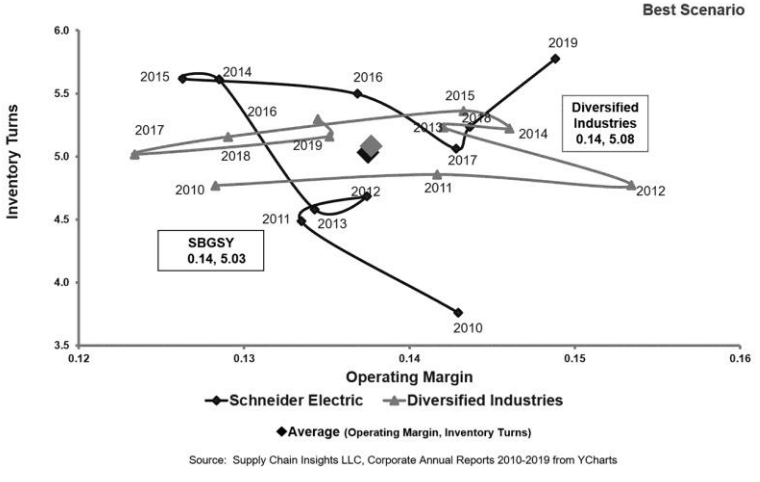
When I read his feedback, I sighed. He was right. In the industry, there is no clear definition of supply chain excellence. Metrics systems are unclear and in my zest to finish the book, I had not provided a definition. Answering his question became a seven-year research project titled the Supply Chains to Admire analysis.

The Response To Tough Love

To answer his question, I chartered a project with the Arizona State University statistics department to analyze which combination of metrics drove the highest market capitalization. The research project studied 1200 combinations of 180 metrics for four hundred companies from 2010 to 2012. After six months of analysis, we decided the best fit was the combination of growth, inventory turns, operating margin, and Return on Invested Capital. My interest peaked when I started plotting the progress of these companies at the intersection of these metrics year-over-year in orbit charts.

In Figure 1.5, I share an example. Note that Schneider Electric for the period of 2010-2019 is below the industry sector average for inventory, and at the industry average for operating margin. However, in these nine years, Schneider is less resilient. (Larger swings in the pattern than the industry sector average.)

Figure 1.5. Schneider Electric Orbit Chart and Performance Against Peer Group



Tracking Supply Chain Performance

To understand supply chain excellence, each year, in my research, I plot the orbit chart performance of publicly-held manufacturing companies. The goal is to track performance and improvement against the metrics of year-over-year growth, operating margin, inventory turns, and Return on Invested Capital (ROIC) for all publicly-held manufacturing and retail companies for the period of 2010-2019.

The supply chain is a complex and non-linear system, and these metrics have complex and interconnected relationships. Performance improvement is easy when you have a lot to lose, but as a company approaches the sector average improvement slows. In the analysis, as shown in Figure 1.6, only 22 companies beat their industry sector averages for the period of 2010-2019.

Figure 1.6. Winners of the Supply Chains to Admire Analysis for 2020

In 2020, twenty-two companies meet the criteria to be a Supply Chains to Admire Award Winners. The list of winners includes AbbVie Inc., Assa Abloy AB, BorgWarner Inc., Broadcom, Dollar Tree Stores, Ecolab Inc., iRobot Corporation, Lockheed Martin Corporation, Koninklijke Ahold N.V. (Ahold), L'Oréal S.A, Monster Beverage Company, PACCAR Inc, Reckitt Benckiser

Group plc, ResMed, Rockwell Automation, Samsung, Sleep Number, Taiwan Semiconductor Manufacturing (TSMC) Company, The Toro Company, TJX Companies, United Tractors, and VF Corporation.

While the companies of Becton, Dickinson, and Company (B.D.), Schneider Electric, and Urban Outfitters did not qualify as sector winners, in the analysis, each company shows marked improvement and notable achievement. As a result, each is worth a mention.

The list of Supply Chain to Admire Award Winners is a stark difference from the perception of industry leaders. While the recognition of L'Oreal and Samsung aligns with perception, the performance and recognition of other companies on the list are not as well known.

The Supply Chains to Admire is a data-driven analysis, it is less subject to industry bias. As a result, the Supply Chains to Admire methodology is a useful assessment tool for companies of all sizes globally.

Characteristics Of Winners

When I finish the analysis each year, I interview the leadership teams to understand why they think they won. Technology implementations or consulting projects are never the drivers. Instead, the results are the product of year-over-year focus by a leadership team. There are five characteristics:

1. **A Shift from Functional to Cross-Functional Metrics.** Organizations that underperform focus on functional optimization of make, source, and deliver processes without clarity on total cost or the reason for shorting customer orders. In winning companies, Production Schedule Adherence replaces Operational Efficiency (OEE), and the emphasis is on total cost,

not functional metrics. (Only 29% of companies easily access total cost data.)

2. **Consistency of Leadership Team Direction.** The organization side-steps fads, shiny objects, and financial reengineering projects. Weekly and daily information flow to focus on understanding customer service and sentiment. R&D, operations, and sales teams are aligned.
3. **Mission Clarity.** The teams are clear on the goal and the culture to win. Leaders understand that it is not enough to say that employees need to be team players. There is a realization that culture needs to be defined by principle-based leadership and ongoing training.
4. **Definition of Supply Chain.** In winning companies, the supply chain is a process that starts with the customer and crosses over the organization market-to-market (sales to procurement). Continual redesign to maximizes value. Lower performing companies define the supply chains as a function within a functional organization.
5. **Continual Process Innovation.** The supply chain needs to adapt to channel shifts continually. Leaders make this a part of doing business. In these organizations, the focus is on the customer. The efforts of teams are never hamstrung by financial hurdles to minimize cost. Leaders continually test and learn to drive innovation.

The Checklist

In summary, we summarize the characteristics of winners and laggards in Table 1.2.

Table 1.2. Qualitative Observations of Supply Chains to Admire Winners and Laggards

Characteristic	Top Performers	Lower Performers
Alignment	A focus on the customer. Definition of a business model from the customer aligning sell, deliver, manufacturing, and sourcing.	Performance centered on functional metrics. Belief that saving money in the back office can be used by commercial teams to fuel growth.
Technology	Constant testing and learning with new approaches.	Focus on IT standardization.
Innovation	An equal focus on process, business model, and product innovation.	A product innovation focus.
Design	Fit for function. Continual redesign.	Making the best of the given design.
Metrics	Balanced scorecard with a focus on cross-functional and shared metrics.	Reward systems based on functional metrics.
Leadership	Shared and consistent vision.	Continual shifts based on changing programs and shiny objects.

I hope that this analysis helps you and your teams. Look for the company case studies of the leaders in subsequent articles.

Hiring Supply Chain Talent. Consider A Musician.

One of the strange outcomes of the COVID-19 pandemic is the categorization of the profession as cool. I love seeing the supply chain propelled from a *boring category* to an industry with promise.

The news cycles helped. Over the last two decades, the word *"supply chain"* never topped headline news. Still, today, while the average Joe may not know the ins and outs of the supply chain as a profession, he knows that supply chain management is critical for the delivery of hospital supplies and managing inventories of scarce supplies in tough times. Today's empty shelf phenomena is an exclamation point highlighting the importance of the profession.

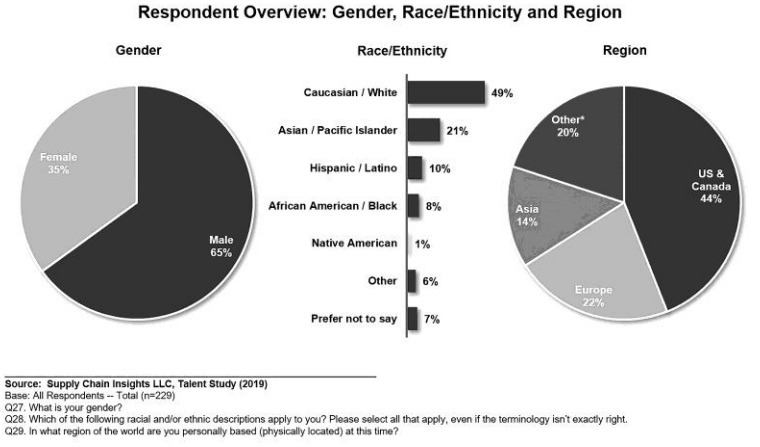
Multiple estimates from CSCMP and ASCM support that talent shortage in 2030 will be 10%. The job requires a rare combination of problem-solving, analytical thinking, and people/influence skills. In short, talent is and will continue to be a missing link for many organizations.

When I went to college in 1972 (yes, I am that old), there were no programs for supply chain education. I graduated in chemical engineering and found my way into supply chain management through several manufacturing leadership positions. The career just happened. As doors opened, I walked through and embraced opportunities. Being the only woman in a conference room for a morning meeting--after waking early to take my child to daycare as a single parent--was tough. It would be laughable to say that it was a supportive environment.

Today, caucasian males dominate the profession. I hate everything that the old boys club embodies, but I love the discipline. To make my point, let me share some data.

I am currently working on charting the results of a recent talent study for our October newsletter. Figure 1.7 is a summary of the first wave of the research study fielded in the United States. As a first-generation supply chain pioneer, I wince looking at this data. While there are many women in supply chain groups today, I struggle to find a networking group that embraces race, culture, and diverse thinking.

Figure 1.7. Survey Respondents of Talent Study (Respondents Primarily from Linkedin)



Today, I am only going to focus primarily on the diversity of thought. I will write much more on inclusion in later articles.

A Narrow Definition of Integration Held the Industry Hostage

Last month, I published a summary of The Supply Chains to Admire research. In this analysis, focused on 2010 to 2019, we find that the top-performing companies--teams that are driving improvement faster than their peer group while out-performing comparative companies in the metrics that matter (growth, operating margin, inventory turns, and Return on Invested Capital (ROIC)), challenge the narrow definition of integration, and ERP, as a core component of supply chain architectures.

I remember a presentation to a large Global 500 company with a back row filled with consultants. The Chief Operating Officer believed that an essential step for the company was the implementation of ERP. He likened

it to the basement of his house. An excellent supply chain, he said, *"sits on a firm foundation."* The consultants on the back row all nodded in agreement. (The project was worth millions for each party.)

As I stood, I smiled and gently questioned his logic. I asked the question, *"Isn't harmonization and synchronization more important than integration?"* I continued, *"Isn't the basement analogy more fitting for the development of a great data strategy? Shouldn't you invest in the building a data architecture to determine which data should flow through clouds, pool in lakes, and stream through rivers?"* He asked, *"What does that mean?"* I continued, *"Less than half of the data to run a supply chain comes from ERP, and as the business changes, it will be impossible for you to have a single instance of ERP."* (Current research says that the average company has nine instances of ERP, but there is more to this than the average. I know that Corning has over 30 and Schneider Electric more than 75 ERP instances. Getting all of this data to a common instance is too great of an opportunity cost for the corporation.)

A consultant on the back row raised his hand and said, *"But isn't starting with a common instance, the right place for this Company to start?"* I laughed and said, *"Perhaps for your company and your paycheck, but not for this manufacturer. It is too great of an opportunity cost to continually upgrade and consolidate ERP when you have a business to manage. A focus on integration versus harmonization and synchronization yields a fragile and inflexible business model. We need to build core competency to manage and evolve disparate IT systems."*

Conclusion

The discussion was not popular. My boss gave me negative feedback for challenging the status quo. In my

opinion, the audience was a 100% white male conference feeding a groupthink frenzy. The resultant project was more than 50M$, and today, the implementation is not used.

Most in the audience did not understand my point on the principles and criticality of designing supply chain rhythms and tempos and the criticality of harmonization and synchronization in driving supply chain performance, which gets me to my point in this article. When you hire this year, consider hiring a musician with analytic, problem-solving, and people skills. All the better if she is a person of color. Break the cycle: drive diversity in supply chain thought processes to improve performance.

When you hire these supply chain musicians, put these new hires on the data architecture team—challenge conventional paradigms. Draw the river of demand and challenge existing supply cycles. Investigate how machine learning and pattern recognition unleash insights. Map each supply chain based on the Coefficient of Variation (COV) and challenge the tempo of the response. Focus on the goal of aligning and synchronizing supply and demand. (Throw away the limited view of integration.) Build ontologies to fuel cognitive learning.

Let me close by congratulating Rahquel Purcell of L'Oreal on her recent promotion to SVP of the North American supply chain team. L'Oreal, a five-time Supply Chains to Admire Award Winner, gets diversity. Rahquel is a powerful and competent woman of color. When I present to the L'Oreal team, the diversity of the people warms my heart. As I leave the sessions at L'Oreal, I smile. Diversity matters.

Supply Chain Talent. To Create Satisfied Employees, Focus on Building Meaningful Work

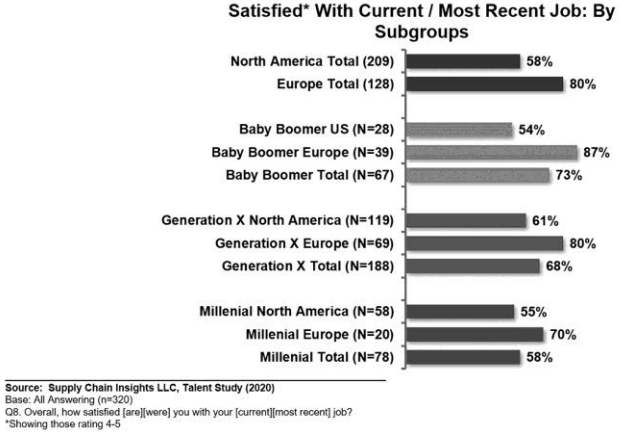
The supply chain talent discussion in the middle of the COVID-19 pandemic is quite different from six months ago. As we work at home through online meeting formats, the work is the same, but the culture is quite different. However, there is a constant. Employee satisfaction drives better work outcomes. In our correlations of supply chain cause and effect, manufacturing companies with more satisfied employees have lower total costs and higher price to book ratios. Not only are costs lower, but corporate value increases.

While we may know this intrinsically, it is useful to remind ourselves that talent is not a cost, but an asset. I am unsure if we will be short 5%, 10%, or 15% of available and skilled workers in 2030, but I believe that the only constant is change with retirements and process shifts. This post aims to usher a warning: senior supply

chain leaders (baby boomers) are more satisfied than Millenials and Gen X. European supply chain leaders are more satisfied than those in North America.

Senior leaders are not doing a good job of passing the torch of knowledge and improving younger generations' job satisfaction. Only one percent of respondents feel that they have a clear career path. Here I share some results from a recent study.

Figure 1.7. Analysis of Satisfied Supply Chain Employees



What Did I Learn From This Study?

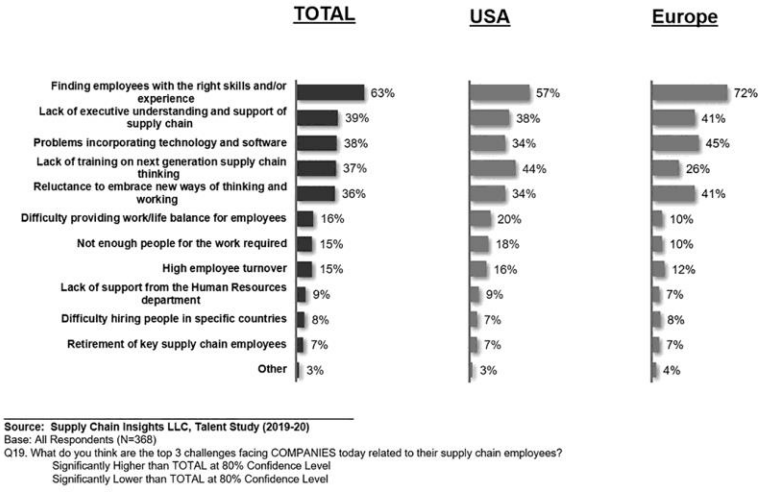
Want a satisfied employee? The answer is to give them meaningful work. There is a strong correlation between job satisfaction and the belief by the individual that the work is meaningful.

1. **Finding Skills Is An Issue.** While finding the right skill set is an issue in Europe and North America, Europeans are more satisfied with European graduates at an 80% confidence level. Problem-solving skills are the most critical and often missing capability.

2. **Foster Ownership.** The best boss fosters ownership of projects and programs. This characteristic is more prevalent in European teams.
3. **Be a Good Boss**. Clear communication of strategy and direction by the boss correlates to job satisfaction. In the study, communication is the most critical factor in being a good boss. Less than 40% of business leaders are clear communicators. Most employees are not clear on strategy, and efforts are disconnected—for example, business strategy and network design lack alignment. Companies are flush with vague terms like end-to-end planning, control towers, visibility without actionable definitions.
4. **Technology Limitations Frustrate Gen X. North America is Less Patient Than Europe.** The challenge with business executives understanding the supply chain is universal across the continents, but the employees in North America, especially Millenials, are frustrated with software capabilities. Someone aptly said to me this week, *"I know more about the Pizza delivery for lunch than where my inbound freight will arrive at the factory."*

In Figure 1.8, we share the over-arching challenges of supply chain professionals.

Figure 1.8. Summary of Supply Chain Challenges



Lora's Take

As I travel the world and speak to supply chain leaders and worked with supply chain teams, I believe that:

1. **The quality of education in European universities is superior to that in North America.** There is more rigor in building problem-solving skills and on-the-job skill-building.
2. **North American teams have more burnout.** Layoffs, mergers, and acquisition labor churn are higher in the States due to labor rules and regulations. These shifts in combination with less vacation and time-off is an ongoing stressor.
3. **Technologists are happier than business users.** The issue for business users is internal politics. As supply chains moved from local to regional to multi-national to global, few companies defined

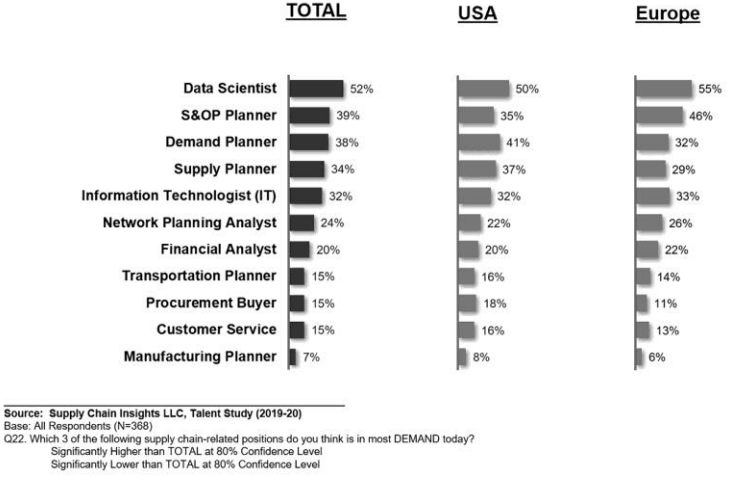
governance well enough to reduce internal friction and politics—the reliance on spreadsheets and email foster passive-aggressive communication.

4. **Analytical skills are in short supply.** Critical positions include demand and S&OP planning. (Please refer to the data shown in Figure 1.9.) Success in these positions requires a strong skillset in problem-solving and internal influence management. Supply chain execution positions in warehouses and logistics are not experiencing the same shortages. Universities need to focus on building planning skill sets.
5. **Supply Chain talent is the missing link.** As an industry, we are not doing a good enough job of transitioning supply chain understanding across generations. Likewise, we are not closing the gap with business leaders to understand the supply chain as a complex non-linear system. The lack of clear communication of strategy and the definition of meaningful work is a barrier in many companies.

As wildfires burn, and scientists push to find a COVID-19 vaccine, I believe that the supply chain matters more and more. I think that great supply chain leaders are needed to improve corporate social responsibility and bring critical supplies like vaccines to the market. My plea? Let's focus on closing the gaps in job satisfaction and enhancing supply chain talent.

Let's face it; people run supply chains for people. Empowered people are the continuous thread for success, but talent continues to be the missing link for most.

Figure 1.9. Positions in the Greatest Demand



These are my thoughts. I welcome your ideas.

Section 2

Making Better Decisions

Section 2

Making Better Decisions

Companies are data-rich and insight poor. Insights are the bridge to accelerating progress. Projects and ideas abound. However, leaders struggle with stalled results. What to do? Here we share some Straight Talk on the state of the market.

S&OP Slip Slidin' Away

At what point does soil erosion cause the side of a mountain to give way? Over time, crumbling occurs. Then suddenly, the mountain gives way, collapsing to the land below.

The analogy applies to the evolution of supply chain processes. This week, as I worked on a Sales and Operations Planning (S&OP) report, I found myself tapping my foot to music in my head, as I asked myself the question, *"Why are companies getting worse, not better in managing their S&OP processes?"*

To make my point, let me take you back in time. The year was 1977. I was graduating with my first college degree. (Yes, I am that old.) At the time, I was an optimistic teenager thinking I could change the world. I vividly remember the Paul Simon Song, Slip Slidin' Away. The

song never topped the charts, but it was a catchy tune. As I worked my summer job as a lifeguard, my well-tanned legs in fringed jeans shorts tapped my Earth Shoes to the beat of the song. Here are some of the lyrics:

Slip slidin' away
You know the nearer your destination
The more you're slip slidin' away

To the mortal man
We work our jobs
Collect our pay
Believe we're gliding down the highway
When in fact we're slip slidin' away

Why Are S&OP Processes Deteriorating?

Erosion and degradation happen slowly. In Figure 2.1, note the slippage in S&OP over the past three years.

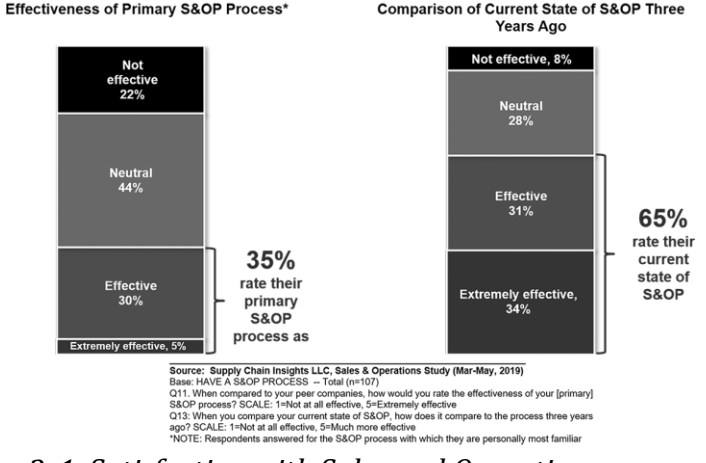


Figure 2. 1. Satisfaction with Sales and Operations Planning

Why is success elusive? Why is progress in S&OP slip slidin' away? My conclusion? Companies are chasing fads and missing the basics. As I use research to track progress, I find a trend every three years that moved us backward, not forward. Here I share these insights.

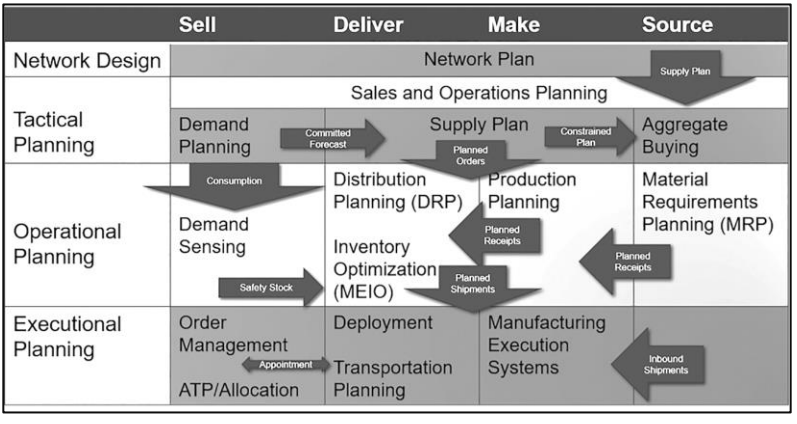
Focus on the Basics:

To understand, let's start with the basics. Process fundamentals are not sexy and often misunderstood. Getting good at the basics requires hard and dodged work—progress takes many years. Start with two basics:

> **Clarity of Strategy.** The best S&OP processes start with a strategy. Companies quickly answer the question of, *"What is the role of S&OP? What defines success?"* Sadly, most companies cannot answer these questions. When I ask them, they look at me like I am the dumbest analyst in the world. The answer is not easy but needs a definition. To move quickly, organizations need clarity of the role of the supply chain to drive growth.
>
> **Discipline.** S&OP, when done right, is a tactical process. The focus is to help companies to make trade-offs for a longer time duration. S&OP execution should not be confused with S&OP planning. The difference is more than nuance. For clarity, let's take an industry like Household Products. The average order cycle is 2.5 days, and the order slush period (firming up orders) is 8-13 weeks. As a result, most companies define the S&OP process to start at 12 weeks in the future and extend through eighteen months. In parallel, S&OP execution focuses on the order slush period

of one-to-twelve weeks. While the S&OP process is monthly, the S&OP execution process is weekly. Each month, there is a cadence to manage playbooks from the S&OP planning process to the plan's execution.

Figure 2.2. Role of S&OP in Planning



Within Advanced Planning Systems (APS), workflows (shown by the arrows in Figure 2.2) and consumption logic across the time horizons. As a result, buy technology for seamless workflow and consumption logic between S&OP planning and traditional APS.

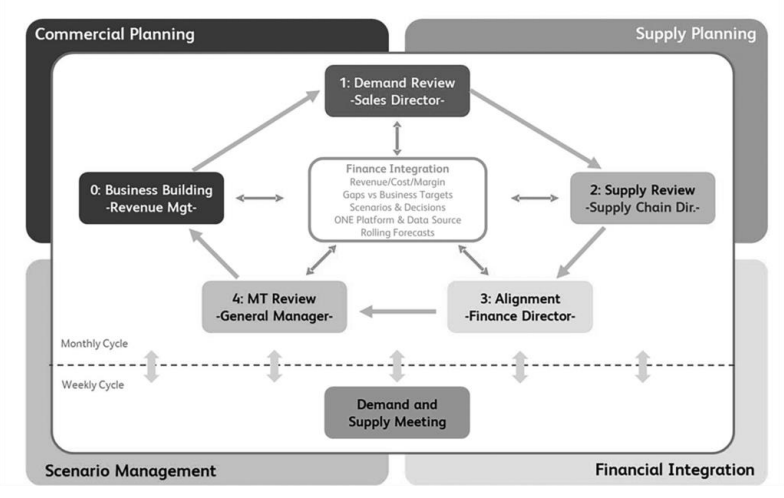
Driving Process Excellence

In S&OP implementation, companies need to manage processes above and below the line. Let me explain. I use the concept of the "line" to signify the S&OP meeting. S&OP success requires significant prep work before and after the meeting.

Getting ready for the S&OP meeting requires model building, maintenance, and what-if analysis. Above the

line are the discussions with the leadership teams to determine trade-offs. In Figure 2.3, we share a client example.

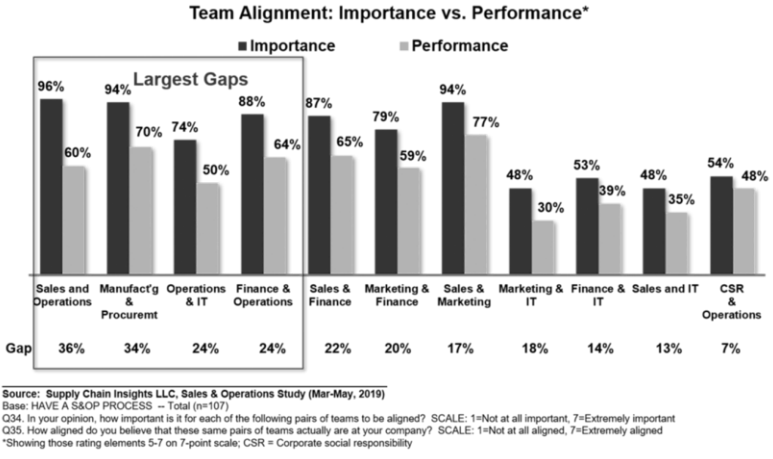
Figure 2.3. Client Example of S&OP Process Flow Surrounding the Meeting



A successful S&OP process is 60% change management, 30% process definition and 10% technology. Most people, enamored with technology, find it challenging to drive governance (who should make decisions and how decisions should be made). To drive alignment, build goal congruence. Define a cross-functional set of metrics to align the strategy and define the right reporting relationships (the S&OP process needs to report to the profit center manager). Reporting relationships to sales, finance, or supply chain are equally bad.

In successful S&OP processes, leaders work to improve alignment between functions. Organizations are not naturally aligned. The gaps shown in Figure 2.4 are an opportunity for business leaders.

Figure 2.4. Alignment Gaps

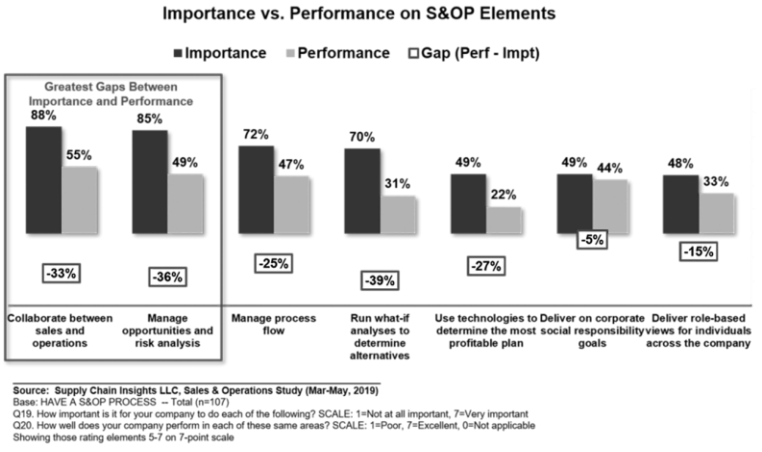


Source: Supply Chain Insights LLC, Sales & Operations Study (Mar-May, 2019)
Base: HAVE A S&OP PROCESS -- Total (n=107)
Q34. In your opinion, how important is it for each of the following pairs of teams to be aligned? SCALE: 1=Not at all important, 7=Extremely important
Q35. How aligned do you believe that these same pairs of teams actually are at your company? SCALE: 1=Not at all aligned, 7=Extremely aligned
*Showing those rating elements 5-7 on 7-point scale; CSR = Corporate social responsibility

S&OP leaders are good at planning. There is strength in "what-if analysis." (Only 1/3 of companies today have "what-if analysis capabilities.) In demand planning, Forecast Value Added (FVA) and inventory mix accuracy improve.

Over the last decade, we have improved the scalability of planning, but the research shows a backward movement to model a feasible plan and drive actionable insights.

Figure 2.6. Gaps in Planning for Sales and Operations Planning



A pitfall is a hidden or danger that is not easily recognized by the team. In contrast, a pothole is an issue or a series of events that drive a gradual process degradation. Both are challenges for leadership teams.

Table 2.1. Potholes and Pitfalls of S&OP Deployment

Potholes	Pitfalls
Degradation of Planning Engine Effectiveness Post Implementation	Strategy Alignment
Training and Skill Dilution from the Initial Implementation	The Role of the Budget
Management of Planning Master Data	Governance
Clarity of Definitions	Process Discipline and Clarity of Roles
Shifts in Leadership	Measurement Systems

Degradation: Chasing Fads

So, you might ask, why are we slip, slidin' away? It is deeply rooted in the organization's orientation to want to chase fads and not be grounded in building the foundational elements listed above.

Was it CPFR? From 1998 through 2005, there was an infatuation with the CPFR process. Companies wanted to be more customer-centric, so VMI processes broadened to include forecasting and replenishment processes. The problem? Retail forecasts are just not good enough to drive success. People accepted that their retail partner's forecast could drive insights. However, the error in customer forecasts coupled with the lack of accountability made this an S&OP rat hole.

What was the role of collaborative sales forecasting? The CPFR process then morphed to collaborative sales forecasting. The concept was simple. Want to know what a company is going to sell? Ask sales. The problem? The sales organization is biased based on incentive structures. While the sales organization's input on trends is useful, having the sales organization forecast without the discipline of FVA logic is mostly a waste of time. Most companies, through collaborative sales forecasting unknowingly, introduced significant bias and error into the demand plan.

Shifts from regional to global supply chains? Governance clarity is paramount in the definition of a worldwide supply chain. In the evolution of markets, companies need to be clear on roles. What is the role of the region? What is the

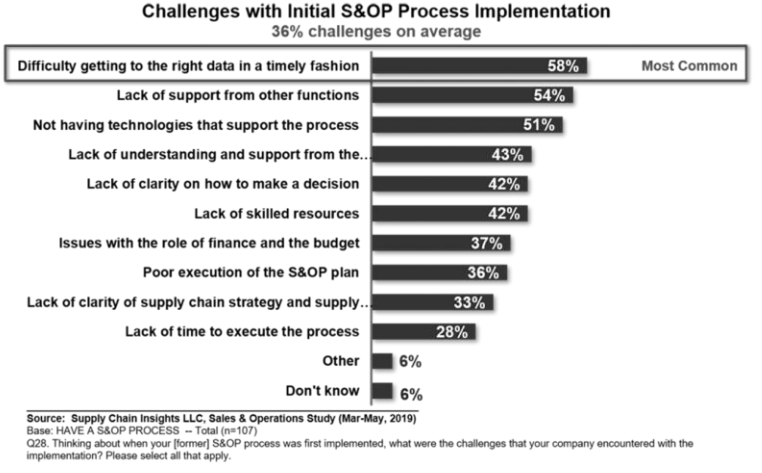
purpose of a division? And what is the role of the global teams? Where are the overlaps? How should companies make decisions? And, how do these decisions roll-up to the larger corporation for visibility and alignment to management processes? In the evolution of the global supply chain, I have seen many, many mistakes in this area.

Impact of IBP? In the last decade, the focus has shifted to Integrated Business Planning (IBP). Companies lack clarity on the role of the financial budget rate processes much lower than companies with clarity in the purpose of the financial forecast to supply chain planning. The difference is significant at a 90% confidence level.

A Mistake of Pushing the Concept of One Number Forecast? A common mistake is to manage S&OP to the budget commitments. In a mature process, the budget is an input, but not the constraint. The reason? The Budget is out of date when published and does not keep pace with the market. To drive growth, corporations need to balance opportunity and risk while updating the budget.

In parallel, it is not sufficient to connect financial data to supply chain processes without context. The only thing that sales, financial, and supply chain forecasts have in common is the word *forecast.* The data models, processes, and definitions are different. As a result, connecting data without context leads to confusion. I believe that many well-intentioned IBP process implementations drove S&OP degradation in the past five years. Outlined in Figure 2.7 are some of the challenges.

Figure 2.7. Current S&OP Challenges



Shifts with DDMRP? Demand-Driven Material Requirements Planning (DDMRP) is a new threat to the S&OP process evolution. DDMRP is a functional process to translate demand into material requirements. Mistakenly, companies are attempting to make it a substitute for the S&OP process. A focus on a single business function of any type is death to the S&OP process evolution.

In short, why is S&OP effectiveness slip slidin' away? Companies are chasing fads instead of getting clear on the basics. These are my thoughts. I look forward to hearing from you.

Learning How To Dance

My aged hand drapes the barre on the celebration of Global Ballet day. Dutifully, no matter how bad I performed in the last class, I return to the barre, extend my right hand, and start a new course. There is a

soothing familiarity to refine moves that defy my capabilities.

On these days, like most, my teacher sighs and reminds me to listen harder to the music. I frustrate her. My teacher's face scrunches in pain as I lead the barre with the wrong tempo. The reason? I lack musicality—the ability for the music and the dancer to become one—and struggle to interpret the changes in tempo or a variation in rhythm. I love to listen to music, but struggle to move my body fluidly through genres. To try to get better, I have enrolled in piano classes and actively listen to my metronome.

Is The Supply Chain Out of Rhythm?

So, why might you ask is Lora telling you this story? On a supply chain blog? Let me explain. As I struggle to build musicality, I think about the rhythms and cycles of the supply chain. Yep, I am that geeky kind of gal.

My mind races. As I get bored with class, I think about recent client experiences and how the rhythms are changing. In essence, some are slowing like a beautiful adage while others are accelerating with more significant variability like a petit-allegro with an almost deafening staccato-like pace. In all cases, with my clients, I find the internal supply chain is out of step—lacking musicality with either the channel or the supplier base. In short: teams are out of sync with the markets. The problem? The markets are more variable, and excellence requires synchronization.

Reflection

IT teams reporting to the Chief Financial Officer (CFO) slowed progress in supply chain innovation. The reason? Most CFOs view the supply chain with a transactional mindset. Their view of data and workflows is focused on efficiency and driving the lowest cost. Few understand resiliency, buffers, and the need for the adaptive supply chain.

The term supply chain is politically charged. The CFOs that I work with lack an understanding of supply chain planning. Their world view is currency-based planning at a brand level, while supply chain planning is volume-based at an item/location level. (As companies become more mature, the definition of location changes moving from a ship-from location to a ship-to-location to be more customer-centric.)

As a result of the CFO's agenda, the organization's focus is usually on the management of enterprise data without an understanding of demand latency (time for consumption to translate into order-based replenishment).

Common Mistakes

In the journey, companies make many mistakes. These throw the supply chain out of balance. Wrecking rhythm and cycles.

Unfortunately, there is no ballet mistress with a cane forcing refinement of a dance that is not understood. As a result, companies struggle:

> **The Supply Chain Needs to be Real-time.** One mistake that companies make is asking for processes to be real-time. While processes can be

updated and refined through real-time data, not all processes need to move in real-time. Instead, they need to operate at the speed of business with zero latency. While real-time data offers great promise; however, the actualized benefit requires a new architecture. However, the focus only on real-time data introduces nervousness into the system.

I Want An Integrated Supply Chain. When I hear this request, I ask the client, *"Integrated to what and why?"* For many, this is code for *"implement ERP."* Why does it matter? Integration is limiting. The goal of synchronization, harmonization, and data portability to drive interoperability improves agility. Synchronization moves data across time horizons through consumption logic and workflows while harmonizing calendar and planning master data (item data, cycle information, and data translation).

What is the difference between integrated and synchronized planning? While integration moves data from point A to point B, data synchronization adds policies (and rules) to align supply chain execution to business strategy.

Let me give some examples:

> **Seasonality.** If a product has strong seasonality, map replenishment at the item level into a production planning system. The reason? Companies miss the synchronization of the different streams by policy to the outcome.

Demand Consumption. Monthly demand planning output needs to be translated (consumed) into a daily plan based on rules. Focus on consumption data in sync with the market. Consumption logic is tricky, requiring the fine-tuning of rules, policies, and optimization. These policies drive replenishment.

Freeze Duration and Production Logic. Production plans improve inventory cycle stock levels. The focus is to freeze the schedule for a short duration to manage demand. This production logic is key to the management of inventory policy. While most companies have worked on safety stock logic, they have the opportunity to improve cycle stock policies and logic.

End-to-end: When I hear the words *"end-to-end,"* I smile. I then ask the speaker to describe, *"What is end-to-end?"* For most, it a supplier to the factory or a factory to a customer.

As shown in Figure 2.8, the design of ninety-five percent of supply chains is from supply to the channel. The problem? As the channel changes, if the supply chain does not start with the customer, it quickly becomes out of step with the market. As a result, companies have the wrong data and struggle to focus on the customer.

A few companies espouse my definition *"as bi-directional flows from the customer's customer to the supplier's supplier."* Most are linear in thinking and limited in scope

(structurally encased by a functional understanding of supply chain excellence).

Figure 2.8. Flows from the Suppliers to Customer

When the supply chain is a function within a functional organization, the answers become more limited. More mature supply chain end-to-end thinking focuses on the flows of products, cash, information, and demand from the channel to the organization and seamlessly through its network. This shift, as shown in Figure 2.9, is not trivial. It is overarching. The supply chain starts and ends with the customer, and there are no alignment issues between commercial and operations teams.

Figure 2.9. Outside-in Processes

Clear Definitions. I want visibility said the client. *"You want visibility of what in what time dimensions?"* I asked. He did not know. At the next client, the team stated that they wanted a control

tower, and when I asked, *"What they wanted to control?"* They were not sure. The problem? Teams bandy terms around without definition. The conversations go round and round. Leadership groups throw around concepts without running the terms to ground. As a result, the plans to execute process changes run afoul.

Summary

As we move into the new year to kick-off the new decade, we need to learn from the past to question the future. Over 95% of companies are stuck at the intersection of growth, cost, customer service, asset utilization, and inventory. With the increase in complexity, supply chains are becoming more and more non-linear. As a result, it takes time to get it right. My advice? Drive conversations from the superficial to make the next steps actionable.

Welcome, Puff the Magic Dragon, To Your Supply Chain Team

Remember the Peter, Paul, and Mary song, *Puff the Magic Dragon*? It was a song from my youth. While there is a raging debate on song intent—*Was the goal of the music to celebrate a children's story from Oliver Wilde about the loss of innocence, or is it a statement about the use of drugs?* We don't know. In this blog, I will rely on the

songwriter's account of a childhood story about a dragon that lived in Honalee.

A dragon is often a symbol of evil. It can symbolize supernatural powers, wisdom, and strength from hidden knowledge. Here, I postulate that the supply chain dragon is data. Supply chain leaders are drowning in data and low in insights. Each survey completed over the last decade comes back with data as a significant challenge for supply chain leaders. In this blog, we reveal the results of a recent S&OP study.

How do we harness the power of data with new forms of analytics? How do we slay the dragon and kill harmful processes? As I think about this topic, I find it useful to listen to this song from 1963. Read the lyrics of this old favorite. The focus is on the loss of innocence. "*…the dragon lives forever, but not so for little boys…"* It is time for us to lose our innocence--traditional analytics thinking-- and ride the data dragon to new horizons while building powerful organizational capabilities.

As you read this blog, here are the lyrics for you to ponder:

Puff, the magic dragon lived by the sea
And frolicked in the autumn mist in a land called Honahlee
Little Jackie paper loved that rascal puff
And brought him strings and sealing wax and other fancy stuff oh

Puff, the magic dragon lived by the sea
And frolicked in the autumn mist in a land called Honahlee
Puff, the magic dragon lived by the sea

And frolicked in the autumn mist in a land called Honahlee

Together they would travel on a boat with billowed sail
Jackie kept a lookout perched on puff's gigantic tail
Noble kings and princes would bow whene'er they came
Pirate ships would lower their flag when puff roared out his name, oh

Puff, the magic dragon, lived by the sea
And frolicked in the autumn mist in a land called Honahlee
Puff, the magic dragon, lived by the sea
And frolicked in the autumn mist in a land called Honahlee

A dragon lives forever but not so little boys
Painted wings and giant rings make way for other toys.

Reflection

Today, technology providers are selling tools/software. The opportunity is to unleash the dragon to enable a learning organization. This journey is about more than visualization, simulation, and pattern recognition. It is about answering the questions that we do not know to ask and testing and learning from market data (in vitro) to understand the effective frontier for the complex non-linear systems known as the supply chain.

Why is this important? Organizations are larger and more complex, needing clear direction stemming from goals and mission alignment. The drivers? There are many, including mergers and acquisitions and globalization.

The focus is on growth, but supply chains are not fit for purpose. The leaders' goal is customer-centric and agile, but the discussions quickly become political with the wrong focus. Functional silos are a barrier, but the ability to obtain and use data effectively is a major stumbling block.

This week, I received this email from a financial institution questioning why business leaders are not harnessing more insights and redesigning processes based on analytics. The frustration by the investor is that the many promises made surrounding ERP and advanced planning did not come to fruition. As you read the financial analyst's views of the industry, summon your inner dragon:

The whole space has moved along very rapidly in recent years. I think one of the huge problems is that US-centric food companies (Kellogg, General Mills, Smucker's, Conagra, etc.) are working on an "if all you have is a hammer, all you see is nails" problem. In essence, they have been making boxed, canned, and otherwise shelf-stable packaged food for well over a century. Still, now consumers and retailers are looking for fresh foods, and they don't know how to adapt. Certainly, Campbell's foray into its c-Fresh business ended in tears.

We have the rise of new channels, particularly eCommerce. And again, companies aren't sure how to configure themselves to play profitably in there.

Meanwhile, retailers are getting far more sophisticated in their analytical capabilities, which is reducing the importance of the category captain role for the largest CPG brands in each category.

Everything is getting faster – new products are introduced and eliminated more quickly, better analytics are enabling better real-time feedback on what should go where on a shelf and at what price at a much more granular level – may be down to individual stores. Yet, companies are blind to these insights.

I'm sure there are a lot of other big themes. Not sure what big topics you've been looking into recently, but if we can find some topics for discussion that would be relevant to investors in the Consumer area, that would be great. We don't understand why the investments of ERP and advanced analytics are not yielding better results…

Stories from the Field

To stir up debate, let me share some stories. In 2015, I worked with a manufacturer of men's underwear. (My stepson calls them *tidy whiteys.*) Imagine the story is about a boring, basic apparel item. The company had a significant market share in their category, but they had a problem. The average buyer was 55-year older men. Younger men buy more underwear than older guys. The Company's packaging was not as attractive to the female shopper buying for the family.

The Company's problem was how to change the demographic and sell more products. Their question? Could analytics in the supply chain help? The company sold on Amazon, operated a direct-sell website, managed outlet stores, and could purchase end-aisle displays in major retail chains. We formulated a test plan to test and learn how the combination of price, artwork, color, package count, and style attracted a different demographic. We established e-commerce tests, studied basket behavior, and harnessed lessons. The team then applied the insights to the bricks and mortar displays.

The team mined unstructured data to understand the brand preference of ethnicity and age. The product development group advocated a long-tail supply chain strategy with many combinations of color, packaging sizes, and artwork. We rationalized product complexity. We moved the needle when a major sports star became the brand advocate. The discovery of the connection of the sports star to the brand positioning came through unstructured text mining of the social and interest graphs of the potential buyer.

A second story is of an electronic distributor. The company's goal was to improve customer loyalty. The measurement was net-promoter scores and results of an annual survey. The problem? These were yearly assessments and the analyses that were not actionable. The question was, *"How could the organization harness data and drive loyalty?"* We worked on the mining of email data using sentiment analysis to understand distributor opportunities by segment. The organization had 12,000 emails/month sitting in inboxes not used.

Mired by product complexity--product portfolios not driving growth--supply chain costs are increasing. How many organizations struggle to formulate the right questions and use new forms of data. My answer? The problem is pervasive. The answer is not with one technology or approach.

We need to harness known data to answer the obvious questions and drive insights through visualization. We also need to ask ourselves, are there new ways to use data that we do not understand and answer the questions we do not know to ask. And, is there an opportunity to build a semantic reasoning layer to enable continuous learning? Discovery, test & learn strategies, market sensing, and opportunity identification are all possible if we are willing to change how we work.

Table 2.2. Untapping the Potential of Using Analytics to Build the Learning Organization

Visualization	**Visualization of an Answer**	**Visualization of a Learning**
Questions Asked	Known	Unknown
Data	Known	Unknown

Let me give you an example. In 2010, Kellogg produced cereal with liners in the box with an odor. The Company published the statement in response to customer sentiment; **Kellogg's** company statement says that "*We have identified a substance in the package **liners** that can produce an uncharacteristic waxy-like off taste and **smell**."* In this situation, as sales declined, the company might question:

> Is the product appropriately positioned on the shelf?
> Was the promotion effective?
> What was the impact of a competitive product?

The team would never have asked the question, *"Is the downturn in sales due to quality defect caused by a supplier providing liners for the boxes that stunk?"* Similarly, in the world of transactional data, they would not have been mining social sentiment to see the onslaught of twitter complaints on odoriferous liners.

The evolving dragon in my story is the *"supply chain engine that could."* Decision support—technologies like supply chain planning, trade promotion management, revenue optimization, and supply chain execution—are based on the promise of mathematical engines to drive optimization. The concept is to take data, push it through a data model (engine), and gain insights from a better output. Historically, the design of the data model drove software market positioning. With each evolution of the market for "engines," the market moved through a hype cycle. In the 1980s, it was optimization overlaid on AS-400 operation systems. Then there was the move to client-server and the deepening of "engine math."

Over the last two decades, I followed the market shifts for decision support, including cloud-based computing, in-memory processing, parallel computation, and open-

source analytics. With each iteration, the focus was on a faster and better engine: not system useability. The response of organizations was to use an excel spreadsheet. Planners feel that it is more manageable and easier. The problem is that the supply chain is a complex, non-linear system that does not lend itself to spreadsheet modeling.

The assumptions were:

- Clean data
- Seamless processing in and out of the engine
- The fit of the data model
- The ability of the model to drive Insights (Requiring testing of the output to understand if the technology is yielding better decisions.)
- Timing: Available output at the speed of business. (Early solutions were not scaleable.)
- Visualization: Usability and ease of use
- Interoperability: The ability to move data with context to business teams based on requirements.
- Use of the insights in a process to improve processes

This dragon story has many twists and turns. The rise of pattern recognition, machine learning, semantic reasoning, text mining, and open source analytics capabilities created new possibilities to drive improvement. Smart guys peddled new approaches attempting to land new big deals. In short, cool techniques looking for a home—entrepreneurs looking for a problem to solve.

Definitions

Teams use terms like Machine Learning (ML), Pattern Recognition, Sentiment Analysis, Artificial Intelligence (AI), and Cognitive Computing interchangeably. Stop the frolic. Demand clarity by the technology providers and hold them accountable. (Most overstate capabilities using buzzword bingo.) In sessions where these terms fly fast and furiously, raise your hand and ask for definitions.

As a starting point, here are the ones that I use:

Machine Learning: The use of algorithms and statistical models to enable a computer system to perform specific tasks without using explicit instructions,

Pattern Recognition: Machine learning based on patterns. This is a useful technique for data cleansing.

Optimization: The use of math techniques and statistics to improve outcomes.

Cloud Computing: The definition is simple: the use of in-memory processing using the cloud (storing and accessing data through the internet versus writing to memory on localized disc drives). The deployments are far from easy. Third-party hosting is distinctly different.

Sentiment Analysis: Sixty percent of data surrounding the supply chain is unstructured: sentiment analysis enables the mining of data from text. Text mining is also a frequently used term. This is a useful technique for warranty, quality, and consumer data. I recently worked

with a company to mine email data for customer service representatives to understand customer sentiment patterns.

Cognitive Computing: The use of pattern recognition techniques and machine learning to build a semantic reasoning layer to answer the questions that we do not know to ask. The ability to discover and learn based on an ontological framework.

Open Source Analytics: A set of languages, techniques, and tactics to enable parallel processing, schema on read, and data insights. Open-source collaboration drove the evolution.

Artificial Intelligence (AI): The development of computer systems enable tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Sentiment analysis, machine learning, and cognitive computing are techniques to enable AI.

Autonomous Supply Chains: A no-touch planning system, sometimes referred to as Lights-out-Planning, is the ability to use data to sense and respond effectively and automatically at the speed of business. Today's supply chains do not sense. Additionally, they are slow and do not respond at the rate of the business process requirements. Lights-out-Planning today is a vision, but not today's reality.

You might disagree with the definitions, but the first start in your journey of harnessing the power of the dragon is to get clear—and hold technology providers accountable for — a set of consistent definitions.

The second step is to align the techniques to improve known processes. In Table 2.3, we share an example applied to supply chain planning:

Table 2.3. Sample Use Cases for Advanced Analytics

Goal	Technique
Clean Data	Pattern recognition and machine learning
Seamless processing	Open Source analytics
Drive Insights	New Forms of Visualization
Time of Data. Reducing Data Latency.	Parallel processing, cloud-based. Open-source analytics
Interoperability	Rules-based ontologies to manage multiple ifs to multiple thens and the use of ISO 8000 standards

Barriers

Stay focused to overcome the industry barriers:

> **Commercial Models of the Technology Providers.** The dirty little secret of the software industry is the commission structure for a sales team. (Most business leaders do not realize that the selection of software lures them into a political snare. Due to large commission structures, software sales teams politicize the selling process by selling to business leaders egos and polarizing the business teams. The selling of large software deals is very lucrative. As a result, many market thrusts are sales-driven—over-hyped promises with many market ups and downs.

The problem? The solution is complex—engines, infrastructure, workflow, rule sets, and visualization. The selling cycle attempts to simplify against a business problem. We don't have clear answers on how to redefine processes to improve outcomes. No one has the answers. As a result, over-hyped marketing with over-zealous sales personnel is a barrier to progress:

Emerging Roles of Data Scientists. Form the right team. Realize that data scientists are essential to the team, but success requires a balanced approach. Don't form a group just of data scientists. The reason? Data scientists speak a different language and lack the process/domain understanding. The tendency of a data scientist is a localized optima focus. Focus on a holistic approach. Rules, engines, policies, and metrics need to align. Attempting to build comprehensive solutions from localized optima is fools play.

Traditional Processes and Technology Standardization. Conventional providers from the ERP and APS markets have been slow to adopt new techniques. Companies sticking to technology standardization will be lag behind.

Steps to Take.

If you are wondering how to ride the dragon, consider taking these steps:

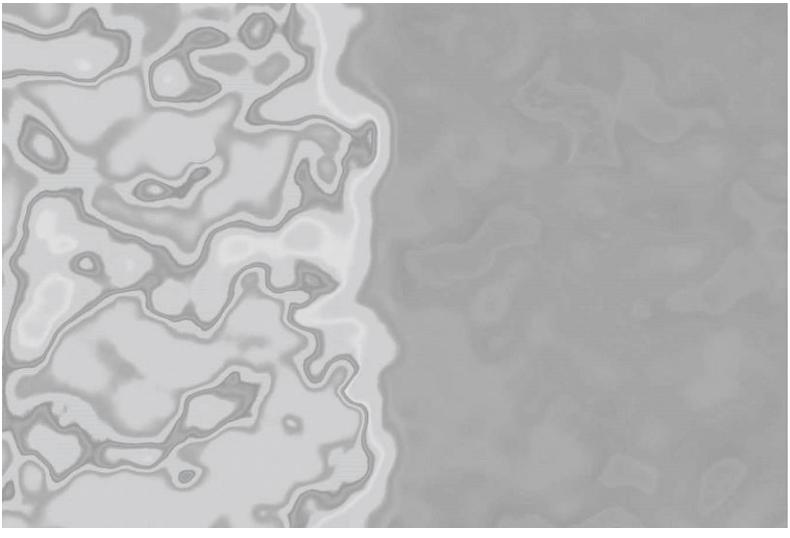
- **Provide Innovation Funding.** Don't hamstring the team with having to justify the ROI of each project.
- **Form a Cross-Functional Team.** The ideal group has maverick thinkers—traditional supply chain

leaders, data scientists, human resource/change management agents, and IT/analytical members.

- **Map the Issues From The Prior Year.** Identify the gaps and opportunities.
- **List All Forms of Data and Locations.** Spend time to identify unstructured data sources and data in the network surrounding the enterprise.
- **Explore the Art of the Possible** by having lunch and learn sessions with technologists.
- **Brainstorm.** Facilitate a strategy session to brainstorm solutions to explore the Art of the Possible.
- **Align.** Celebrate both success and failure. Market the insights from the group's success to internal groups.
- **Educate.** Build an education program for supply chain operations.

Ride the dragon. Unleash the potential. I look forward to hearing your thoughts.

Getting Your COV On...



The Coefficient of Variation is the ratio of the standard deviation to the mean. It is useful to analyze demand data to understand "forecastability" and randomness.

Not all data is forecastable, and not all demand optimization engines are equal. The more forecastable the data set, the easier it is to find an optimizer. With a lower COV, the process is more straightforward, and the required skill level not as high. It is for this reason that I use COV analysis to type logical supply chain flows. Using demand classification logic, you can understand the rhythm and flows of demand. ...and hopefully, get your groove on.

Companies do not have one supply chain; they have many. There are usually three to seven supply chains. The tactics need to align with the flows based on volume

and variability. Most supply chain leaders cannot get their groove on because they generalize--using the same metric targets and tactics for the supply chain without paying attention to the flows. Typically, the focus is volume-based segmentation with a bias to build supply chains for predictable and high volume products. This approach is problematic because sometimes the low-volume products are mission dependent. Samples fall into this category.

Let me give you an example of a client where a low volume product was critical to brand positioning. The client manufactured baby formula. The goal was to build brand loyalty by giving a new mother the formula product in the hospital. The concept was simple, but the execution was flawed. The idea was to build brand loyalty at birth. The problem? The company focused only on high volume products to the retail channel. The product was losing market share to competitors because the company was shorting the shipments to hospitals of the samples for new mothers.

Here is how I build the demand classification logic:

1. Start with high volume and predictable demand. Most companies have a high volume and predictable supply chain (COV of less than .5). The goal of the supply chain for predictable volume is efficiency.
2. Then map the intermittent supply chain (COV of .5-1.5). This supply chain design needs to be more responsive.
3. Finally, outline the less predictable supply chain (greater than 1.5). This supply chain is make-to-order.
4. Consider other demand flows. Often there is a seasonal group of products, new product launch

streams, and a service supply chain logical model. Design these flows.

To be successful, each logical supply chain model needs different tactics. In Table 2.4, we share an example of tactics by supply chain type from a customer session.

While the table was quickly generated in group discussion and is not perfect, use it as an example to understand the logic.

Table 2.4. Sample Use of Tactics Per Supply Chain

Classification	Tactic			
	Sell	Deliver	Make	Source
High Volume/Predictable	Forecasts based on orders	Full truck load movement Container/rail/ocean	Lean	Just in Time Procurement DDMRP
Low Volume/Predictable	Forecasts based on orders	Transportation Optimization for Routing and Pooling.	Constraint-based planning/Finite scheduling (reduce cycle stock through campaigns).	Source in market. Platform rationalization. DDMRP
High Volume/Not Predictable	Use of sales data/market information Demand sensing	Postponement Shorten cycles	Production in market Strong What-if Capabilities	Source in market/short lead times Demand orchestration of alternate bill of materials
Low Volume/Not Predictable	Demand sensing	Air freight Late stage postponement	Make to Order/Configure to order capabilities	Platform rationalization
Seasonal	Product profile planning	Seasonal builds based on market data		
New Product Launch	Attribute-based planning	Translation of market data to inventory strategies	Flexible work stations	Scaling partners

Discussion on Demand

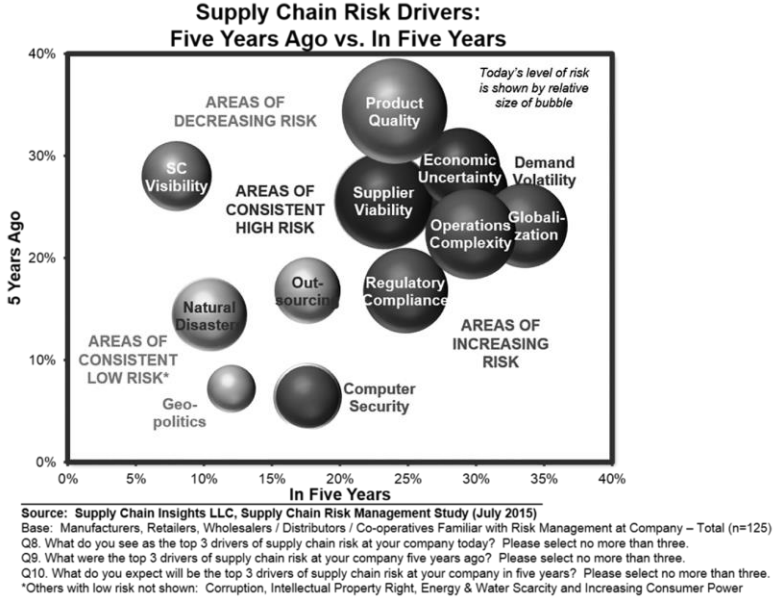
When companies tell me that their demand variability increased over the last decade, I ask why. I want to know the drivers. Most cannot answer simple questions. Organizations have a better understanding of supply than demand.

In Figure 2.10, we share data from the risk management study of 2015. Note that at this time, demand volatility

risk was more significant than economic uncertainty. However, as an industry, have made little progress in mitigating demand variability as a supply chain risk.

The answer is more than simple demand planning techniques. Making the shift is a change management opportunity for companies to move from supply-centric thinking to rethink demand as a river that flows through the supply chain. The COV helps business leaders to understand the rhythm of the river flows. To make this journey requires the building of outside-in processes from the market and orchestrating the signal seamlessly across make, source, and deliver. Cross-functional workstreams are a radical shift from the functional orientation of traditional supply chain thinking.

Figure 2.10. The Role of Demand Variability in Risk Mitigation from the 2015 Study



Source: Supply Chain Insights LLC, Supply Chain Risk Management Study (July 2015)
Base: Manufacturers, Retailers, Wholesalers / Distributors / Co-operatives Familiar with Risk Management at Company – Total (n=125)
Q8. What do you see as the top 3 drivers of supply chain risk at your company today? Please select no more than three.
Q9. What were the top 3 drivers of supply chain risk at your company five years ago? Please select no more than three.
Q10. What do you expect will be the top 3 drivers of supply chain risk at your company in five years? Please select no more than three.
*Others with low risk not shown: Corruption, Intellectual Property Right, Energy & Water Scarcity and Increasing Consumer Power

When I delve into the data, I find:

Forecasting Solution Signal Efficacy. Nine out of ten demand planning solutions I test are not improving the forecast (using Forecast Value Added analysis with the definition of a naive forecast as a three-month average of shipments.) Most initial deployments will lift or improve the forecast error by 7-12%. Over time there is degradation. It is usually not one issue; instead, it combines problems with data cleanliness, optimization tuning, and employee understanding/training.

Elongation of the Supply Chain Tail. Product proliferation results in lower volume per item. Supply chain design focuses typically on high volume products. Traditional techniques are unable to adapt to shorter cycles.

Measurement. Companies struggle to measure demand accuracy. Many companies mistakenly measure demand error at a "national" or a "customer level" at a "product family" level. This analysis is insufficient for supply chain planning. Supply chain processes require accurate data at an item/shipment level. Also, bias is an issue. In growth companies, the forecast is usually under-forecasted while in a down market, there is usually a positive bias, or the tendency to over-forecast.

Supply-Centric Thinking. One of the most significant issues is supply-centric thinking. This includes:

> **A, B, C Analysis by Volume.** This analysis is blind to demand variability.

Generalization of Tactics. Supply chain leaders love shiny objects--new technologies and processes. They tend to jump from one fad to another. As a result, tactics are applied across the supply chain without alignment to volume/variability analysis.

Wrong Metrics. In a supply-centric model, weighted MAPE is sufficient (WMAPE), but as the long tail increases, companies need to focus on MPE and MAPE. Weighting error hides the issues of intermittent demand.

A Side Discussion on MAPE and WMAPE to Understand Demand Error

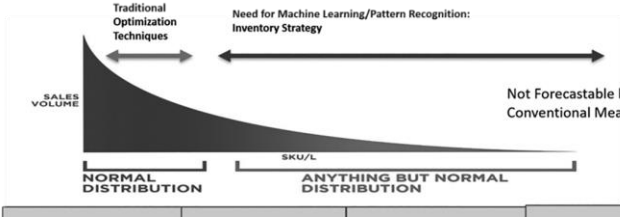
In the discussion of MAPE versus WMAPE, to make the point, I use the example of premature babies in the hospital. (At this client, they are shorting one out of two orders due to short shipments of intermittent demand. They feel over-confident in supply chain performance because WMAPE hides demand variability with lower volume shipments. (In this client example, WMAPE of high volume predictable products is 26% versus 76% when measured at a MAPE level.))

On average, 11.5% of children are born prematurely in the US Premature children require extra precautions (a

different supply chain of sorts). I then ask the group a question, "Would it be acceptable to drop one out of every two premature babies from their neonatal units? You are what you measure...

Now let's return to the data in the client case study. In Figure 2.11, I share the current state of FVA analysis across the tail. The client analysis supports that at no point in the product tail is the forecast generated by their existing technology and processes better than the naive forecast; yet, all the client wants to talk about is the roll-out of the present technology globally. In this discussion, I scratch my head.

Figure 2.11. A Client Case Study



MAPE	89%	94%	169%	169%
Naive Forecast	76%	83%	165%	165%

Why are they not more focused on using decision support to get a better answer? And, why is there not a focus on fine-tuning the engines and applying different demand planning techniques? The answer lies in

the truism, *"You manage what you understand."* All too often, the focus is on implementation, not getting better answers.

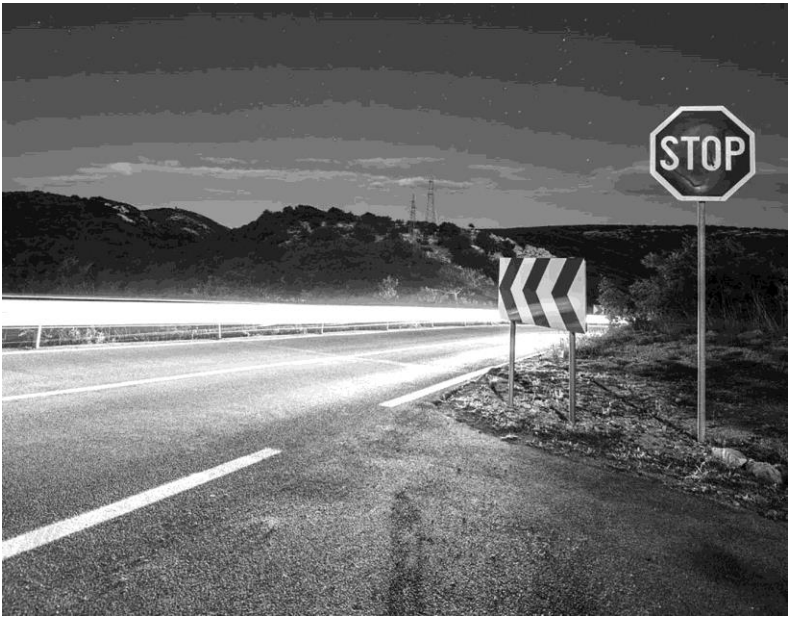
Demand planning is all about attention to detail at an item/location level. As the COV increases, the engine sophistication needs to change, and the organization must always answer the question, *"Are my processes and technologies improving forecast error and bias? And, how does the supply chain variability affect process flows? Then based on volume and variability, what are the right techniques to apply to each supply chain?"*

Yes, I firmly believe COV helps companies get their groove on... It helps companies understand the rhythm and flows of the supply chain dance.

All I can say is *shake it* on this Valentine's Day. Dance to the rhythm...

I look forward to hearing your feedback.

Managing Supply Chains During The Pandemic: Seven Processes To Stop



I remember standing in the temperature screening in Doha. As line wound around multiple stations, my backpack cut into my shoulders. I was tired and cranky as I read the overview of MERS. As a United States resident, I was blissfully unaware of this virus. I shrugged it off.

The Middle East Respiratory Syndrome (MERS), first reported in Saudi Arabia in 2012, made little news. Likewise, I watched the coverage of SARS, H1N1, and Ebola from my TV screen. As the COVID-19 saga unfolded, this was my mental model. My first articles dealt with the virus as a Chinese localized phenomenon. My jaw dropped when a friend became ill in Dallas in January from a visit to Dubai. The shift from observing a

pandemic to being a participant and learning to live with COVID-19 is uncomfortable.

We now know that COVID-19 impacts are far-reaching and long-lasting. Unlike the prior supply disruptions in my lifetime, there will not be a new normal. Instead, supply chain leaders face wave after wave of disruption until there is a vaccine. The market shifts will be many and local. As a result, much of what we have learned as a supply chain best practice is no longer applicable.

In this time of uncertainty, the right focus is essential. Part of the work for a business leader is defining what teams can stop doing.

Start Doing

In prior articles, I have written extensively on the need for outside-in demand sensing processes based on market consumption data. I have also written about the need for supplier development programs and building robust supply chain capabilities in value networks. (I list these articles at the bottom of this post for reference.)

However, in this article, I will take a different tact and share a list of processes for companies to stop doing. I think that this is important now because work teams are stressed, and many companies are downsizing. As a result, focusing on what can drive success is never more critical.

Stop Doing

What can we stop doing? **The first step is to eliminate traditional demand planning processes based on conventional order pattern modeling.** They will be worthless through the pandemic. The sales order pattern

is no longer a predictor of future demand. Instead, invest in market sensing and the use of market consumption data. Attempt to read market shifts as they happen and drive a response.

The second process to stop is collaborative sales forecasting. Collaborative sales forecasting started two decades ago with the belief that sales forecasting could help improve demand output. For most companies in good times, this was not the case. During the pandemic, collaborative sales forecasting is just a waste of time. We need to align the supply chain to market data.

The third process to stop is the use **of Syndicated Data in consumer products.** While syndicated data will still be useful in evaluating market share, the use of syndicated data for revenue management and trade promotion management is not relevant. The issue? The lack of granularity and the latency of the data due to processing. The answer? Invest in a data lake to evaluate revenue management strategies and assortment planning based on the market.

The fourth process to stop is the issuance of **Request for Proposal (RFP). Transportation RFPs** are particularly problematic. The reason? Logistics is a constraint and is unpredictable. A transportation RFP is a waste of time—instead, partner with logistics service providers. Get regular price updates and model the impacts using supply chains using strategic network design technologies. Get good at modeling and build agility into your network.

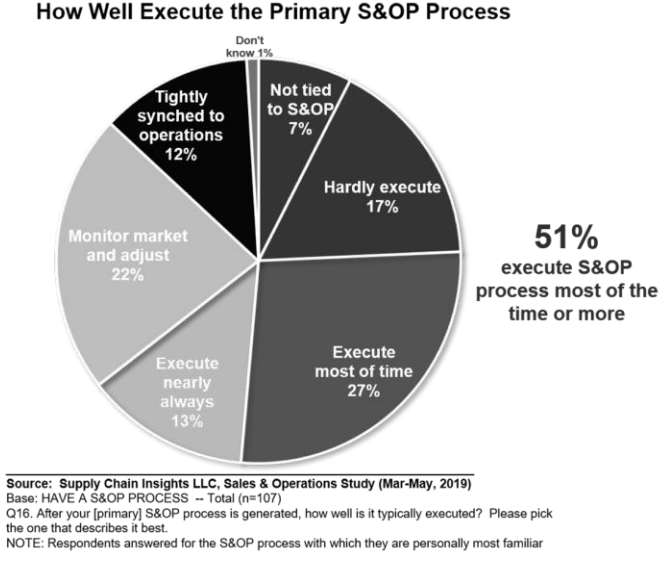
The fifth process to **stop is the execution of supplier management processes that usually include the elongation of payment terms and third-party service firms.** Get close to your suppliers through supplier

development programs and shorten payment terms to improve business continuity.

The sixth step is to stop the **current Advanced Planning and Enterprise Resource Planning projects.** At this time, they add noise to an unstable system. Instead, invest in new forms of analytics to improve visibility and prescriptive analytics.

The seventh step is to put as much emphasis on S&OP planning as on execution. Few companies are good at S&OP execution. Stop planning in isolation and align for effective operational execution.

Figure 2.12. Sales and Operations Planning Status on S&OP Execution



Why are companies not good at S&OP execution? It is merely a matter of focus. Companies run out of steam because S&OP planning is so arduous, and the plans never get executed. Now is the time to build playbooks

and continually align demand and supply. Shown in Figure 2.12 is the current state of S&OP execution.

Wrap-up

In closing, let me leave you with some thoughts. The pandemic is the result of a novel virus. Today, we have more that is unknown than known. What we stop doing will give us resources to focus on managing the supply chain in these uncertain times. Let me know your thoughts and good luck.

State of Inventory

Each day through the Covid-19 pandemic, I tune into Anthony Cuomo's (governor of New York) daily briefings. It is my break in the day. As a multi-tasker, when Governor Cuomo broadcasts, I use the time to work out on my rowing machine.

His opening line is, *"Let's start with facts. While we all have opinions, let's start by reviewing the facts."* When he says this, I smile and row harder. I wish that all discussions could start with the facts.

Reflection

In my day-to-day work in supply chain management, I find more encounter more opinions than facts. My observation is that over-zealous and self-serving marketing programs fuel most issues. Strong opinions and egos abound.

For over two decades, I obediently tapped my foot to technology leaders' glibly spouting opinions. I seek facts, but I find that they are few and far between.

The lack of fact-based discovery makes me itch.

A Story

Last week on my Network of Networks call, a proud technology salesperson, let's call him Jim, announced, *"I am speaking at Logimed next week on the impact of Just-in-Time (JIT) on the COVID-19 response. Downsizing inventories over the past decade crippled the response."* As I heard Jim speak, I twisted in my seat, unsure what to say. His statement just did not align with the data, as shown in Table 2.5.

Table 2.5. Days of Inventory Peer Group Across Time Periods

Days of Inventry by Industry: Comparison Across Time Periods					
Industries	Years				Difference (2014 - 2019 vs. 2004 - 2006) Periods
	(2004 - 2006)	(2007 - 2008)	(2009 - 2013)	(2014 - 2019)	
Beverage	108	115	133	184	76
Pharmaceuticals	151	164	173	202	51
Medical Device	107	123	142	152	45
Semiconductor	60	69	79	92	32
Beauty	117	127	132	141	24
Automotive Parts	47	52	61	67	20
Chemical	63	62	67	81	18
Household Products	56	53	57	74	18
Aerospace & Defense	94	89	99	107	13
Automotive	45	51	53	55	10
Food	50	51	59	60	10
Broadline Retail	71	76	74	79	8
Apparel Retail	74	77	77	81	7

So when we start with the facts, it is clear that every industry peer group increased the days of inventory. Besides, each peer group is markedly different. So, why have we not reduced inventory?

Now I will share my opinion.

Complexity. Supply chain leaders in the beverage and household products industries struggled to manage complexity. Each company managed marketing programs misaligned to market-drivers. Platforms and product portfolios grew without rationalization. There is desirable complexity (products with a differentiated value proposition that grow revenue without sacrificing costs) and bad complexity (products and services without a differentiated value proposition that drain costs.) Most companies do not know the difference.

Supply Chain Leadership. With average operating margins of 20-22%, medical device and pharmaceutical companies are supply chain laggards. The companies in these two industries just have not made honing supply chain capabilities a priority. One of the issues in the current COVID-19 recovery response is the lack of leadership in these industries.

Supply Management. Industries like automotive pushed cost and waste backward in the supply chain. As a result, second and third-tier inventories grew disproportionately. With a focus on cash-to-cash, payables increased, but brand owners failed to take responsibility for inventory in their supply base.

Network Design. Only 9% of companies actively design the supply chain with a focus on buffer design. As demand variability increased, companies myopically focused on safety stock without focusing on burgeoning in-transit inventories or the need to manage cycle stocks better. Also, with the acceleration of M&A, companies have multiple supply chains, each with

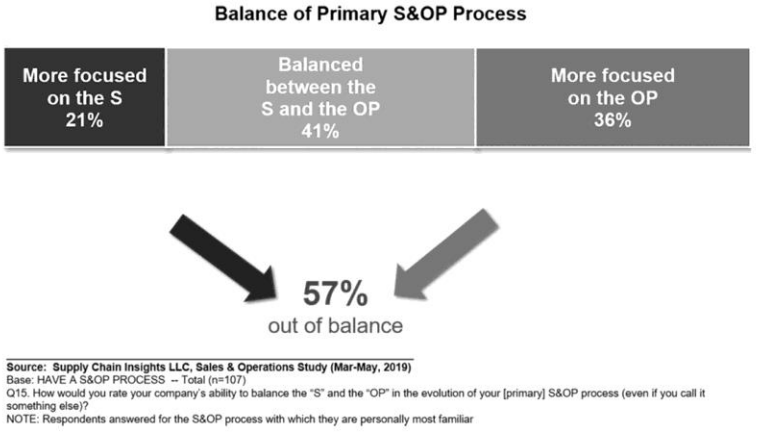
distinct rhythms and cycles requiring design.

Factory Scheduling. With the evolution of the advanced planning market and the growth of the market share of ERP expansionist companies, solution capabilities in factory scheduling weakened. With the increase in demand variability and platform complexity, factory scheduling and the management of cycle stock should have increased, but it did not. (I always shake my head on why companies are not more active in this area.) We were better at factory scheduling in 2002 that we currently are.

Executive Understanding. Many executives do not understand the form and function of inventory and the need for inventory buffers. Inventory is both waste, or MUDA, and the most important buffer in the supply chain. There is constant tension. However, without analyzing the inventory that is actively working as a buffer and stock dragging the P&L, companies operate in a blind spot. Only 18% of companies in the last decade deployed more advanced inventory management solutions (often termed MEIO) and actively use them. Without this level of visibility, executives mistakenly see inventory as a big blob, or a wasteland, that can be cavalierly reduced to make a quarter.

Balance in S&OP. While 82% of companies have an S&OP process, less than 50% of company processes are balanced, and only 1/3 of companies actively run "what-if" scenarios. In a mature S&OP process, Companies manage inventory as a well-designed set of buffers containing risk trade-offs. As shown in Figure 2.13, this is not today's reality.

Figure 2.13. S&OP Balance



As a reminder, the form and function of inventory start by analyzing inventory forms while fine-tuning customer service. The higher the demand variability, the greater the need to hold inventory as raw materials or work-in-process —postponement techniques and platform rationalization help improve agility.

Table 2.6. Form and Function of Inventory

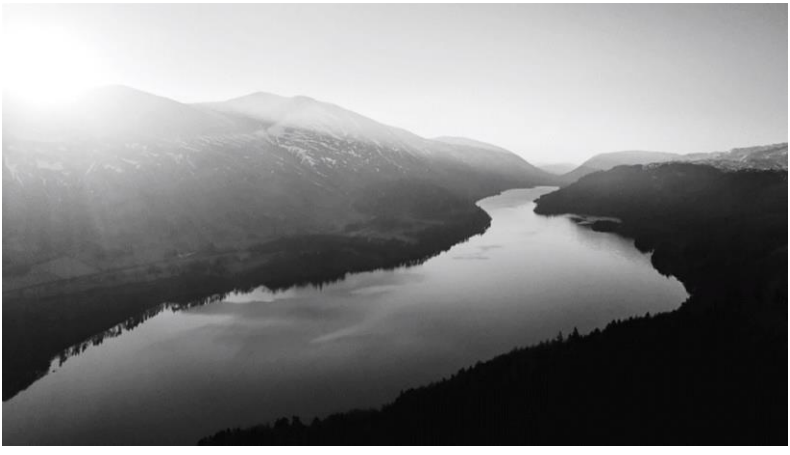
Form	Function
Supplier owned inventory: raw materials	In-transit Inventories: Inventory that is on trucks, barges and containers. The longer the trade-lanes and the slower the mode, the larger the requirements for in-transit inventory.
Company owned inventory: raw materials	Cycle Stock: In the planning of production, finished good production is cycled to ensure that the production lines are fully utilized. The average rotation between products on production lines in consumer packaged goods is three weeks.
Work in process inventory	Safety Stock: Inventory requirements to buffer demand and supply volatility.
Finished goods at the company warehouse	Seasonal Inventories: Inventories required to support seasonal builds.
Finished goods in the channel	Promoted Items: Inventories to support the promotional lift to support a promotion.

The function of inventory is a methodology to analyze inventory effectiveness. While most companies only analyze safety stock, leaders evaluate each segment--in-transit, cycle, seasonal and demand shaping support--inventory, and reduce waste. Assessing the form and function of inventory is the foundation of inventory management.

In short, as we look at the data and think through all of the deployments of technologies and processes to improve inventory, I conclude that we can do better. Supply chain teams need to up the ante and face facts. Let's face it. Traditional supply chain practices are not equal to today's challenges.

Your thoughts? I look forward to hearing from you.

How Did We Get Demand Planning So Wrong?



In the 1990s, I was very excited to implement a simple form of demand planning—the algorithm used historical order patterns to generate a forward-looking product-based mix-level forecast. Three decades later, despite an abundance of market data, companies are applying similar techniques. The practice of forecasting, based on my work with manufacturers, regressed with the evolution of Advanced Planning in the last three decades. Here I share my observations on why:

> **The Role of the Budget.** Companies are enamored with the tight coupling of a financial forecast with a supply chain forecast. In the process, there is little realization that the only thing that the two have in common is the word forecast. Best in class companies use the budget as a comparative input while laggards tightly couple the forecasts and clamp-down on the supply chain to meet the budget. The attempts create many problems, including that the financial forecast lacks the mix-level detail to run the supply chain,

and the budget is wrong and out of pace with the market on the date that it is published. The rise of Integrated Business Planning in Sales and Operations Planning (S&OP) degraded S&OP success by 25% over the last decade due to botched attempts to tightly integrated supply chain forecasting to financial budgets.

We Were Chasing Shiny Objects. One of the worst issues is the continued chasing of shiny objects in the evolution of the demand plan. Two decades ago, it was Vendor Managed Inventory programs(VMI) and CPFR. Today, none of these efforts connect to the central demand plan. Now the focus is on machine learning and cognitive computing. However, what good is a new technique if we are not clear on the goal?

Focus on the Implementation of Technology. In the last decade, the focus for the implementation of was as an IT project. The goal? Just get the system running on time. While the selection, procurement, and implement cycles went on and on, the processes of model tuning, data cleansing, and forecast refinement did not. Companies side-stepped the methods of backcasting and lack the understanding of forecast measurement. I am working with a company today that has implemented three different technologies. Instead of model tuning, backcasting, and refinement, they built technology on top of the three demand planning systems to evaluate which method to use for which item to write to the system of record. The problem? We get enamored with technology and lose our way.

Market Shifts. Supply Chains were unprepared for the pandemic. Despite an abundance of market

data—consumption, rating/review, and activity—only 1% of companies changed their models to be more market-driven. The shifts were different by industry—a change from restaurants to eating at home, buying loungewear versus formal apparel, and the delay of elective surgery—yet, the majority of organizations continued to focus on the output of traditional models using order data as the basis for the modeling. Market-driven forecasting versus enterprise-focused modeling will be the downfall of many organizations.

Governance. Governance is an ongoing issue. I work with a 35B$ food manufacturer that has thirty-five instances implemented for demand planning. Each is custom, and there is no discipline for demand planning metrics. The organization spins continuously on the upgrade cycles and refinement of the many instances. Upon closer evaluation, each instance averaged a negative 20% Forecast Value Added. In contrast, P&G, a 65B$ global leader in demand planning, has one instance with well-defined demand management goals and objectives. The planners at P&G average twelve years in the position with a clear career path while the planners at the food company change jobs frequently with no clear career path in demand planning. The issue? Lack of transparent governance and definition of the right demand planning solution.

In closing, one client I work with stated that *"The Company will never be good at demand planning. Why should she try? Shouldn't she just focus on driving an agile response and give up on-demand planning?"* In response, I hung my head. In the statement, there was a lack of understanding of the need for demand planning in the organization that required leadership. The Company

snarled in the tangle of the issues lacks enlightened leadership. Unfortunately, in my experience, the understanding of demand planning and the role in supply chain excellence is not well understood.

Let me leave the reader with my point of view. Demand is a river that flows through the organization. The river starts with the customer and winds through the value chain with each step of ordering and replenishment, introducing the bullwhip effect. Forecasting is a time-phased snapshot of the river at a place in time.

Laggards get enamored with the snapshot attempting to be very precise on approximate numbers. The art of sensing, translating, and very few manufacturers understand shaping demand. In the last decade, despite the increase of new and promising technologies and techniques, the industry went backward. The largest issue? The lack of understanding of the role of demand management in the delivery of supply chain excellence.

Section 3

Evolving Technology

Evolving Technologies

Process and technology need to align. Opportunities abound to drive improvement with new technologies. The pace of change is faster than an organization can absorb. What to do? How can companies drive innovation and change through new technologies? Here we give insight.

Can We Stop the Dance of the Supply Chain Leader With Shiny Objects?

It is that time of year again.

I called yesterday to schedule my annual physical. At the visit, the doctor will spend time with me--complete an examination, interview, and lab screening--to conclude a diagnosis. A physician never recommends a medicine without a diagnosis. Nor would I ask for a prescription without a thorough discussion.

It is that time of year again: the time when my clients flood my inbox with plans for their new year and ask me for a review. As I open their documents, I smile. For all, it seems that the answer is a technology implementation.

Supply chain leaders love bright and shiny objects. Like the myth of the Lorelei, where the beautiful siren lures wayward sailors ashore, technology sales teams sell the supply chain leader hope. It is hope for a faster career, quicker answers, and driving significant results.

It is that time of year again. It is a time that companies call me to introduce me to their digital leaders. When I ask what digital means to them, I get the hemming and hawing routine. And, of course, when I ask about their projects, the plans sound like 2010, not 2020. Most companies are focused on digitization--making current processes faster and paperless--versus digital transformation--rethinking the atoms and electrons of the supply chain to drive value. Sadly, many digital transformation efforts are hijacked by well-intended employees with pent-up energy to find funds for their favorite projects of yesteryear.

It is that time of year again. It is a time when I look back and reflect. I ask myself the question, *"Are supply chain leaders making progress?*" Some companies like AbbVie, Eastman Chemical, Ecolab, Intuitive Surgical, L'Oreal, Monster Beverages, Sleep Number, and Leggett & Platt are driving progress, but most are not.

It is not a perfect world; however, 95% of companies are stuck. They wrongfully believe that there are traditional practices are best practices. They are not.

As I watch companies visit another stuck company and ask for advice, I laugh. Networking is a science that requires mastery that most do not understand.

What To Do?

Stuck and not sure what to do? Here are six steps to take:

> **Step #1. Diagnosis.** Form a small cross-functional team and complete an internal diagnosis. Ask yourself, *"How well is the supply chain performing?"*

Step #2. Quantify the Opportunity. Don't benchmark against industry standards like APQC that are vague lacking grounding. Instead, hold yourself accountable to internal efforts to drive improvement--evaluate progress at the intersection of inventory turns and margin, the long-tail impact of complexity on costs, forecast value added (FVA), reduction of slow and obsolete inventory (SLOB), and schedule adherence. Just as a physician never prescribes a drug until after the assessment, avoid discussing technology until the completion of the diagnosis phase.

Step #3. Unleash the Art of the Possible. Educate. Imagine. Ideate. Challenge convention. Invite technologists and provocative speakers to educate the group.

Step #4. Question the Status Quo. Don't follow the pack. Lead and drive value by designing outside-in processes. Map the outages of the last year and ask yourself some tough questions. What did you know when? What should you have learned when? What are the root issues? Map them and assess the problems along with the diagnostics to understand how to get started.

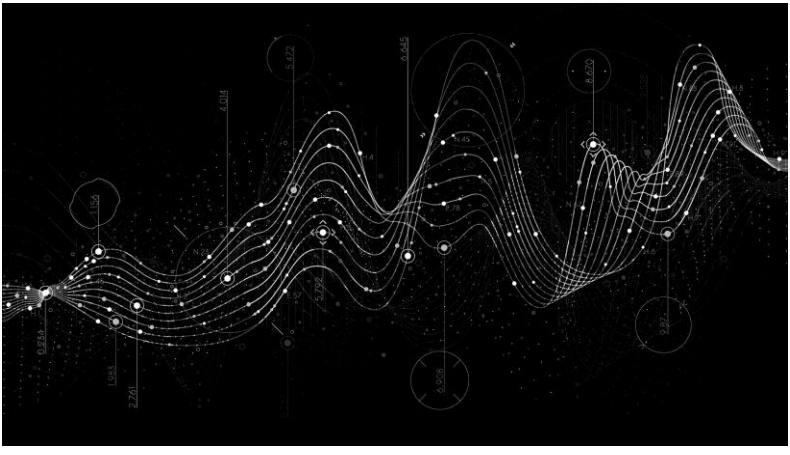
Step #5. Build a Vision. Use the activities to build a vision. I like the technique of working with a visual artist to give the group a visual. A picture is worth a million words. While a business group may not read a vision document, an image sparks discussion in new ways.

Step #6. Stop Dancing with Shiny Objects. In this journey, ask the group to stop meeting with technologists and pushing consulting/technology points of view. Technology is only 10% of the

answer; yet, teams spend an excessive amount of time waltzing with shiny objects. (In fact, in most organizations, it is a Tango, not a Waltz.) I am always amazed at technologies purchased and not used.

It is that time of year again. A time when the ball will drop on Times Square, and we will usher in a new decade. Let's hope that it is a time that allows us to drive more progress: value for corporations and improvement for the planet. Happy New Year.

Automating Supply Chain Planning



For the past six years, I spent my Labor Day weekend preparing for The Supply Chain Insights Global Summit. It is now a ritual. For the event, I invite the Supply Chains to Admire award winners to present their story and give the winners awards.

The analysis is six years old. Making the cut to be a Supply Chain to Admire Award Winner is a strict standard. Throughout the yearly studies, the number of winners is consistent at 4.5%. Less than five percent of companies are outperforming their peer groups while driving improvement. The reason? Courage. The winners challenge the status quo. Traditional supply chain processes are not equal to the challenge.

The analysis, designed to provide Industry benchmarks by peer groups, celebrates the success of 23 companies out of 28 peer groups. Eighty percent of companies studied are moving backward on key measurements like cost and inventory management over the last decade. The reason? There are many. Some would say that there are too many to count, but I believe that the list includes

complexity, compliance, commodity volatility, increase in demand volatility, globalization, and alignment.

The shifts raise questions. "*How do we automate? Is a touchless process feasible?*"

Can Data Scientists Help?

The answer is maybe. The addition of data scientists to the supply chain team is a panacea.

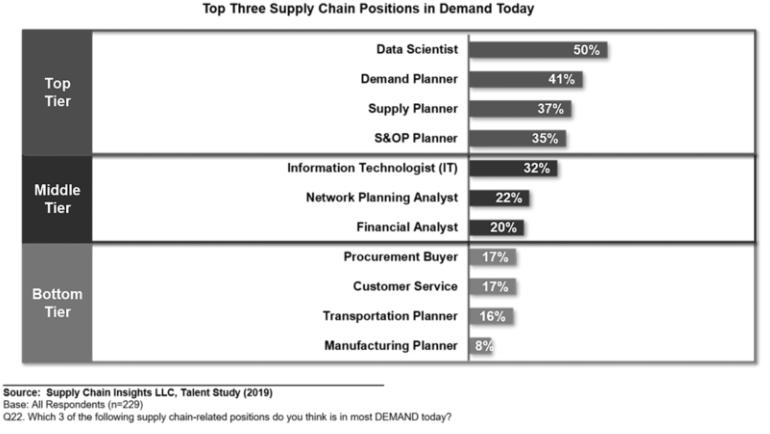
Let me explain. I am a simple gal. For me, progress starts with people. In preparation for the Global Summit, we completed a survey of employee satisfaction. The significant gaps, as shown in Figure 3.1, are finding employees with the right skills, training on next-generation processes, and the lack of executive understanding of supply chain processes. These themes are not new. The answers are more complex.

Figure 3.1. Challenges in the Development of Organizational Development of Supply Chain Talent

The most significant gap in sourcing talent, as shown in Figure 2.2., is proficiency with analytic skills. These are

tough to find. With the supply chain programs embedded in the Department of Marketing within Business Schools, many business leaders worry that the incoming talent lacks depth in analytics skills.

Figure 3.2. Supply Chain Roles in the Greatest Demand



The shifts in analytics—Python, R, Schema on Read-- are exciting, but the organization's ability to use them is questionable.

In many organizations, the inclusion of data scientists in teams is like a dog chasing its tail. The reason? Automation requires clarity. Data scientists think they know the answers, and business leaders are unable to speak their language. As a result, there is an impasse.

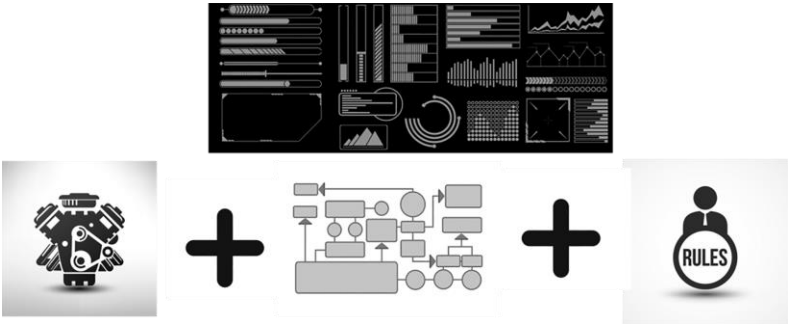
Why Is Progress Slow?

The data scientist focuses on engine improvement through optimization, pattern recognition, and machine learning, but the new processes need a redesign more than sexy new engines.

Let me explain. The systemic improvement requires the redesign of workflow, rules, and the user interface and the advancement of engine capabilities. Most business leaders lack this attention to detail, while most software providers are too busy selling today's systems to rethink and provide a step-change in functionality. The industry faces the Innovators' Dilemma. As a result, the most significant innovation happens in best-of-breed start-ups.

To maximize the value of a data scientist team, the organization needs to think about an organizational layer of translation to adequately communicate the requirements of workflow, rules, and the user interface. Without this, the data scientist will improve the engine, but not drive improved results. The gap stems from a lack of holistic thinking.

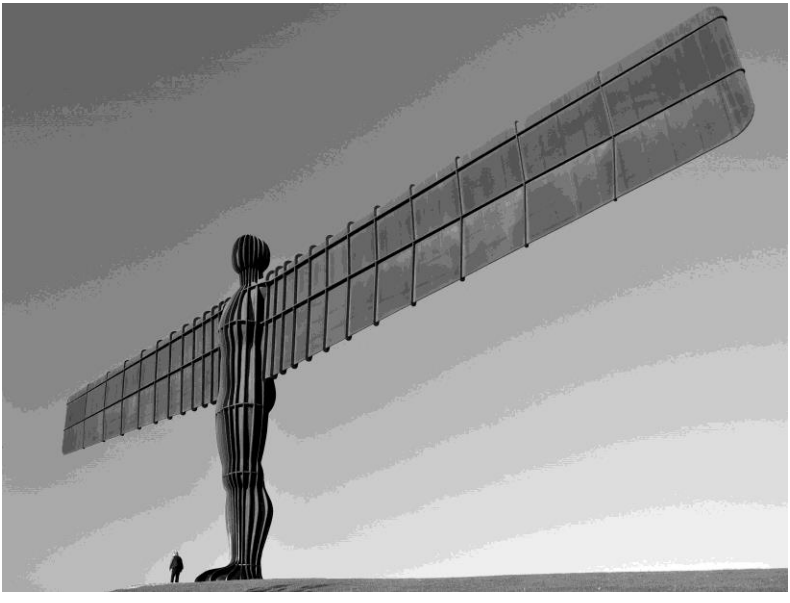
Figure 3.3. Holistic Thinking for User Interface, Engines, Workflow, and Rule Sets



What to Do?

To drive progress, we must challenge our mental models and test our paradigms. Challenge groups to learn from the future, then to unlearn, followed by challenging existing paradigms to drive future thinking.

Building Wings and Feet



As the leaves fall from the trees outside my windows, the financial planning cycle is in full swing. Employees at my clients are busy with strategic planning and annual budget reviews. For them, it is all-consuming.

The fall ritual precedes the dropping of the ball on Times Square to ring in 2020. For the past ten years, I have written about the redefinition of the supply chain to embrace new business models. In this writing, 2020 was a target and a marker as a transformational year. 2020 is a non-event.

Unfortunately, not much has changed in the supply chain over the past decade despite an unprecedented influx of new technologies, business models, and process redefinitions. Most become fads. Why? The focus of the supply chain leader is supplying products forward to the channel while the executive team is trying to drive

change in business models and product portfolios from the market back. The dilemma? Most supply chains need a fundamental redesign. They are not fit for purpose. Fixing this is not easy, and is the genesis for this article.

As we move into the New Year and a new decade, I wanted to reflect. What can we learn from the past decade to apply to the current financial planning processes in full swing?

The Preamble

For the last two weeks, I find myself sitting in CFO offices, attempting to explain how financial leadership can drive supply chain improvement. The discussions are with groups of executives—often ex-management consultants. They are trying to learn the supply chain, but to most, it is an enigma. The discussions focus on shifts in the channel and the required impact on the supply chain and the unwillingness of supply chain leaders to change.

Absent from the table is the supply chain leader.
Most of the discussions are circular. As I sit and listen, senior executives throw around superlatives like customer-centric, agile, efficient, and responsive. Still, they lack the understanding of how the words translate to supply chain strategy in the real world.

Managing a supply chain requires big feet—grounding in real-world experience—coupled with big wings—conceptualization of strategy. I find that supply chain leaders have the big feet but struggle to build the wings. The vacuum leaves frustrated strategy leaders sitting at round tables in the CFO offices.
I also find too few leaders with the ability to connect the real-world with the swirl of strategic concepts (shifts in the channel and the consumer, the emergence of the

circular economy, shortening of product lifecycles, and global shifts in the world economy) driving the need for a supply chain redesign. To power growth and unleash new potential, the feet and the wings connect in new and meaningful ways.

Background

The number one question that asked today by manufacturers across all industries is, *"How can I improve customer service?"* Nine times out of ten, improving customer service requires different management of the budget cycle and a rethinking of financial planning. Companies confuse the processes of from 2010 through 2018 and supply chain planning. They are complementary, but not inter-changeable processes.

The supply chain is a complex non-linear system. The budget is not sufficient and is often a detrimental input for supply chain forecasting. The popular concept of the "connected supply chain is flawed."

Why Is the Financial Forecast Not a Good Proxy for a Supply Chain Forecast?

The financial budget is a cost-control mechanism. The budget is not suitable as a supply chain forecast for many reasons. The issues include:

> **Level of granularity.** Supply chain management requires good data at the mix level of an item/location. Granular data by volume is a must to manage replenishment, network design, and inventory targets. The budget is typically in a

currency, and as a result, not easily translated into volume.

Time horizon. The budget is for a fiscal year, with quarter reporting and updates. In contrast, the supply chain forecast is a rolling forecast over a longer duration.

Bias and error. Financial forecasts tend to have a negative bias (forecasts less than market potential) to ensure that employees have a better probability of meeting their bonuses. The processes for financial budgeting are usually convoluted and political.

As a result, connecting the financial forecast to supply chain forecasts is fraught with issues. The direct connection between the two processes increases costs and increases error. Instead, the financial forecasting is an input to the supply chain forecast, but should not be a constraint.

Supply chain forecasting should be held accountable to Forecast Value Added (FVA) analysis. (Unfortunately, over the last decade, misguided attempts to implement Integrated Business Planning (IBP) took us backward, not forward on delivering balance sheet improvement.

The direct connection of the sales forecast is also flawed, but for different reasons. The sales forecast tends to have an even more significant bias than the financial forecast due to sales incentives. Additionally, many sales and marketing forecasts do not reflect the total volume. Why? Special programs—new product launch, promotional packaging, and samples—are often managed as marketing programs using offline processes (usually spreadsheets). The management of the supply chain requires visibility of all volumes.

The bias and error in sales and finance data is a barrier. Without measurement and accountability, the popular concept of connecting sales and financial data to supply chain data is detrimental to customer service.

What Can We Learn from The Last Decade to Drive Improvement?

What can we learn from the past decade to apply to this budget cycle? Here are nine considerations:

> **#1 S&OP Budget Constraints.** Sales and operations planning (S&OP) is a horizontal process to drive organizational plan alignment. Companies that directly connect financial data to supply chain data without creating a feasible plan at an item/location level rate themselves significantly lower on S&OP effectiveness, resulting in higher costs, levels of inventory, and order short shipments. The data in Table 3.1 is from a recent research study.

Table 3.1. The Role of the Budget in the Sales & Operations Planning Process

	Company's Financial Budget	
	Effective S&OP	Other
	A	B
The budget is an input to the S&OP process, but does not constrain it	50%	37%
The S&OP process is an input to the budget, but is not constrained by it	33%	24%
Revenue goal alignment is determined by the data output of S&OP	23%	46% A
Budget goals drive and constrain the S&OP process for inventory	17%	22%
Cost goals in the budget are updated based on the output of S&OP	13%	19%
We do not use financial data in our S&OP process - ANCHOR	10%	6%
Other (please specify)	10%	6%
Don't know ANCHOR	3%	-

Source: Supply Chain Insights LLC, Sales & Operations Study ((Mar-May, 2019))
Base: HAVE A S&OP PROCESS -- Effective S&OP (n=30), Other (n=54)
Q21. Which of the following describe the role of your company's financial budget in your [primary] S&OP process?
AB Higher than other group at 90% or higher level of confidence

The take-away? The financial budget should be input into the S&OP plan, but it should not constrain the process. Companies need to rethink the misguided thinking on one-number forecasting. Also, IBP implementations reduced the effectiveness of many companies' S&OP operations due to the lack of discipline and measurement.

#2 Demand Is A River. One of my favorite activities with clients is to help them draw their river of demand. Visualization of the market flows challenge current organizational paradigms. Thinking of demand as a flow from the customer's customer challenges functional paradigms. The technique challenges mental models as demand as a spreadsheet of time-phased data within a time horizon. Only a mature company realizes that demand is a river that needs to drive strategic, tactical, and operational planning.

The goal should be a shared plan, not one number. Let me explain. There are many numbers in a hierarchical demand management supply chain model, and financial teams usually want to focus only on the top-line sales numbers. The many numbers and biases result in tension. Supply chain excellence requires discipline at the mix and item/location data—details matter.

Let's take an example. As shown in Figure 3.4, at a recent client engagement, there is a strong and clear process definition of the budget process, and the lack of clarity and discipline in demand flows for the supply chain. As a result, this team introduced a 22% error into the demand stream due to the lack of discipline and clarity. The S&OP

plan, termed S&OP+, tightly coupled the budget to the supply chain supply plan introducing additional error. As a result, the organization, tightly capacity-constrained, failed to forecast and build capacity ahead of market demand. Currently, the lack of capacity and S&OP capabilities are a barrier to growth.

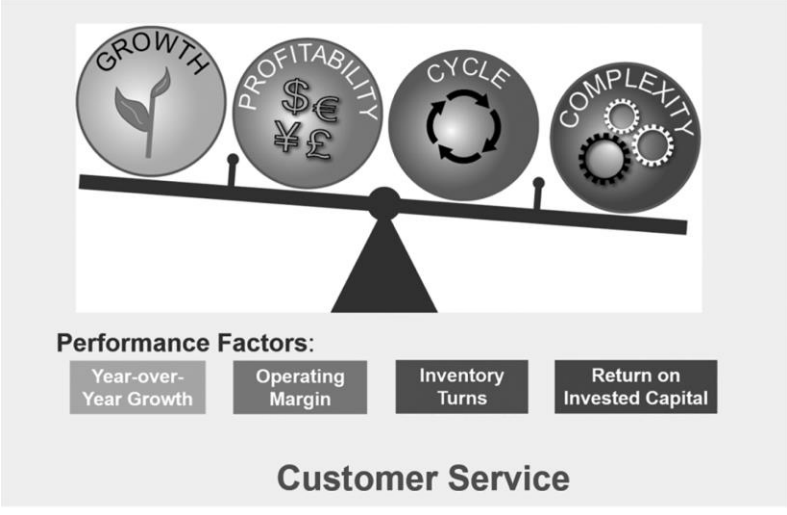
Figure 3.4. Navigating the River of Demand

#3 More Than a Simple Triangle. A simplistic view is that supply chain excellence is the trade-off of cost, inventory, and customer service. In the real world, the intricacies are much higher. Growth, asset utilization, and item complexity play equal roles.

For the global supply chain, it is a constant juggling act. A common issue in financially-driven companies is the substantial utilization of manufacturing assets past reasonable limits throwing the supply chain out of balance. Don't manage metrics in isolation. Instead, as shown in Figure 3.5, replace functional metrics with a balanced scorecard approach. To maximize value—price to tangible book, functional metrics

need to be reset to focus on reliability. Examples include first pass yield, schedule adherence, hands-free orders, orders shipped complete, and minimization of waste.

Figure 3.5. Supply Chain Trade-offs



#4 Maximize Buffers. With the increase in demand and supply volatility, buffers grow in importance. These are natural shock absorbers. The two primary buffers in the supply chain are manufacturing capacity and inventory.

With higher levels of asset utilization, inventory management becomes more critical. Ironically, inventory levels today are higher than they were in 2007; yet customer service levels issues abound. The reason why? The answer is simple. Few companies manage inventory holistically—cycle, in-transit, seasonal, promotional, and safety stock levels. The lack of holistic management is compounded by decisions to make broad-brush cuts in inventory to meet a quarter-end target.

Table 3.2. Average Inventory Levels by Industry throughout 2010-2018

Days Of Inventory By Industry: Comparison By Time Period					
Industries	Years				Difference (2014 - 2018) vs (2004 - 2006)
	2004 - 2006	2007 - 2008	2009 - 2013	2014 - 2018	
Beverage	102	109	138	167	65
Pharmaceuticals	144	154	172	203	59
Medical Device	107	123	142	151	44
Semiconductor	60	70	80	89	29
Household Products	56	58	60	79	23
Beauty	117	124	131	139	22
Aerospace & Defense	86	80	91	106	20
Automotive Parts	52	58	66	71	19
Chemical	64	63	68	80	16
Automotive	45	51	53	55	10
Food	51	51	59	60	9
Broadline Retail	70	73	72	78	8
Apparel Retail	74	77	77	80	6

Source: Supply Chain Insights, LLC, May 2019. Data Sourced From Y Charts.

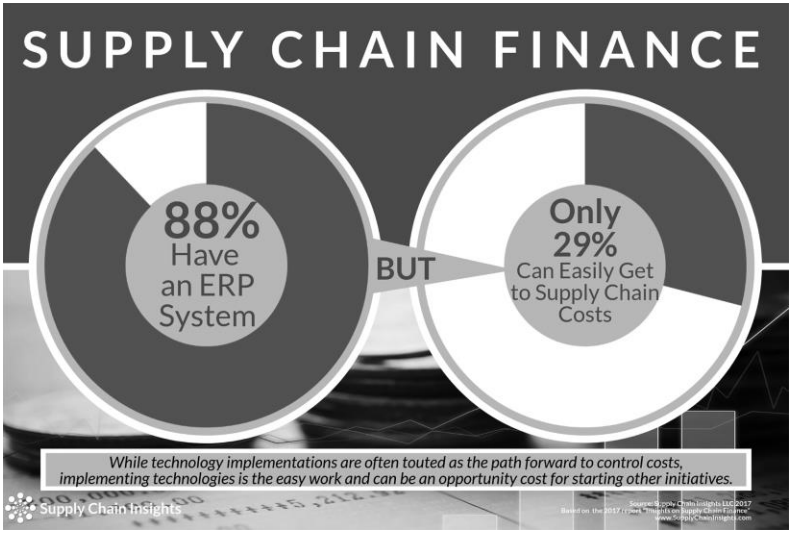
The issue? In financially-driven organizations, inventory is managed as a liability, not as an asset. There is a lack of understanding that inventory needs item/location level management.

Focus on the form and function of inventory as a part of network design. Only 7% of companies actively design their networks.

When inventories are managed with end-of-the-quarter cuts to make working capital targets, and if the company has high asset utilization, customer-service recovery is almost impossible. With higher compliance costs and the growth in customer fines, companies are learning this lesson a million dollars at a time.

#5 A Focus on Functional Metrics Throws the Supply Chain Out of Balance. Only 29% of companies make decisions based on total costs. Instead, as shown in Figure 3.6, most organizations measure only functional costs—transportation, manufacturing, and procurement. A silo'd focus on costs will throw the supply chain out of balance.

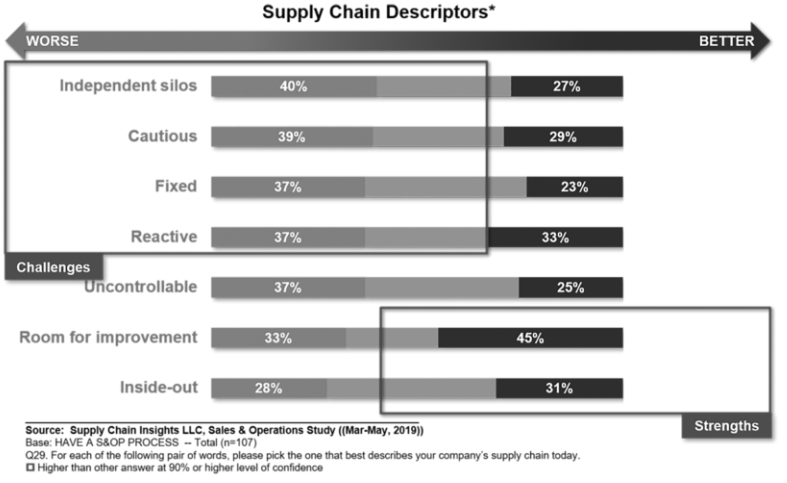
Figure 3.6. The Companies' Ability to See Total Costs



#6 The Only Constant Is Change. Tax and tariffs. Commodity shortages. Shifts in demand. The looming recession. When companies focus on internal processes and build inside-out practices, the supply chain will be less agile and will take longer to adjust to market signals. It is for this reason, as shown in 3.7, that one out of two supply chain leaders feel that their supply chain processes are adequate.

We do not have "best practices." Instead, we have historical concepts that are outdated.

Figure 3.7. Current Satisfaction with Today's Supply Chain Processes



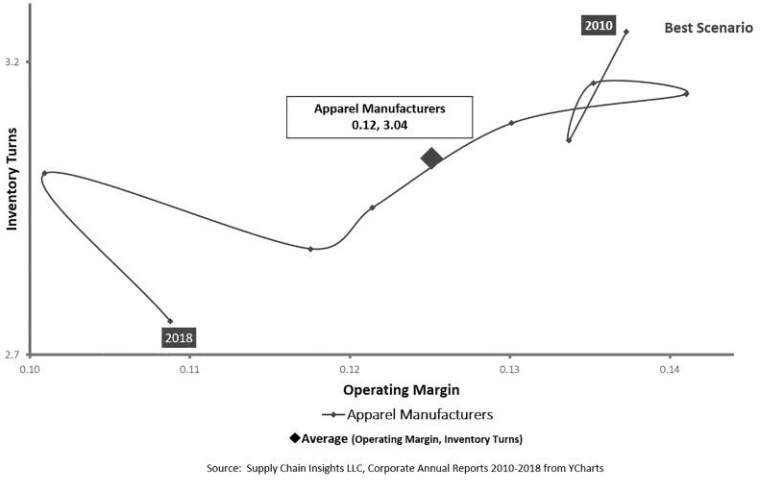
#7 Financial Reengineering Projects Do More Harm Than Good. Over the last decade, financial reengineering projects reigned. Few created long-lasting value. Popular techniques included business process outsourcing, contract manufacturing to reduce the cost of labor, low-cost country sourcing, tax efficiency projects, and the elongation of payables to improve cash-to-cash.

The focus is on saving costs within the organization, but most financial re-engineering projects throw the supply chain out of balance. Industry patterns show a steep decline in supply chain metrics in 60% of manufacturing industries since 2010. To understand the point, let's look more closely at an industry peer group. Apparel is an example. Note in Figure 3.8 that throughout 2010-2018, while the industry chased lower labor costs, apparel manufacturers lost margin and decreased inventory turns. Companies struggled

to balance inventory and customer service with higher levels of volatility.

Spreadsheet modeling is not sufficient and is at the root of the problem. The reason? Spreadsheet-based modeling fails to adequately reflect the impact of cycles, variability, and constraints. As a result, the organization reduces operational costs, but increases cost in other functions.

Figure 3.8. Results of Financial Reengineering Fails the Apparel Manufacturing Industry



Source: Supply Chain Insights LLC, Corporate Annual Reports 2010-2018 from YCharts

Companies struggle to have the right discussions. Most are abstract discussions around a circular table in a CFO's office with well-intended leaders that lack real-world experience.

The action items? Understand the aggregate trends for your industry. Ask yourself questions to understand the drivers. Challenge the effectiveness of financial reengineering efforts. Over 60% of industries have negative trends like apparel manufacturing.

#8 IT Standardization: Only the Path for Laggards.
Companies following the path of ERP standardization in supply chain projects (purchase of transactional and decision support software) from the same vendor rate themselves at a significant disadvantage in modeling and S&OP effectiveness. There is a gap in "what-if modeling" and "creation of a feasible plan." Over the decade, in the four studies completed in S&OP, this gap shown in Table 3.3, grew.

Table 3.3. Comparison of S&OP Effectiveness for SAP Users Versus the Rest of the Population

SAP APO vs. Other Process		
	SAP APO	Other
	A	B
Much more effective	13%	35% A
4	40%	31%
3	43%	30%
2	-	2%
Not at all effective	3%	2%
Average of Ratings	3.60	3.96 A

#9 Earning a Seat at the Table. Traditional supply chains are insular and inside-out. Today's supply chain design started with the supplier. Tomorrow's supply chain needs to be mapped and orchestrated from the customer back. As a result, functional techniques like the SCOR model are obsolete.

As we move to circular economies that maximize the use of resources and improve sustainability, supply chain leaders have the opportunity to make the supply chain discussion more strategic. However, to do this, the team needs to have a real-

world understanding (the feet) and a working knowledge of strategic concepts (the wings).

Conclusion

To earn a seat at the table, the supply chain teams need to challenge convention. The process definitions that got us to 2020 will not drive leadership for the next decade. Those that can connect the wings and feet—reality and opportunity-- will have a strategic advantage in their careers.

We must learn from the past to unlearn to rethink the supply chain. The process is mostly a change management journey. A rule of thumb is 60% change management, 30% process design and 10% technology. Unfortunately, most discussions start with technology.

Your thoughts? I look forward to hearing from you.

Seven Ways to Avoid a Food Fight

Yes, here it goes—another food fight. I am witnessing two right now. Warring factions are holding the company's supply chain efforts hostage.

How does it happen? Supply chain technologies are a complex sale. By definition, a complex sales cycle is one where there are multiple stakeholders--not one buyer--that need to align to invest in a solution. The goal of the technical sales team is to drive allegiance to their solution. They play to the business leader's ego, often resulting in alignment issues.

In investigating options, companies engage with sales teams that are gifted and trained to persuade the business leadership team to believe in their solution. When decisions are regional, companies buy multiple solutions. In the building of global processes, supply chain leaders try to bridge geographical gaps, but sometimes the unknowing drives a food fight.

No, there is no food thrown from forks. Instead, words thrown through email are the new medium. Email (a passive form of communication) fights ensue, and

political bickering begins. In the process, the teams focus on the battles; and the company loses the war to driving supply chain improvement.

Reflection/True Confession

My first foray into supply chain planning was 1992. Recruited by a supply chain planning technology company, I was confident in my skill set. I found that I was over-confident.

After building macros on excel spreadsheets as a supply chain leader for five years, I thought building software would be easy. It was not.

Learning what I did not know was humbling. Wrangling the nuances of the user interface, security, workflows, rules, and engines is mind-numbing. My key learning? No matter how confident you feel in your understanding and capabilities, be open to the outcome. Don't believe that you know the answers. Dive into the details.

Recommendations

To help organizations avoid food fights, I offer seven recommendations:

> **Get Clear on Definitions.** Organizations get caught up in the trap of Supply Chain *Jabberwocky.* For example, what are the definitions of the time horizons? How do rules, workflows, and engines redefine process outcomes? ("Jabberwocky" is a nonsense poem written by Lewis Carroll about the killing of a creature named "the Jabberwock.")
>
> The answer? Start outside-in from the market back. Invest time to learn market drivers. Avoid

the Supply Chain Jabberwocky (the use of vacuous words and acronyms that bantered around the organization is meaningless dialogue). For example, leaders use the term *end-to-end.* What does it mean? What is an end? Where does the process start and stop?

Another one of my favorite jabberwocky terms is *customer-centric.* (It could be a drinking game.) The phrase is frequently used but lacks meaning. Companies are not clear how to prioritize customers and their needs.

Planning is distinctly different than the supply chain execution processes. The only thing in common is that the term supply chain. Each is important, and they need to be synchronized, not integrated. Clarity of time horizons and consumption logic is essential to define the solutions to make this happen.

Table 3.4. Example of Planning Horizon Definitions

	Freeze Duration (FD)/Order Duration 1-2 Days	Slush Period (SP)/ Operational Planning FD to 8-13 weeks	Tactical Planning SP to 12-18 months
Demand Planning	Demand Sensing		Demand Planning
Customer Service	ATP and Allocation Rules followed using customer priorities	Focus on Efficacy of Customer Programs (VMI/CPFR Programs	
Distribution Planning	Visibility of receipts, in-transit and hold productions. Focus on first pass tender and on-time delivery and orders completed in full.		Design of Inventory Strategies: Form & Function of Inventory
Tactical Supply Planning	Continuous review of planning master data and the effectiveness of the master production plan and the S&OP cycle.		Focus of the Master Production Scheduling Period. Frozen and slush periods are frozen for Master Production Planning (MPS).
Manufacturing Scheduling	Plant production schedules frozen during the order duration.	Finite scheduling. Management of contract manufacturing requirements.	Continuous review of planning master data and the effectiveness of the master production plan and the S&OP cycle.
Transportation Planning	Delivery reliability.	Truck tendering and load compliance.	Design of the network and freight contract rationalization.

Be Data-Driven and Focus on Outcomes. Avoid political arguments. Test engines, define workflows, and ensure that the technologies deliver superior decision support. Never implement supply chain planning as a technology project. Instead, focus on definition and testing.

Not all data can be optimized. Select the best optimization technique based on data characteristics. For forecasting, use 2-3 years of history to backcast and test demand planning optimizers and continuously measure improvement using Forecast Value Added methodologies (FVA).

Don't Buy Technology. Build Capabilities. Use design thinking and process workflow testing to build organizational capabilities. Get clear on the possible and drive the "art of the possible" through testing new approaches. Drive continuous improvement processes to understand the root cause for orders shorted and the quality of planning master data. (Planning master data includes cycles, conversion factors, lead times, rates, etc.)

Work Above and Below the S&OP Line. Many companies are engrossed in the implementation of Sales and Operations Planning (S&OP). They get so involved in the definition of the technology for S&OP that they forget that there is a need for technology enablement above and below the S&OP meeting process. Both are important.

Above-the-line technologies focus on visualization, what-if analysis, and cross-

functional collaboration. In contrast, the below the line technologies are more focused on plan development, constraint-based management, and time-horizon management/consumption: different teams and requirements, but all-important.

Side-Step Pitfalls and Potholes. A pitfall is a hidden or danger that is not easily recognized by the team. In contrast, a pothole is an issue or a series of events that drive a gradual process degradation. Both are challenges requiring leadership. In Table 3.5, we share examples.

Table 3.5. Examples of Potholes and Pitfalls

Potholes	Pitfalls
Degradation of Planning Engine Effectiveness Post Implementation	*Strategy Alignment*
Training and Skill Dilution from the Initial Implementation	The Role of the Budget
Management of Planning Master Data	Governance
Clarity of Definitions	Process Discipline and Clarity of Roles
Shifts in Leadership	Measurement Systems

Avoid an RFP. Most teams in the RFP process drive deeper into food fights and jabberwocky. The teams do not know what they do not know. As a result, the groups will spend months in vendor discussions and end up even more polarized (unable to make a decision). The strategic sales methodologies of technology sales teams will widen the gaps between groups.

All the best in your journey. Try to shut down the food fights early through data-driven discussions, transparent leadership, and the testing of solutions against well-defined requirements.

AI This. Not So Fast!

Grounded during this pandemic, and unable to interact with clients in person, I try to write 3,000 words a day. Morning after morning, fueled by good black coffee, I type away. I share insights based on research for the supply chain leader. I write for this blog, craft reports from research for our newsletters, create blogs for Linkedin, and build articles for Forbes. I am also developing a framework for my new book. Stay tuned.

Frequently, when I post about an issue, a well-intending consultant or an aggressive business development executive will tout the evolution of the autonomous supply chain as the answer. The comment is usually something like, *"Implement RPA or AI to solve this problem."* Or, *"If you need an answer, implement my solution."* When this happens, I sigh. This type of response is just not helpful. Everyone tries to be a cool kid with over-zealous comments on posts, but unfortunately, there is no truth in advertising in the supply chain market. (If the industry had truth in

advertising policy, there would be far fewer signs in the airports from consultants and technology providers.)

Background

The autonomous supply chain is a vision, but it is not today's reality. I find in my Supply Chains to Admire research that 96% of companies (when compared to their peer groups) are unable to drive improvement while delivering higher performance year-over-year on a balanced scorecard (growth, inventory turns, operating margin, and the Return on Invested Capital (ROIC)).

I define supply chain excellence as year-over-year performance better than the peer group on this balanced scorecard. Ecolab, L'Oreal, and TJX are exceptions. They did it. Each company ranks in the 4% of companies beating their peer groups.

Figure 3.8. Orbit Chart of TJX Versus Peer Group for the Period of 2010-2019

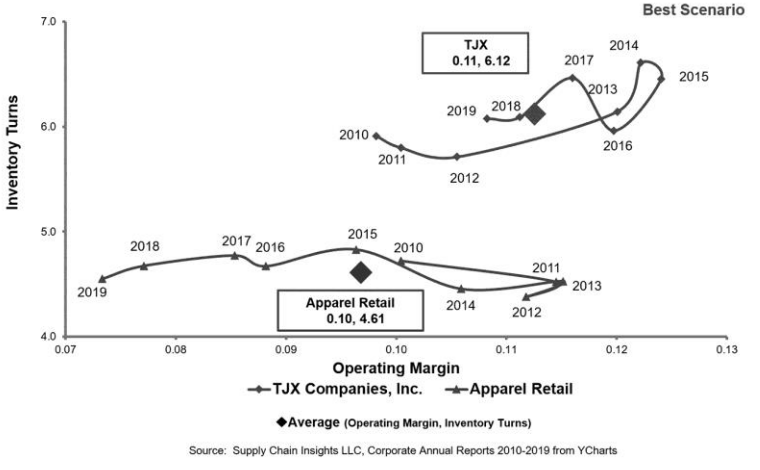
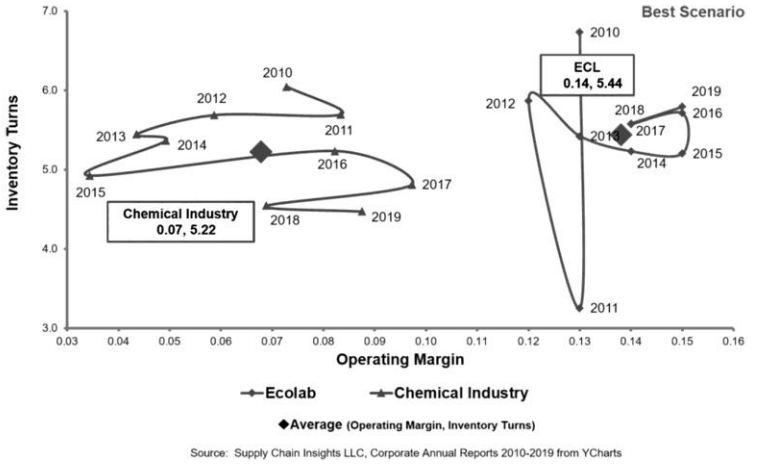


Figure 3.9. Orbit Chart for Ecolab at the Intersection of Inventory Turns and Operating Margin Versus the Chemical Industry for the Period of 2010-2019



The term "AI" is overused. The marketing is used freely without meaning. Technology vendors are hanging the word "AI" on their marketing like I hang icicles on my XMAS tree. When I get the press releases and briefings, I laugh. If only the aspirations were equal to the delivery. The reason? We don't know enough about what drives performance improvement to code an AI engine even if it was ready.

Shifts in Technology

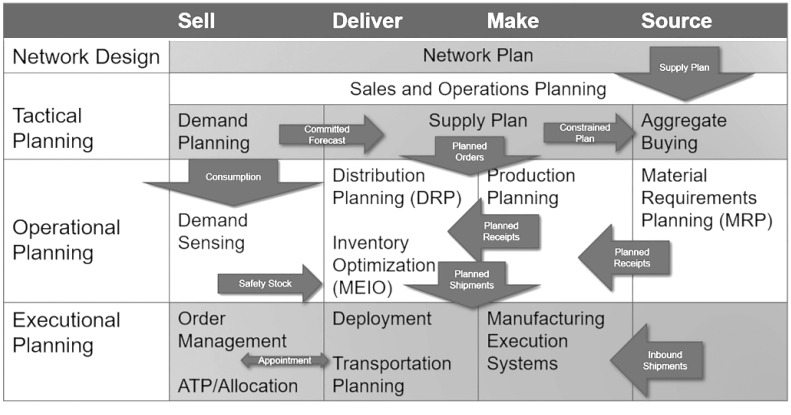
Data science and cloud-based delivery offer promise, but supply chain planning is morphing slowly, and at the edges. No technology company is attacking supply chain planning at the center.

Let's celebrate that over the last two years; there were four significant acquisitions by traditional supply chain planning providers to deepen analytics capabilities:

07/2018	JDA purchases Blue Yonder
11/2017	Logility acquires Halo for 9.3 M$
10/2019	Llamasoft merges with Opex
06/2020	Kinaxis buys Rubikloud for 60M$

The supply chain planning technology provider faces the innovators' dilemma. Maximizing the market potential requires a step-change in design. Automating the current conventionally-held definition of planning is insufficient because the design -- in the face of the pandemic --is quickly becoming outdated. The problem? Future growth is dependent on selling the current solution, but the existing convention/platform, as shown in Figure 3.10, is not the right model for today's supply chain.

Figure 3.10. Current Supply Chain Planning Flows



The technology companies face tough challenges breaking out of the pack. We don't know the potential of new math to redefine supply chain planning. Today's problem in the pandemic is wildly different than the pre-pandemic world. If anyone thinks that they know the answer, show them the door. It is not that easy, and hanging "AI" all over the marketing literature is just not helpful.

In short, we do not know the potential of the art of the possible. Data scientists and supply chain leaders speak different languages with vast differences in world views. The data scientist is over-zealous, and the Supply Chain Leader is wary. Bringing the two together requires leadership. My goal in this blog is to seed the discussions to drive better outcomes.

Examining The Current State

The analyst mindset is to track software evolution by taxonomy where like solutions are grouped, named, and tracked. Supply chain planning is a subset of the decision support technology taxonomy. Other forms of decision support include revenue management, trade promotion management, cost-to-serve, and network design. Now in its fifth decade of evolution, supply chain planning is starting to change. The shifts are happening slowly at the edges. I am celebrating, but I hope to drive seismic changes from the center. What we have now is not good enough, and I have my fingers crossed that Covid-19 will cause a significant and positive shift by highlighting the deficiencies.

Several false assumptions underly current supply chain planning solutions:

> **-Companies could systemically apply optimization to decisions to drive improved outcomes.**
>
> *The issue? Most of the optimization focus in the traditional software solution focuses on a function of source, make or deliver. Procurement and transportation operated as islands.*
> *As the supply chains became more sophisticated with global operations, a need grew for more complex requirements. The regional supply chain in*

the 1990s was more straightforward, and in those days, localized optimization was more effective. This condition is no longer valid.

-The order is a good proxy for demand. Historic order patterns are useful in predicting future demand.

The issue? COVID-19 is highlighting this issue. As we work through the COVID-19 period, supply chain leaders face a period of ongoing disruption until vaccination is widely available. How long will this be? We don't know. Companies have never faced wave-after-wave disturbance. I expect supply chain leaders to fight wave-after-wave of disruption for two-to-three years.

-Manufacturers operate in a constrained environment, and the goal is the automation of the Theory of Constraints theory.

The issue? Outsourced manufacturing is growing (now at 42%), and we have not automated networks. The Theory of Constraints is only one tool in our tool belt. We need to combine TOC with flow analysis to drive better answers.

-Volume planning is sufficient.

The issue? Today, there is no easy way to make price/volume trade-offs. Decisions based on volume create blind spots for cost management, especially in the face of changing mix.

-The efficient supply chain is the most effective.

The issue? The lowest input costs define the efficient supply chain design, but the construct ignores the factors of variability. Demand is not demand, and an item is not an item—details matter. For example, the higher the demand variability, there is a need for greater capacity in manufacturing assets and inventory buffers. An agile supply chain is a different design focused on minimizing the impact of variability, while a responsive supply chain focuses on the shortest cycles. Most companies don't have one supply chain: they have many. Typically, companies need all three designs.

-Functional optimization drives effective supply chains.

The issue? Managing total costs is tough: companies cannot quickly assess complete cost data. Over 90% of companies have implemented ERP, yet only 29% easily access total cost information. Since the supply chain is a complex non-linear system, functional optimization often throws the supply chain out of balance. For example, the lowest transportation costs can have adverse effects on other distribution costs and inventory levels.

-Tight integration with ERP improves decision making.

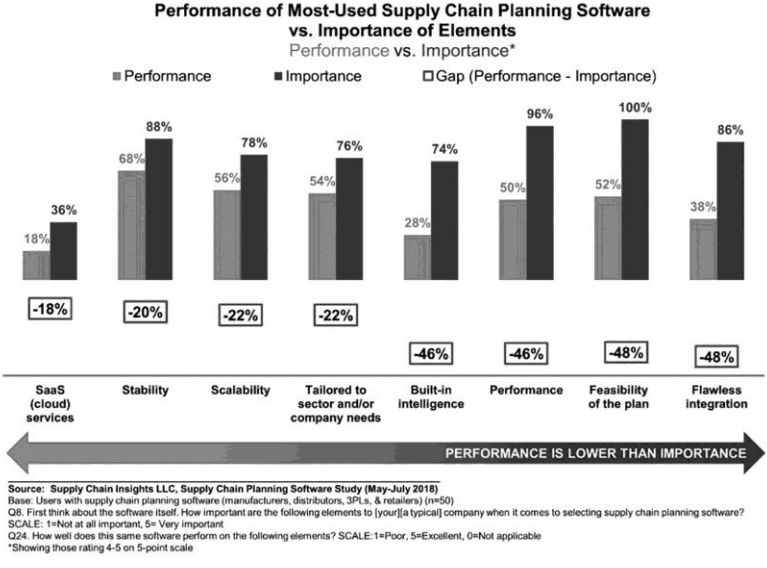
The issue? Transactional data is essential, but not sufficient. Only 40-60% of the required data comes from ERP, and with COVID-19, market data is critical. The most effective supply chain planning systems focus on bi-directional orchestration and what-if analysis.

Moving Forward

Technology companies are feature-oriented. The focus is on building more in-depth features versus questioning overarching architecture. The issue? The features add complexity, not value.

The evolution of decision support is happening on the edges. The solutions are moving from a functional platform focused on the Theory of Constraints (TOC) to produce a feasible plan. However, unfortunately, as shown in Figure 3.11, we were not able to even accomplish this goal. Today companies are not satisfied with their capabilities to build a feasible supply plan.

Figure 3.11. Current Gaps in Supply Chain Planning



Source: Supply Chain Insights LLC, Supply Chain Planning Software Study (May-July 2018)
Base: Users with supply chain planning software (manufacturers, distributors, 3PLs, & retailers) (n=50)
Q8. First think about the software itself. How important are the following elements to [your][a typical] company when it comes to selecting supply chain planning software?
SCALE: 1=Not at all important, 5= Very important
Q24. How well does this same software perform on the following elements? SCALE: 1=Poor, 5=Excellent, 0=Not applicable
*Showing those rating 4-5 on 5-point scale

Planners have access to more data than teams in the larger organization. Only 1/3 of companies have access to what-if analysis. Similarly, only 18% of supply chain

leaders feel that they can get to planning data when they need it, and only 29% of organizations can quickly get to complete cost information. My conclusion? It is time for a disruption in the supply chain planning market. Bring on new forms of analytics in a meaningful way.

My Plea

My plea is for us to blow-up the market and drive meaningful change from the center of the platform. It is a time for advanced analytics, flow, policy, and automated rule sets to get better answers. The need is there. The technology is moving us along, but the problem is us. We need to adjust our mental models to test and learn to understand the Art of the Possible and stop pushing hollow marketing. Please don't automate the current state: let's make it better.

Section 4

Business Case Studies

Business Case Studies

The rubber hits the road when business leaders apply strategies and implement technologies to drive results. Here we showcase Supply Chains to Admire case studies.

The Eastman Chemical Journey To Build Customer Centricity

Eastman Chemical Company, once a subsidiary of Kodak, is an independent global specialty chemical company producing a broad range of advanced materials, chemicals, and fibers. Annual revenues are slightly higher than 10B$. The Company operates four business segments with a global team of more than 14,500 employees.

We recently had the opportunity to interview Tom Morton, Vice President of Global Supply Chain and Quality Control, to gain insights on why Eastman Chemical outperforms their peer group on the Supply Chains to Admire from 2010 to 2018.

In its seventh year, the Supply Chains to Admire analysis is a celebration of supply chain success. Over the same period, Eastman won the award for four of the seven years.

To select winners, Supply Chain Insights analyzes balance sheet and income statement data and carefully compares companies within industry peer groups. The use of supply chain ratio data allows comparing a larger company to smaller company performance and supply chain performance across different global currencies. This award program answers a set of questions:

- Which public companies are outperforming their peer group on the portfolio of the Supply Chain Metrics That Matter while also driving a faster level of improvement with their teams? (The metrics are operating margin, growth, inventory turns, and Return on Invested Capital (ROIC).)
- How do companies that outperform drive improved value for their firms on Price to Tangible Book Value (PTBV) and Market Capitalization?
- What are reasonable rates of improvement for companies within a distinct peer group? What can we learn from top performers?

As shown in Table 4.1, from 2010 to 2018, Eastman grew at a 10% rate versus an industry average of 4.2%, had an operating margin of 15% versus the industry average of 11%. The company's inventory turns were 5.4 versus the industry average of 4.7 with a Return on Invested Capital of 11% versus 7.7 %.

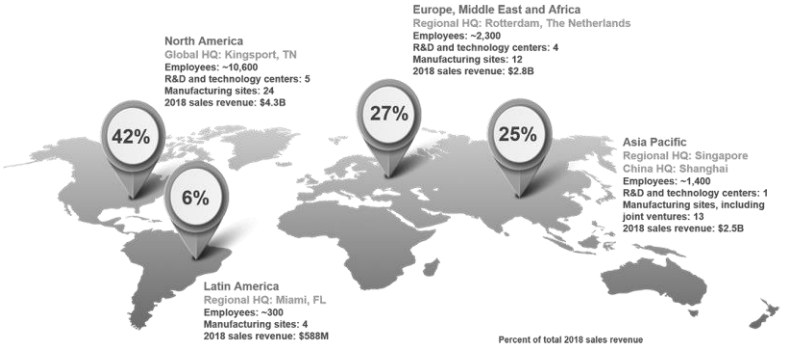
When asked, *"What drives success at Eastman? Why do you outperform your peer group?"* Tom responded, *" I think that it is due to being customer-centric and delivering on our promise of reliable delivery.*

Table 4.7. Chemical Industry Performance for 2010-2018

COMPANY	2018 ANNUAL REVENUE	GROWTH	OPERATING MARGIN	INVENTORY TURNS	RETURN ON INVESTED CAPITAL	PRICE TO BOOK	MARKET CAP	INDEX RANK
		2010-2018						
Air Products and Chemicals Inc.	$ 8,930	1.0%	0.18	12.62	0.11	3.35	25499	5
Akzo Nobel	$ 10,930	-4.0%	0.08	5.26	0.1	2.01	16925	11
Albemarle Corporation	$ 3,375	7.0%	0.19	3.92	0.1	2.98	7023	16
Amyris Inc.	$ 80	18.0%	-1.72	8.98	0.0869	48.81	379	44
Arkema SA	$ 10,410	6.0%	0.1	0.49	0.06	1.6	6307	28
Asahi Kasei Corp	$ 18,432	2.0%	0.07	4.23	0.07	1.2	11504	18
Ashland Global Holdings	$ 3,743	-6.0%	0.04	4.83	0.03	0.97	3383	23
Axalta Coating Systems Ltd	$ 4,696	1.0%	0.08	4.00	0	3.07	3585	3
BASF	$ 74,007	2.0%	0.1	4.90	0.11	2.36	80081	37
Cabot	$ 3,242	5.0%	0.09	5.71	0.05	1.91	2804	21
Celanese Corporation	$ 7,155	4.0%	0.12	6.41	0.12	4.42	9499	6
CF Industries Holdings	$ 4,429	9.0%	0.29	10.97	0.11	2.57	10506	35
Covestro	$ 17,259	2.0%	0.07	3.98	0.1	0.94	4912	1
DowDupont Inc.	$ 60,278	9.0%	0.09	5.32	0.07	1.46	46988	7
Eastman Chemical	$ 10,151	10.0%	0.15	5.39	0.11	2.88	9992	33
Ecolab	$ 14,668	12.0%	0.14	5.40	0.09	4.84	28696	13
Evonik Industries	$ 17,740	3.0%	0.11	5.50	0.11	0.37	3418	24
FMC	$ 4,728	8.0%	0.15	3.25	0.11	4.07	7005	18
Givaudan	$ 5,650	5.0%	0.16	3.15	0.11	4.29	14903	10
H.B. Fuller	$ 3,041	11.0%	0.08	6.52	0.07	2.21	1986	8
Hitachi Chemical	$ 6,040	3.0%	0.07	7.77	0.07	0.35	1131	16
Huntsman Corporation	$ 9,379	3.0%	0.08	5.53	0.05	2.44	4561	4
International Flavors & Fragrances	$ 3,978	6.0%	0.17	2.90	0.13	4.81	8291	29
Johnson Matthey PLC	$ 13,675	5.0%	0.04	15.90	0.12	1.28	3485	38
K+S	$ 4,769	0.0%	0.15	3.57	0.08	1.6	6765	39
Kansai Paint Co., Ltd.	$ 3,628	6.0%	0.09	5.32	0.07	0.22	537	20
Koninklijke	$ 10,943	1.0%	0.09	3.48	0.07	1.51	11356	31
Kraton Performance Polymers	$ 2,012	11.0%	0.07	3.15	0.04	1.64	823	22
Lanxess	$ 8,498	3.0%	0.07	4.50	0.07	1	2686	30
Lonza Group	$ 5,542	7.0%	0.08	2.55	0.04	3.05	5341	42
LyondellBasell	$ 39,004	4.0%	0.13	7.26	0.35	3.86	33503	14
Mitsui Chemicals Inc	$ 11,991	-2.0%	0.03	4.54	0.02	0.12	579	40
Nippon Kayaku	$ 1,515	2.0%	0.13	2.80	0.08	0.24	411	25
Nippon Shokubai	$ 46	0.0%	0.06	4.23	0.05	0.46	901	43
Nitto Denko	$ 7,728	4.0%	0.12	6.54	0.1	0.42	2401	9
PPG	$ 15,374	3.0%	0.12	4.81	0.17	4.92	23346	27
RPM International Inc	$ 5,322	5.0%	0.1	4.17	0.08	4.09	5574	12
Sensient Technologies	$ 1,387	2.0%	0.13	2.16	0.08	2.62	2513	15
Solvay	$ 13,342	4.0%	0.09	5.23	0.06	0.37	4104	36
Stepan Company	$ 1,994	6.0%	0.07	9.85	0.1	2.3	1283	33
Symrise AG	$ 3,724	8.0%	0.15	2.73	0.09	4.21	6785	26
The Chemours Company	$ 6,638	-2.0%	0.11	3.82	0.07	3.86	2120	2
W.R. Grace	$ 1,932	-2.0%	0.15	5.29	0.13	15.62	4447	32
Wacker Chemie	$ 5,879	2.0%	0.09	5.36	0.1	1.28	4055	41
MEAN WITH OUTLIERS	$ 10,620	**4.2%**	**0.07**	**5.32**	**8.9%**	**3.60**	**9827**	
MEAN WITHOUT OUTLIERS		**4.2%**	**0.11**	**4.90**	**7.7%**	**2.24**	**7447**	

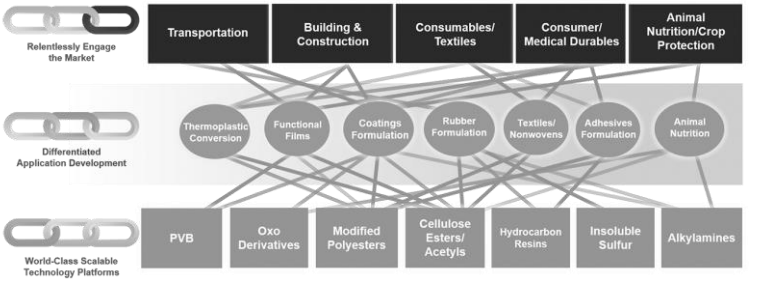
Tom continued, *We operate teams that target attractive niche market segments, and we leverage disruptive macro trends to drive growth. I was fortunate to have spent time in sales. This experience helped me understand what it means to put the customer first. The philosophy is everyone sells, everyone serves, and everyone helps. Success requires a team effort."*

Figure 4.1. Overview of the Eastman Supply Chain



The solution focus is on thermoplastic conversion, functional films, coasting and formulations, rubber and formulations, textiles and non-wovens, adhesives, and formulations along with animal nutrition.

Figure 4.2. Major Market Focus

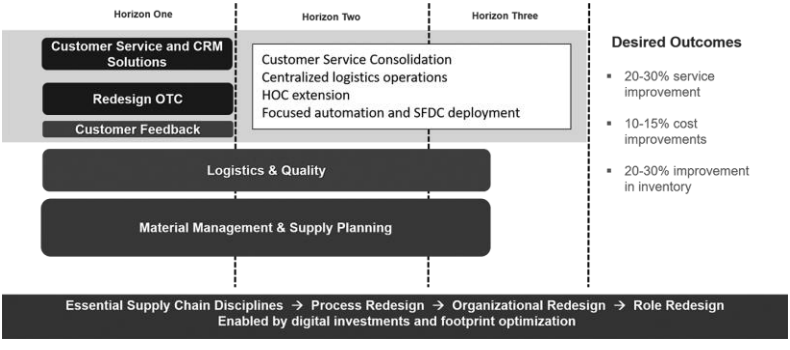


The matrix organization shown in Figure 4.2 operates from the outside-in (from the market back). The Company's focus on multigenerational product development and streamlining time to market by 3X.

Tom ended the interview with the thoughts of, "*The world changed and the game changed. We needed to transform our business. 2018-2019 was a time of slow global economic growth, US/China trade disputes, and a strong US dollar. We drove change by focusing on improving* cash-to-cash over three years. Our goal was

20-30% on-time improvement. We invested in logistics and centralized operations. The team also focused on developments in Integrated Business Planning (IBP.) The work outlined in Figure 4.3 is a three-year vision. We are currently in year two.

Figure 4.3. Digital Change Transformation



Tom wrapped up the discussion with insights on change management. He continued, *"The movement from a supply-based focus to one based on customer input is a significant transformation for a chemical company. To make this successful, we focused on consistent and timely communication and valued transparency and openness. We embraced vulnerability by encouraging a dialogue on failure. Driving supply chain change is not easy, but the results are worth the effort."*

The Sleep Number Supply Chain Delivers on the Customer Promise

Sleep Number is a Supply Chain to Award Winner for 2020. Based on the performance against the industry peer group, as shown in Figure 4.4, the Company ranks in the Winners' Circle for two consecutive years (2019-2020.) The Company typifies the building of a supply chain outside-in to focus on delivering on the brand promise. By taking ownership of the supply chain through the product lifecycle, Sleep Number successfully focuses on customer satisfaction.

Sleep number may sell beds, but the Company's focus is on Health and Wellness. For kicks and grins, when you meet a Sleep Number executive, ask, "*What was your* SleepIQ® *last night?"* The discussion will spark a great conversation on sleep and the role of a great mattress in improving wellness. If you speak long enough, you may gain great insights on sleep from one of the world's largest databases of sleep data.

Underneath the story of business success is a supply chain delivering growth at twice the competitors' rate

while outperforming on cost, inventory turns, and Return on Invested Capital (ROIC). You may also get some great insights from the world's largest database of sleep data. The design of the supply chain is to deliver a good night's sleep for the customer.

In Figure 4.4, we share the Sleep Number orbit chart. Note the recent decline in margin is a conscious choice to grow market share and build a digital supply chain.

Figure 4.4. Orbit Chart For Sleep Number for the Period of 2010-2019. A Comparison Of Company Performance To Industry Average.

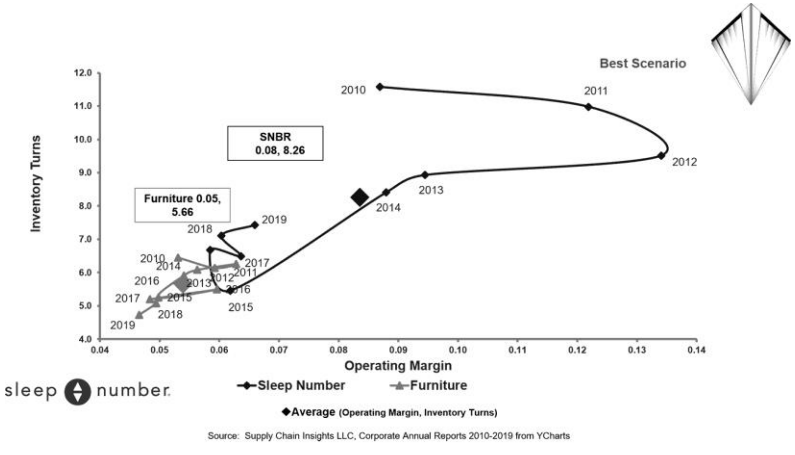


Table 4.4. showcases Sleep Number's success against competitors. Note the high growth rate and balanced metrics performance.

Table 4.4. Comparison of Companies in the Furniture Peer Group for the Period of 2010-2014

INDUSTRY: Furniture								
COMPANY INFORMATION		IMPROVEMENT	PERFORMANCE				VALUE	
NAME	2019 REVENUE (MS)	SUPPLY CHAIN INDEX	GROWTH	INVENTORY TURNS	OPERATING MARGIN	RETURN ON INVESTED CAPITAL	PRICE TO BOOK	MARKET CAPITALIZATION
			2010 - 2019					
Bassett Furniture Industry	452	13	7%	2.85	3.4%	9.7%	1.17	202
Ethan Allen Interiors	747	16	1%	2.25	6.8%	6.9%	2.09	733
Flexsteel Industries	444	17	3%	3.62	5.2%	7.4%	1.25	234
Herman Miller	2,567	3	5%	2.64	7.1%	9.5%	0.44	637
HNI Corporation	2,247	5	3%	11.84	5.8%	10.8%	3.59	1,682
Hooker Furniture	684	1	16%	4.46	6.0%	8.0%	1.48	262
Howden Joinery Group	2,022	2	6%	2.77	15.7%	56.3%	2.59	1,573
Hunter Douglas	3,686	5	7%	5.46	9.0%	11.7%	3.97	962
Knoll Inc	1,428	15	1%	3.82	6.7%	0.5%	7.03	327
La-Z-Boy	1,745	4	5%	5.82	10.1%	11.0%	4.12	5,049
Leggett & Platt	4,753	7	4%	5.65	6.2%	12.2%	2.20	1,182
Libbey Inc	786	9	5%	13.13	7.0%	13.0%	4.67	1,767
NACCO Industries	141	11	-14%	2.99	-13.3%	10.2%	0.58	147
Natuzzi	402	14	-3%	3.39	-3.7%	-7.3%	0.42	100
Sleep Number	1,698	9	12%	8.26	8.0%	51.0%	6.31	1,174
Steelcase	3,443	8	1%	13.14	5.0%	7.0%	2.40	1,791
Tempur Sealy	3,106	12	16%	8.05	13.1%	22.3%	27.86	3,008
MEAN WITH OUTLIERS			4%	5.89	5.8%	14.1%	4.25	1,225
MEAN WITHOUT OUTLIERS			6%	5.89	7.7%	10.8%	4.74	1,225

Background

The Company now is in its thirty-first year of operation, is growing at twice the rate of the industry due to the focus on customer intimacy. Sleep Number's award-winning 360® smart beds are the first commercialized smart beds, and effortlessly adjust throughout the night, sensing each sleeper's movements and automatically adjusting to keep both sleepers comfortable. Additionally, the Company sells smart adjustable bases and bedding solutions that include customizable pillows, temperature-adjusting layers, furniture and more. The Company won the JD Powers customer satisfaction award for the mattress segment for the past four out of five years. Sleep Number has now improved the lives of over 12 million sleepers with its air adjustable beds.

With a headquarters in Minneapolis, MN, the supply chain supports 600 stores in 50 states. Sleep Number

Labs, the Company's technology center, is in San Jose, California, and works on data analytics and algorithm development to gain insights from Sleep Number's proprietary SleepIQ technology, which has created one of the largest sleep databases in the world.

The two primary manufacturing sites are Salt Lake City, Utah, and Irmo, South Carolina. These facilities' focus is core manufacturing, including sewing, electronic assembly, and packaging/shipping. The Company operates several warehousing and assembly locations to over 100 core markets. In each of the core markets, the Company operates a service delivery system to ensure customer service.

With a headquarters in Minneapolis, MN, the supply chain supports 600 stores in 50 states. The technology center is in San Jose works on data analytics and algorithm development to gain insights from the largest sleep database in the world. The two primary manufacturing sites are located in Salt Lake City, Utah, and Columbia, South Carolina. These facilities' focus is core manufacturing, including sewing, electronic assembly, and packaging/shipping. The Company operates twelve warehousing and assembly locations to service 125 core markets. In each of the core markets, the Company operates a service delivery system to ensure customer service.

Great Supply Chains Start With A Clear Mission

The supply chain strategy's design is to deliver on the Corporate Mission to *improve lives through customized, individualized sleep experience.*

At the 2019 Supply Chain Insights Global Summit, when Tony Rossi, Vice President of Supply Chain, and John Brine, Digital Strategist, were asked why Sleep Number outperformed peers, their response was, *"We believe that the secret sauce of being a Supply Chains to Admire Award Winner is a clear mission to drive alignment to customer service. Our mission drives all of our employees behavior. "* The company manufactures proprietary sleep products, designs, and executes white-glove delivery to build lifelong customer relationships.

The Company's success starts with its products. The Sleep Number 360® smart bed redefined and disrupted the $30 billion mattress industry. Since its founding in 1987 – DualAir™ adjustability, the core innovation allows each sleeper to adjust their Sleep Number® setting to their ideal level of firmness, enabling optimal comfort and high-quality sleep. Couples recognize the value of individualized adjustability.

Figure 4.5. Sleep Number's Focus to Deliver Superior Customer Loyalty

Secondly, the company controls the experience by owning the distribution channel. The brand is tightly controlled through the delivery experience to maximize customer satisfaction. The goal is a lifelong customer relationship. Forty-five percent of sales are repeat and referrals.

Innovation runs deep through the Sleep Number timeline shown in Figure 4.6.

Figure 4.6. The Sleep Number's Innovation Timeline for Supply Chain Redefinition

The Company started by advertising in late-night infomercials. The target market was the customer that could not sleep due to back problems. The first store opened in a retail mall space in 1992.

Defining the Customer Experience Through Supply Chain Excellence

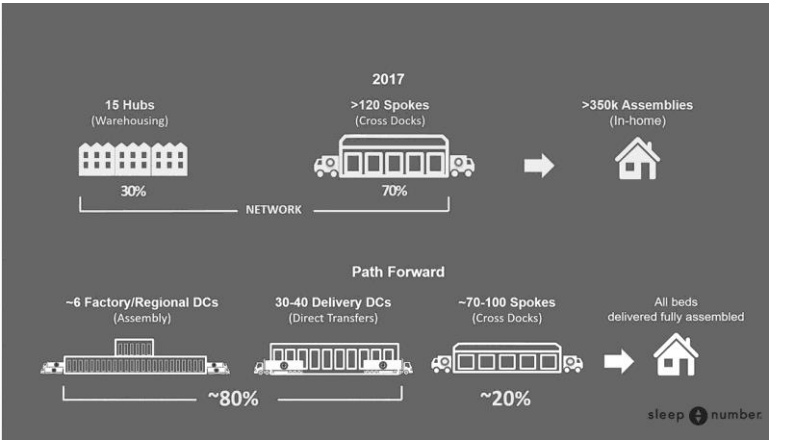
In the early 2000s, the Company began rolling-out the *"white glove"* delivery experiences. Slowly the company built a supporting supply chain to support 400 retail stores by 2002. In 2017, with the 360 Smart Bed launch, the Company rethought bed fulfillment. The redesign included an ERP implementation to enable a core data model across functions. The Company also opened 15 service centers to facilitate home delivery technicians access to parts and materials.

As the Company expanded, the smaller markets had a greater dependency on Less Than Truckload (LTL), creating the need to improve reliability. There was a need to enhance flexibility for delivery to customers and visibility to ensure delivery. The answer? The Company deployed a customer scheduling system and a late-stage postponement network to improve inventory agility to help navigate large swings in demand associated with Labor Day and Presidents' Day sales. Late-stage assembly in the warehouses enables five-day delivery. The Company uses a single piece mixed material flow line that can make any mix of mattresses at any point in time. To fine-tune the network, Sleep Number redesigns components of the network periodically. The Company also builds work systems for teams to see progress on delighting the customers. According to Tony, *"Nothing gets to the customers without the right team members making it go every day."*

The digital transformation shapes the path forward. In this presentation, John Brine asked, *"Who likes their ERP? Nobody. Who needs their ERP? Everybody."*

Brine continued, *"There is a role for ERP. We need to close our business and have an understanding of material flows. Our goal is to simplify the flows. Using advanced analytics, we built a system on top of 6 different systems to answer the questions surrounding order tracking for our customers."* Shown in Figure 4.7 is John's vision.

Figure 4.7. The Sleep Number's Innovation Timeline for Supply Chain Redefinition



Visibility An Essential Component

The first focus was on customer visibility. The process design started with the customer and then mapped back to manufacturing and transportation. The first stumbling block on the digital journey was nothing was digital. Paper supported most of our processes, and there was no single system of record. Sleep Number partnered our suppliers and vendors to use material availability and in-transit data. The focus was not solely on data, but on insights. For example, the Company used intelligent alerting to drive action. Something like an email to the field team to say, *"Hey, this is behind. What do you want to do?"*

To drive the digital transformation, the Company also created a virtual and mobile workflow from the customer bedroom through the supply chain. This mobile

application became a gateway for communication. Along the supply chain, personnel can post pictures, as questions, and request information.

Looking Forward

The next step in the digital supply chain is product serialization. The future for Sleep Number is about outcomes and improving reliability to the customer. On-time delivery and hassle-free installation is part of the essence of the brand. To lower structural costs, the team is continually evaluating product complexity and the added value of each item.

Sleep Number takes sleep very personally and is committed to giving each client a good night's sleep, but behind each bed's delivery is a very effective supply chain designed with the customer in mind.

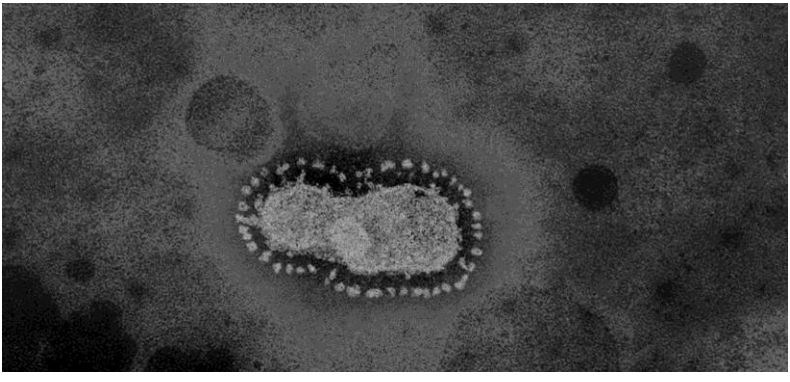
Section 5

Risk Management

Risk Management

During 2020, COVID-19 It tested the global supply chain and shook economies. Here we share the progression of articles published to help supply chain leaders as the pandemic evolved.

Preparing the Supply Chain for COVID-19



Today's supply chain is global. Before 2020, supply chain leaders laughed when they said, *"When local supply chains sneeze, the global process catches a cold."* The severe contagious disease outbreak known as COVID-19 now makes this statement passe.

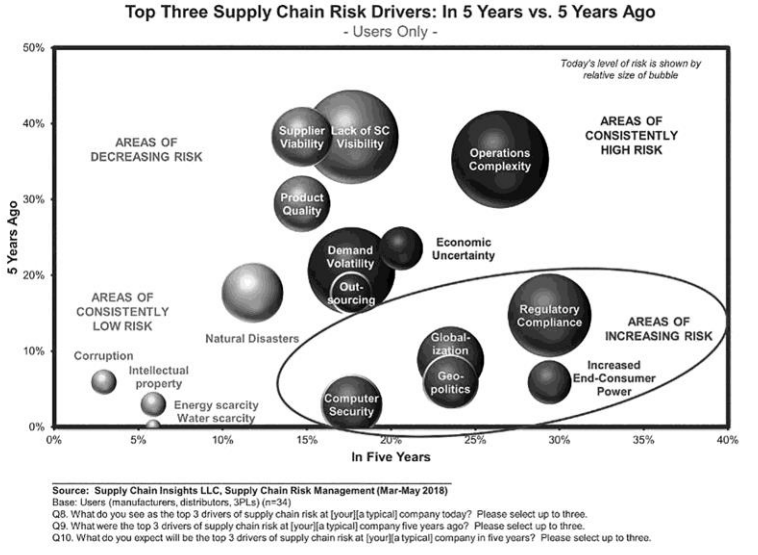
The ripple effect is just beginning. Companies are not well prepared. Only one-third of companies have "*what-if analysis"* and teams capable of modeling the impact. Two-thirds of companies do not know the locations of second and third-tier suppliers. What to expect? Many, many surprises.

A Look at History

The impact of the Chinese economy is substantial and growing.

For the supply chain leader, the pervasive nature of this event is a new phenomenon with unprecedented uncertainty. For reference, in 2013-2018, the top three supply chain impacts were security hacks, west coast port slowdowns, and hurricanes. Shown in Figure 5.1 is research on risk management.

Figure 5.1. Supply Chain Leaders' Views on the Impact of Prior Disruptions



Source: Supply Chain Insights LLC, Supply Chain Risk Management (Mar-May 2018)
Base: Users (manufacturers, distributors, 3PLs) (n=34)
Q8. What do you see as the top 3 drivers of supply chain risk at [your][a typical] company today? Please select up to three.
Q9. What were the top 3 drivers of supply chain risk at [your][a typical] company five years ago? Please select up to three.
Q10. What do you expect will be the top 3 drivers of supply chain risk at [your][a typical] company in five years? Please select up to three.

Expected Impact

Recovery is going to be long and knotty. Together business leaders are writing a new chapter in supply chain risk management. While many think that the answer is a shiny new piece of technology, the requirement is far more pervasive. The most significant issue is the complexity of the global supply chain.

Together, we can fight supply-centric thinking. Start with a focus on demand to manage supply.

Start With Demand

The first impact on global trade is the downturn in Chinese demand. Disrupted Asian trade ripples though the economy with over 400 companies warning of the effects of the Coronavirus on earnings in February 2020. What to do? Model demand based on actual market demand.

The problem? In a company, when it comes to demand, good news travels quickly while terrible news travels slowly. As a result, expect bias.

As a business leader, when you work through the issues of the pandemic, realize that order history will not be a good predictor of demand to guide you through recovery. Traditional sales and marketing data is also obsolete. There is no substitute for local market data.

The second impact is supplier disruption. Expect the unexpected. In the coming days, we will see the Ford story from Thailand floods replayed. Take a page from history.

In 2011, disruption to one of Ford's second-tier suppliers during floods in Thailand idled global production for its most profitable manufacturing centers. Driven in part by more significant worldwide trade and the adoption of lean operating principles, Ford's operations were global with little in-house working inventory.

The Ford team learned that their second-tier supplier had an issue when the critical parts for the manufacturing did not arrive at their factory on time. The team was caught by surprise because they did not know the location of their suppliers.

In the coming months, the Ford case study will repeatedly happen to over 70% of manufacturers. The pandemic is a time where supply chains will compete against supply chains. For some brands, the impact will be long-lasting, while for others, the result will be a business failure.

Current State

Today, when it comes to risk management, supply chains are in worse shape than in 2011. This is despite investment in technology. The issue? The supply chain is more complicated. As a result, I expect to see the Ford story play out over and over again.

Next steps? Build an action team. Deploy supplier development teams to map the location of first, second, and third-tier suppliers. Make contact and offer help. Prepare plans for alternate sourcing. Invest in modeling capabilities to give suppliers accurate forecasts based on the shifts in demand.

Finally, take care of your people. Follow precautions. Where possible, shut down offices and ensure flex hours. Stress on Asian teams will be high. Be supportive.

The common themes will be uncertainty and surprise. Good luck.

Living Through the Pandemic

I have the symptoms. Fever, dry cough, and burning in my chest. Exhausted, my body craves an afternoon nap. Lethargic, I look forward to getting past this illness. I reached out to my doctor to get tested for COV-19; here was her response:

"I recommend that you rest at home unless the symptoms get incredibly severe. The test is only available at the Emergency Rooms in the area. If you go, the wait times are long, your risk exposure is high, and it takes seventy-two hours to read the test positively. Let me know if your condition gets worse. "

I know that I am at risk for the virus due to travel. As a result, I am self-quarantined in my home. Do I know for sure if I have the virus? No, but I have the symptoms and cannot get tested. I am taking steps to be sure I don't make my friends sick.

For the time being, I order food delivery from local grocery stores and the few open restaurants. Whatever illness I have, I am lucky that my symptoms are mild. I have nine days to go before I reach the fourteen-day recommended quarantine for COVID-19.

Reflection

Over the last two weeks, we lost the war with this virus. The lack of test kits to baseline and guide healthcare planning leaves us blind.

For perspective, just two weeks ago, I was debating a trip to Italy with a colleague. At that time, there were a few reported cases. Today, the virus overwhelms Italy's healthcare system. I fear this is where we will be in the US in two weeks. The supply of ventilators, hospital beds, and trained teams is questionable. The fighting in grocery stores, and the hoarding of basic foodstuffs, is unlike what we have ever experienced. The country is on edge.

We all need to try to help. Since I have over 316,000 supply chain leaders following me on Linkedin, here I share my thoughts. I want to start a dialogue with supply chain leaders on how we can help:

> **Get Gear for Healthcare NOW!** Demand is surging. We are at risk. Most of the inventory is in warehouses in China. Only ten percent of masks, gloves, and emergency medical clothing manufactured in the US are readily available. I hope that companies like 3M are actively working with the government emergency team to allocate N95 masks. Companies are actively bringing capacity on-line and working with the FDA for the pending healthcare surge.

Retail Data Sharing. The shelves at retail for paper goods and laundry detergent are bare. Is it because toilet paper companies have no inventory? No, this is not the case. Paper manufacturing companies hold 17 days of stock. Why the shortage? The issue is that when the velocity of demand increased at the shelf, and the manufacturers of paper goods were blind--tethered to an order signal--and, as a result, found themselves on the back foot. (The demand latency and offset lead times of retail demand are 14-20 days.)

To align retail and manufacturing signals through this pandemic, I ask all retailers to share daily shelf-level data weekly with manufacturers. Today, it is a profit center for most grocers. While Wal-Mart and Target give the data free of charge, most grocery stores charge for the data or supply syndicated data suppliers like IRI and Nielsen, which has a three-week latency. This pandemic has fundamentally altered demand, and we need to streamline data across the supply chain. Weekly data sharing by all grocery stores would help.

Collaborative Logistics. The health of truck drivers is a concern. We need to keep trucks moving. Today, 40% of lorries run empty, and supply chains are not truck friendly for loading and unloading times. As the virus impacts escalate, I anticipate a shortage of drivers. Now is a time for supply chain leaders to work together to minimize wait times and maximize backhauls**.**

Build Safe and Secure Food Supply Chains. This virus originated in a wet market in China. What is

a wet market? Due to the lack of refrigeration in China, live animals are purchased at the food markets in China and slaughtered on site. Today, we are dealing with the pandemic of a virus that originated in a wet market in China. The impact is terrible.

Tomorrow, who knows? The problem is pervasive. We do not have interoperability and traceability across the food supply chain. Today's investments by brand owners in the food chain focus on making the enterprise more efficient versus improving the network to provide a safer food supply chain. Today, the extended supply chain operates via spreadsheets, excel files, and portals. A recall is manual and takes six-eight weeks. My ask is for food and pharmaceutical supply chains to step up and invest now to build value networks.

Wrap-up

These are my thoughts. I welcome your ideas. Think hard.

Take action. How can supply chain leaders help?
I wish you and your family all the best through this pandemic. The virus is here, and everyone needs to lend a hand.

COVID-19 Supply Chain Recovery: Act Different and Drive New Outcomes

Ugh. <Face plant...>

My mailbox is full. It seems that *"supply chain experts"* are everywhere, wanting to give me advice on the remedy for current disruption issues. They want my *ink and endorsement*. *PR agencies* are reaching out to encourage me to write about their companies. I find it to be *noise,* in a time where supply chain leaders need to stand elbow-to-elbow to define the new normal. The issue? We don't have the answers, and this pandemic is humbling. We are writing a new case study in supply

chain management. All we know is that history is not a good indicator to predict the future.

As a result, I push 'delete,' 'delete,' and 'delete' on these requests in my inbox, I reflect that we do not have the right answers. Trading partners are adjusting to a new normal. Companies will initially scramble, and then experience an eerie period of quiet.

The supply chain will adjust in waves. Demand will shift. As we enter the community spread, co-workers will get sick. Business shutdowns will ripple through the economy. The shifting of healthcare from elective surgery to emergency response will dramatically change healthcare. The trucking companies that we take for granted will struggle to get drivers.

The impact at first will be very regional. Then it will be more pervasive and longterm. There is no magic bullet. I believe in analytics and modeling, but we are a long way from the autonomous supply chain being a reality.

What To Do?

If you are a supply chain leader, you might ask, what do you do? Where do you turn?

Step back and reflect. These are unparalleled times. We have never had *"Supply Chain"* make headline news like it does today. So, I thought I would pen a note to drive a discussion with supply chain leaders. Use this list to start a dialogue and then add your thoughts in the comments:

> **Redesign Business Systems to Move Data at the Speed of Business.** Now is an excellent time to rethink processes and remove data latency. What good is a process if it does not provide data at the

speed of business? Real-time data introduces noise to the system. Focus on analyzing patterns. To emphasize the point, let me share a story.

I tested positive for COVID-19 last week. I believe that I contracted the virus on a long-haul flight on March 1st. I showed symptoms on the 5th and wrote a note to my physician. At that time, the only available tests were in the Emergency Room. There was a ten-hour wait in the ER, so I chose to wait. Concerned, on the 8th, I sent another note to my physician. On March 12th, I tested at a local drive-through center in a farmers' field an hour from my house.

Five days later, I got the test results. My symptoms are mild, but I learned that I tested positive when I was almost well. The issue? The speed of the virus is faster than the rate of testing. With multiple handoffs between parties, the availability of resources, and the lack of governance between the CDC and public health, the process was too slow.

Now let's apply this concept to the supply chain. Long supply chains with multiple handoffs and lack of interoperability will get goods to markets when there is no longer demand from consumers. The reason? Demand has changed as supply slowed. We need data at the speed of business and in the right format to synchronize the supply chain.

The empty shelves at the grocery store for toilet paper is a clear example of the failure of supply chain integration and the need for multiple party synchronization of the demand signal. The reason? Manufacturers average seventeen days of inventory and would love to ship the product, but the pace of translation of shelf take-away to order replenishment is slower than market purchases.

Redefine Demand Plans. Tether your supply chain to consumption data and align to synchronize supply with market demand. Realize that the order patterns of the past are not a good indicator of the future. As a result, output from traditional forecasting systems, Distribution Requirements Planning (DRP), and Materials Requirements Planning (MRP) are not useful. Analyze inventory positions based on consumption data. Don't rely on traditional processes.

If consumer products companies were using point-of-sale data, the toilet paper shelves would not be empty. In my quarantine, I have tried to order toilet paper on Instacart four times and Peapod twice, but to no avail. Five retailers' web presence on Instacart is not in sync with the shelf patterns, and the swamped eCommerce grocery systems are scrambling.

Simplify the Product Portfolio. The simpler the product portfolio, the easier on the team in this stressful period. Use this time to rationalize the product line and ask the question, *" What products to manufacture?"* Let me share a story. A Reuters reporter called last week to discuss the impact on the fashion supply chain. Her concern was the ability of luxury goods manufacturers to source fasteners from Chinese suppliers. I smiled and said, *" I wish that this were the problem."* I continued, "*I think that the focus should be if the goods should be produced at all? With quarantine and stay-in-place edicts, consumers will not be buying luxury handbags and high-heel shoes."* Now is the time to ask the hard questions.

Keep a Cool Head. I remember running a warehouse for an ice cream business. When I implemented a warehouse management system, vanilla ice cream fell off the pick list at Christmas. It was unfortunate because vanilla ice cream sells the best in the holidays. When we discovered the problem, we sent team members overnight to fill shelves. However, the sales vice president had me stand-up at the management meeting to scold me for fifteen minutes on the fulfillment issue. A

business issue (corrected when detected) became personal.

Things happen. Do not let the fulfillment issues become a personal problem with the team. Take care of associates. Don't judge. Ask how you can help.

Act Ethically. If supply is limited, let upstream trading partners know. Try to share accurate data daily. Be proactive and offer substitution options and avoid price gouging. Focus on reliability and data sharing.

Baxter is an example of what not to do. When Hurricane Maria decimated Puerto Rico, forty-percent of the United States IV bag supply was interrupted. US hospitals learned of the IV shortage five-months later when goods ordered did not show. The manufacturers started finding alternate supply and working with the FDA months after the hurricane. The lesson? Now is the time to be proactive.

Train, Train, Train. As quiet descends on the supply chain --a shift in consumption for some supply chains and the shutdown of businesses-- use this time to train employees on supply chain basics.

Supplier Development. Many suppliers will not make it through this business downturn. Reach out to suppliers and find out how your company can help. While the traditional supply chain pushes cost and waste backward in the supply chain, companies that are better at supplier

development can align resources to try to improve the health of downstream suppliers.

Clean-up Data. Let's face it, in most of our supply chains, planning master data (cycles, lead times, conversion rates, and yields) are not correct. Resources are tight. Use this time to focus on data clean-up.

The Turnaround Will Take a Village

I am posting a podcast tomorrow of a company that saved ten million dollars by rationalizing materials based on the redefinition of demand and the clean-up of planning master data. The goal is to be sure that the right products get to the right place in the time of need.

Let me end with a story. In the depths of the 2007 recession, DuPont asked for time to discuss the market with their lead economists. I laughed because I sat a the BACK of my economic courses at Wharton (not the best student), and the request by seasoned economists was humbling. The problem for DuPont was that demand latency for their product was seven months. (Time from consumption to order translation by DuPont.) As a result, the DuPont order signal was seven months out of sync with the market. Bad news travels slowly in an organization, and good news travels quickly.

As sales started to slow, DuPont, due to investor relations issues, did not slow production. As a result, the company built inventories and then had to shut down plants. The economist's question for me was, "*Is the economic recovery going to be a U, a V or a W?"* As they asked the question, I laughed. My answer was, *"While I am flattered by the question, why are you asking me, when you have access to market consumption data and market*

indicators? Why not use market data versus order data, and sense this yourself?" The room was quiet.

Good luck as you work through the pandemic response. Focus outside-in and use market data and then realign the supply chain.

When the World Turns Upside Down with COVID-19

I live in York County, PA. Recovering from COVID-19, I slept as the governor placed the county under the *"stay at home work order."* Gradually, my neighborhood is settling into the reality of the shelter in place order.

Under quarantine from the illness, and isolated from the outside world, I depended on Instacart for groceries for the last two weeks. Order-after-order returned without flour, toilet paper, and eggs. Each order averaged a 45% shortage on an item fell level. (I know, even in sickness, I am a supply chain geek. Inventories were updated on a batch basis and did not reflect actual shelf availability.)

In the United States, we are bracing for the APEX. I am lucky to work from home, and my body is successfully fighting the virus. I give thanks. My symptoms are mild. Today, I put on a nice shirt along with a pearl necklace

and drop earrings for a client's zoom meeting. My hair is long, and I grimace in the mirror that my gray roots show, but work goes on.

Reflections

While many label the COVID-19 as the "Chinese Virus." The label is a misnomer. China only shut down the Hubei Province with 58.5M and the outlying areas with a community of 140M people: representing approximately 10% of China. Taking strong measures, the Chinese government, through testing and isolation, and what many would consider draconian measures, squelched the Wuhan outbreak. (One of twenty-three provinces.)

The problem in the United States is far more reaching. We are facing a pandemic spread across fifty states with a US population of 329M. By definition, within the country, we have no borders. Without testing data, we cannot ascertain the steps to take to contain the spread. Healthcare professions recommend a three-prong approach: testing, social distancing, and sourcing medical supplies. The problem? Each has supply chain challenges. Day-to-day, we are living the challenges of a supply chain risk management case study—anxiety reigns.

The first hurdle was testing. The design of the testing supply chain was not equal to the challenge. Kit availability was the first hurdle. I experienced this first hand. It took me four days to get a COVID-19 test followed by seven days to get the results. I learned that I was sick when I was getting well.

Shortages riddled the testing processes. First, it was the single-sourced swab from Italy; then, the issue was protective clothing followed by a lack of reagents. As a result, we don't know how many US citizens are affected without testing. The data is critical for healthcare models.

I am a supply chain gal. My goal in this post is to write for the business leader operating the supply chain.

Recommendations:

I have been actively interviewing supply chain business and technology leaders on my podcast series, Straight Talk With Supply Chain Insights, to help supply chain leaders. As I learn, I share these with you. Here, I share my five insights.

Start With Demand. Demand is anything but typical. Traditional models predict market sales based on history. Today, through this pandemic, history is not a good predictor of demand. Instead, companies need to develop outside-in models to analyze patterns. The good news is that advanced analytics can help. Through the pandemic, companies will quickly learn that the customer order is a weak signal to understand market potential. Demand patterns have fundamentally changed in all channels. As a result, inventories, manufacturing plans, and supplier purchase orders are wrong.

Let me explain. During this disruption, waiting on the order puts your company on the back foot, reducing agility. For example, in the consumer goods supply chain, shelf purchases are first translated to warehouse withdrawal. When inventory levels in the warehouse fall below minimal stock targets, the manufacturer gets an order based on historical demand. In rising demand, this process will continually understate the market requirements. In parallel, when demand is falling, the order will overstate the market need. Instead of aligning the supply chain

to order, focus outside-in, and build processes to operate market-to-market. (Use channel data and market insights, and model sourcing strategies based on consumption data.) Batch transactions, multiple steps, and data latency increase the bullwhip effect. What to do? Eliminate data latency, decrease the bullwhip impact through the use of market sales data. Anticipate and expect a shift in baseline demand and shifts in buying behavior.

As a result, walk away from traditional demand planning processes. Find the market indicators that best predict demand for your business.

Manufacturing Dependent on Suppliers. Today supply chain discussions are headline news. As we attempt to manufacture ventilators, the country will quickly learn that manufacturing is not a light switch. Ramp-up takes time. Assembly is a relatively easy step in the supply chain.

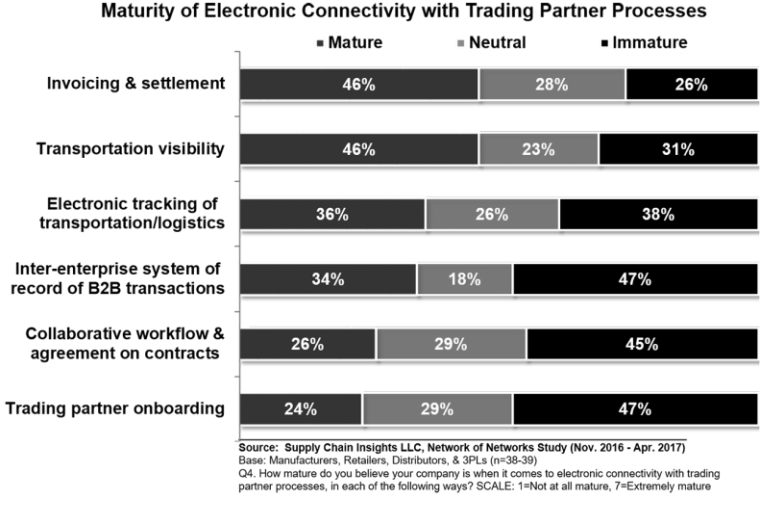
The constraint is sourcing. There is a dependency on suppliers (critical electronic boards, pumps, valves, and medical-grade hoses), and in times of burgeoning demand for items like ventilators, parts will be the constraint. It is great to see that we are now air-lifting the medical-grade parts from China on commercial flights and working through the registration and approval processes to move the parts across borders. (There are many regulations in the medical device supply chain that prevent cross-border shipping in normal conditions.)

Only thirty percent of companies know the location of their second and third suppliers. As companies scramble to meet the shifts in demand,

expect shortages in areas you would never expect. What to do? Map your supply chain. Understand the location of your supply chain tiers and understand what else they manufacture and how shifting demand will impact your operations. Deploy supplier development teams to help.

Border Friction. Group Buying. B2B Connectivity. Sourcing managers will have many sleepless nights. Usually, one-in-three purchase orders change. Today, it is 85 percent.

Figure 5.3. Current State of Business-to-Business Connectivity



Portals and spreadsheets are insufficient because they lack a system of record for synchronization. A robust business-to-business sourcing backbone source is needed quickly. Invest in visibility by turning-on a cloud-based platform to track purchase orders, purchase order changes, Advanced Shipping Notices (ASNs), and receipts. The changes will be too many to track manually.

Without automation, tracking inbound materials will be impossible. As shown in Figure 5.3, companies are better at invoicing and settlement than electronic tracking of transportation and the sharing of inter-enterprise data.

Rationalize Inventories. With the shifts in demand, most companies have the wrong inventory. Do an assessment based on demand modeling and adjust mix models. Push out inventories based on demand patterns and change purchase orders to maximize resources through the pandemic.

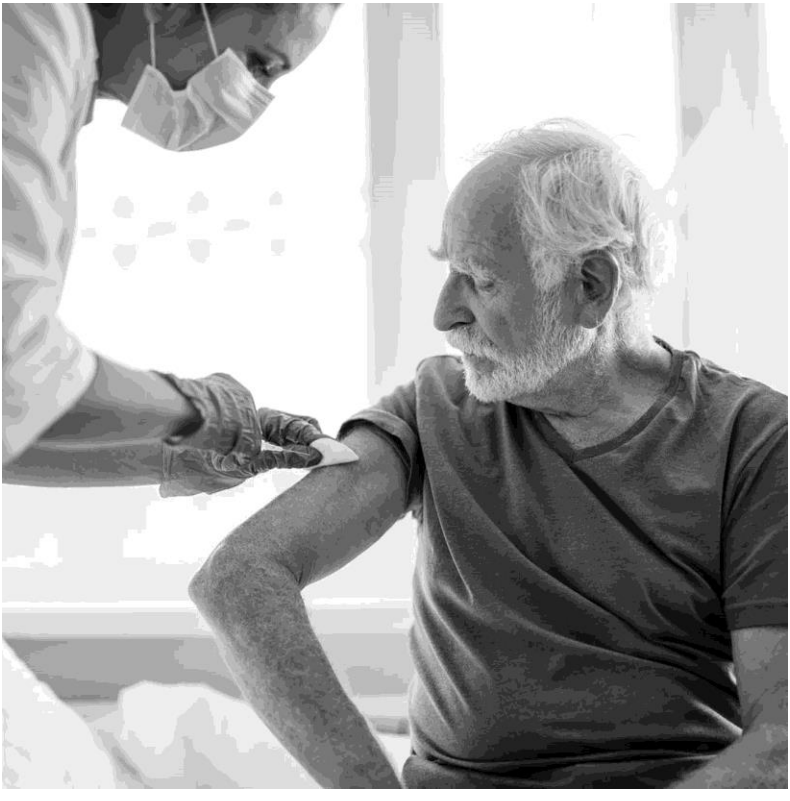
Simplify the Business. I laughed to see toilet paper on sale on Instacart when there was no inventory. History drives most trade promotions. Last week, not only was there no toilet paper on the shelf, on suppler was offering a buy one/get one free promotion. The reason? It was an annual promotion.

These are different times. Consider rethinking promotions and price actions in the channel to simplify demand sensing. Try to align with market demand quickly.

Good luck. Stay safe. Take care of your employees and focus forward—leadership matters. Supply chain expertise is in short supply.

I look forward to getting your thoughts.

The Global Supply Chain Needs a Shot in the Arm



My left arm hurts.

I have been on a waiting list to get the shot for three years. This week, I rolled up my sleeve and got the Shingrix vaccine. Glaxo SmithKline introduced Shingrix in 2017, but shortages prevailed.

I paused when the pharmacist asked, *"Do you mind which arm gets the shot?"* I replied, *"Isn't it all the same?"* However, two hours after getting the shot, my arm

throbbed and turned red. I now understood. Shingrex has side effects. On the next day, I was glad that it was the left arm, not my dominant right arm. It hurts.

In Search Of A Vaccine

Yesterday, as I struggled with the side effects of fever and chills, I reflected. I am 66 and became eligible for the Shingrix shot at the age of 62. For three years, my name was on the waiting list at three different health care facilities. None called. During the pandemic, demand fell, and it was now available.

The global economy rebound from COVID-19 hinges on the discovery and manufacture of an effective vaccine. The promise is eighteen to twenty months, but there are no promises. However, supply chain leaders understand that drug discovery, manufacturing, **and distribution** are **all** necessary to deliver the vaccine to a willing arm.

The measles vaccine took four years in 1968. Development and distribution, as any supply chain leader knows, are two different topics. Return to business as usual hinges on the introduction of a vaccine. My take? The intention is high, and the learning will be rapid, but it will not happen soon. As a result, the supply chain, as we knew it is dead. The approaches and technologies deployed before March 2020 are now legacy applications. Together, we need to go to a place that we have never been before in the evolution and innovation of supply chain processes.

The problem is that there is no clear supply chain leader in the pharmaceutical industry. With a typical operating margin of more than 20%, the sector lags in other sectors' distribution capabilities. The reason? The high margins of the industry make the supply chain as a discipline less critical.

There has never been a winner in the pharmaceutical industry in the eight years of the Supply Chains to Admire analysis. The companies are just not good at managing inventories and orchestrating distribution strategies. The industry planning team expertise lags the consumer goods and hi-tech sectors. The global supply chain recovery depends on a vaccine, but I expect the distribution cycle to be longer than the discovery phase. In Table 5.1, we share the Supply Chains to Admire 2019 analysis.

Table 5.1. Supply Chains to Admire Analysis for the Pharmaceutical Industry

INDUSTRY: Pharmaceutical								
COMPANY INFORMATION		IMPROVEMENT		PERFORMANCE			VALUE	
NAME	2019 REVENUE (M$)	SUPPLY CHAIN INDEX	GROWTH (Year Over Year Revenue)	INVENTORY TURNS	OPERATING MARGIN	RETURN ON INVESTED CAPITAL	PRICE TO BOOK	MARKET CAPITALIZATION
			2010 - 2019					
Abbott Laboratories	31,904	25	2%	3.39	0.12	8%	2.87	75612
AbbVie Inc.	33,266	4	9%	4.25	0.31	17%	15.75	86074
Acura Pharmaceuticals Inc.	2,657	33	244%	0.50	-14.53	-102%	3.17	56
Alexion Pharmaceuticals Inc.	4,991	9	30%	0.96	0.33	11%	6.84	24471
Allergan PLC	16,089	32	31%	2.43	-0.05	0%	1.78	48657
AmerisourceBergen Corp	179,589	12	10%	13.74	0.01	14%	7.44	15654
Amgen	23,362	13	5%	1.34	0.37	11%	5.29	100239
Aspen Pharmacare Holdings Ltd.	2,739	28	13%	1.93	0.25	9%	1.18	3662
Astellas Pharma Inc.	11,783	19	2%	2.32	0.16	12%	3.52	42342
AstraZeneca PLC.	24,384	17	-3%	2.40	0.17	12%	4.96	81778
Bayer	48,749	8	2%	2.24	0.12	9%	2.86	85588
Biogen Idec Inc.	14,378	5	13%	1.58	0.41	21%	5.01	50249
Biomarin Pharmaceutical Inc.	1,704	10	18%	0.59	-0.16	-4%	5.96	11388
Bristol-Myers Squibb Co.	26,145	18	4%	3.65	0.21	12%	5.25	88228
Catalent Inc.	2,518	3	5%	6.35	0.12	2%	3.06	2816
Daiichi Sankyo Co Ltd	8,386	22	1%	2.01	0.13	6%	1.44	15650
Eli Lilly and Company	22,320	15	0%	1.63	0.23	18%	9.71	79418
GlaxoSmithKline	43,099	21	0%	1.96	0.20	15%	67.53	104990
Johnson & Johnson	82,059	24	3%	2.97	0.26	15%	4.22	279369
Mallinckrodt PLC	3,163	20	7%	2.96	0.11	-2%	0.82	3172
Merck and Company	46,840	2	7%	2.75	0.18	9%	4.01	154913
Mylan NV	11,501	29	9%	2.64	0.13	4%	2.86	16064
Novartis AG	48,677	15	1%	2.51	0.20	11%	2.63	183052
Novo Nordisk A/S	18,296	7	7%	1.27	0.40	64%	14.81	106678
Perrigo Co PLC	4,837	26	13%	3.38	0.15	3%	2.74	12595
Pfizer, Inc.	51,750	13	1%	1.58	0.28	11%	2.81	195977
Regeneron Pharmaceuticals Inc	7,863	30	43%	1.23	0.19	16%	10.07	31221
Roche Holding	61,869	5	3%	2.30	0.29	22%	10.68	204910
Sanofi S.A.	42,128	23	0%	1.68	0.21	7%	1.64	113038
Teva Pharmaceutical Industries Limited	16,887	27	2%	2.00	0.21	1%	1.48	34059
United Therapeutics Corp.	1,449	30	16%	1.74	0.40	21%	3.26	4913
Vertex Pharmaceuticals Inc.	4,163	11	111%	3.50	-0.57	-10%	16.56	25541
Zoetis Inc.	6,260	1	9%	1.31	0.23	11%	13.25	22725
MEAN WITH OUTLIERS			19%	2.64	-0.3	8%	7.44	69851
MEAN WITHOUT OUTLIERS			8%	2.29	0.20	9%	5.56	69851

New Problems Require New Solutions

Today's supply chain processes are functional. They are seldom cross-functional to optimize source, make, and deliver together.

Enterprises respond, but they can't sense market shifts at the speed of markets. The implementation of marketing and sales technologies made sales and marketing

processes more efficient, but not market-driven. The difference? The issue is the time required to sense and adjust to market shifts. The average demand latency for a grocery retailer is eighteen days, three weeks for consumer manufacturers, and six-to-nine months for chemical companies. While we have played the beer game many times and laughed about the bullwhip effect, the investments over the last decade made it worse, not better. We focused on integration, not data synchronization, and interoperability.

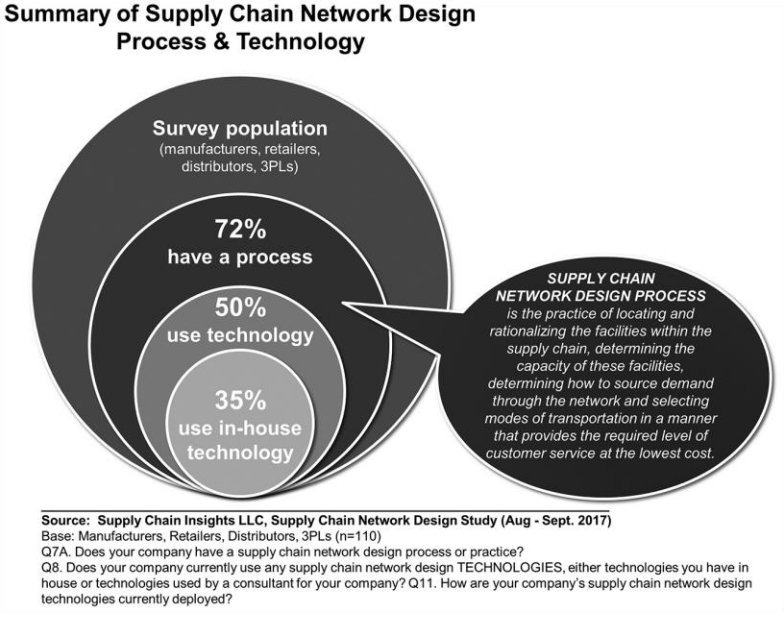
We need to face facts. The focus on functional automation with an emphasis on efficiency amplifies the bullwhip effect. Companies are not good at sensing market consumption at the speed of business. Without a vaccine, the supply chain becomes increasingly local. As a result, investments need to shift from transactional system automation to sensing and agile automation. Building sensing capabilities requires partnering with smaller and innovative technologists. Here I make the argument:

The Hammer and the Dance. Prepare for a different supply chain. Without a vaccine, regions will slowly resume activities. The dance will start slow and then become faster. However, when the virus resurfaces, the hammer will fall, and shutdowns ensue. Traditional supply chain approaches broad-brush market replenishment. Without a vaccine, the next two years will be all about doing local well. There will not be a new normal. Instead, expect constant change. Design agile supply chains. The impact? There are many. Traditional demand planning based on historical order patterns is obsolete.

Recommendation. *Build a data lake and implement demand sensing technologies to drive replenishment based on local market conditions. Redefine tactical and operational demand based on market inputs. Use network*

design tools to redesign and align continually. Retrain employees and design outside-in practices.

Figure 5.4. Network Design Process Overview



Factory design did not include the criteria of social distancing. Let's face it. By definition, factories are not COVID-19 friendly. Improving factory design is not an easy fix. In the long-term, expect redesign through robotics, pattern recognition, cameras, and 3D printing. In the short-term, expect disruption.

***Recommendation**. Localize supply—design inventory strategies to include buffer strategies. Simplify manufacturing scheduling to limit last-minute changes.*

Constants are no Longer Constants. Prepare for Constants As Constraints. I grew up managing supply chains in a world where containers were readily available, airline bookings were costly but possible, and trucking a discussion on cost, not availability. We are

entering a world where logistics availability is fragile: we cannot take it for granted. Companies will scramble for outside warehouses and container storage as warehouses fill with the wrong products (items ordered and sourced before the shutdown). As border crossings become longer, often requiring quarantines, truck transits become more variable. In the post-COVID-19 pandemic, the logistics assets that we take for granted become a constraint. Containers and warehouses will quickly fill with products that are not selling, and logistics providers will struggle with illness in the trucking industry.

Recommendation. Be a good shipper. Share projections for demand and quickly unload containers—track lead times and update planning systems with new data and trends. Use telematics data to track deliveries and update customers. Plan on variability and long lead times. Expect that this recovery is anything but business as usual.

Innovate With Innovators. The principles of traditional planning technologies fall short in helping companies through recovery. For example, how do you optimize chaos? What is the role of order pattern recognition when the order no longer represents demand? Instead, partner with data scientists to sense local requirements and realign supply. Expect for this technology to be throw-away, but essential for short-term business continuity. Do not waste time with a Request For Proposal (RFP).

Today, there are no clear answers. Instead, consider the investment in new forms of analytics to be a business essential. (In parallel, stop the work on traditional demand and supply planning. The fundamentals are just wrong to help through the recovery.) Focus on demand sensing, what-if analysis, and the alignment of demand and supply based on agile strategies. Explore new forms

of analytics with technology innovators. However, don't expect answers to come from traditional planning providers. Planning in the recovery is not business as usual, and conventional planning technologies aren't up to the challenge. I expect that we will be doing the local dance for the next one-to-three years.

Design Now For Local. When There Is A Vaccine Think Global.

I was on a call last week with a group of logistics professionals discussing the recovery. The Canadian legislative representative painted a picture of a global recovery. It is tough when you follow as speaker when you have a different view. I think that this recovery is anything but global. While testing drives the cadence of the local supply chain, the restoration of the global supply chain hinges on the availability of a vaccine. I hope that the pharmaceutical companies build powerful supply chain capabilities and that it isn't as problematic as getting the Shingles shot.

My left arm is ready…. Bring on the vaccine. Until then, let's gear up to do locally well while adjusting to ever-changing rhythms and cycles. In this new world, no one knows the answers. If someone says that they do, show them the door.

Time to Turn Our Backs on Traditional Supply Chain Processes?

Today, I am reflective.

My last post on the Supply Chain Shaman blog was forty-five days ago. I spent the month of March trying to help business leaders mitigate the impact of the pandemic. My first focus was on China sourcing. Then it was the redefinition of the supply chain for the global shutdowns

Sick with the virus; I spent my energies writing and moderating podcasts. As the economy shut down, I sunk in a pit of despair. Sadly, the economy fell to the impact of the inevitable community spread.

I firmly believe that the rebound of the economy requires reliable supply chains, but to make this happen, we need to turn our backs on historical practices and innovate new ways of working.

Swimming Up Stream

I liken the COVID-19 pandemic containment for the economy to a medically induced coma. Shutdown quickly to prevent the spread of COVID-19, shelter-in-place orders rapidly transformed work into essential and non-essential work environments. As the world for non-essential workers moved to on-line meetings, conference calls, and uncertainty, essential workers redefined the workplace to mitigate risk. As we moved into our new roles, for all supply chains, demand shifted. No doubt about it, we are characters in a supply chain case study searching to define a new normal. We will not find it anytime soon.

Today, we find ourselves as unwilling participants in the middle of a risk management case study. News coverage showcases the differences between logistics and supply chain management. An example is a focus on moving and buying ventilators without assessing critical parts and skilled therapists' availability. Another example is testing. What good is a test unit when there are not enough swabs or reagents? Why should states be in a bidding war for test kits? Why is there not a standard for testing? Twenty-to-thirty percent of the COVID-19 tests produce false negatives. I could go on and on, but I won't. I will leave this for the scientists. Let's learn the lessons and apply it to supply chain management.

Time to Know. Time to Act.

What can we learn? For me, it is heightened respect for **time**. When did we know what? How quickly could we respond? The virus moved quicker than the ability to test. (For example, I believed that I contracted the virus on April 2nd, and received my results on April 17th. The illness, thankfully, receded. As a result, I got better before I got the test results.)

The testing supply chain—reagents, pipettes, and public health contact tracing—could not keep pace with the speed of infection. The healthcare value chain was slow to respond—the majority of Personal Protective Equipment (PPE) was in Chinese warehouses. (China was the source of over 90% of PPE.) I gave thanks when the Patriots jet—championed by Mass General and Robert Kraft (owner of the Patriots)—landed in Boston with a million masks. Operation Air Bridge by the US Government was also a welcome relief.

As I watch the news and work on client documents in my quarantine, I try to manage my emotions. It is tough. I am sure that it is hard for you as well. I continue to think about the COVID-19 recovery and how to help clients. Here I share my thoughts.

Restarting the Supply Chain

Will the start-up of the supply chain be a reboot or a need to reformat? Let's use your computer as an analogy. While a reboot of a computer restarts the machine to eliminate the in-memory processing, a reformat erases everything on the computer and starts again. For many supply chain leaders, the plan for the supply chain needs to be reformatting, not a reboot. Let me make my argument.

The supply chain restart will be in waves. It will take time. The shutdown was quicker than is possible with the reboot. To adapt, I recommend that companies form two groups:

- **Operational/Business Continuity Group**. This cross-functional group (sales, procurement, manufacturing, and distribution) is an active team to manage the day-to-day issues and exceptions in the supply chain. The goal of this team is to minimize disruption.
- **Recovery Team.** The design of the second group is to analyze and reformat the supply chain for economic recovery. The design of this post is to help this team.

Steps To Take

To drive the reformatting process and restart critical processes, don't accept the status quo. Continually question what you do. Start the focus on these six steps:

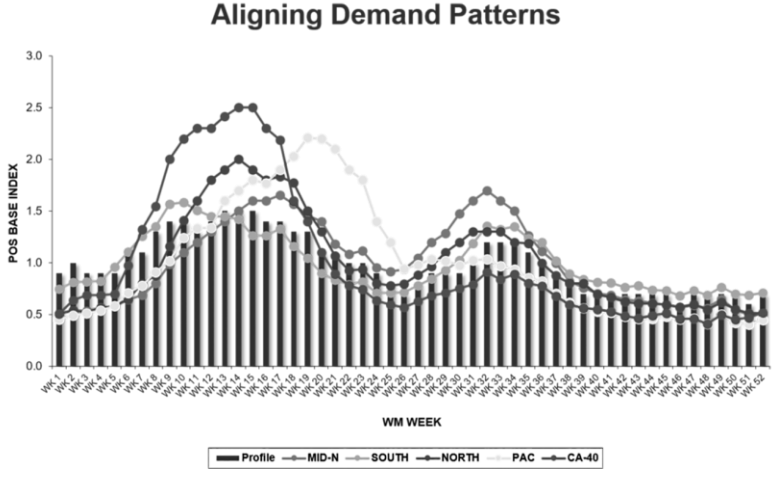
Step #1. Start With Demand. Get Good at Sensing the Market. A double whammy—economic downturn and the pandemic—are shaping demand. Community spread will drive regional differences as regions move through public health crises. Historically, the supply chain focused on aggregate market sensing with a broad-brushed replenishment. Historic replenishment practices are no longer be sufficient.

Replenishment will vary more than ever market-by-market—focus planning models on markets. Throw away the big brush. As an illustration, in Figure 5.5, we show a market-by-market planning model by a sinus drug manufacturer. This type of

planning needs to be deployed by all consumer manufacturers.

Be open to different forms of modeling. One company that I work with is using COVID-19 levels in sewage to plan recovery curves. Another input for a model is looking at hospital bed utilization to predict market baskets. Economic stimulus check disbursement will drive other models. Experiment to find the right data set to evolve regional models.

Figure 5.5. Model Local Market Trends



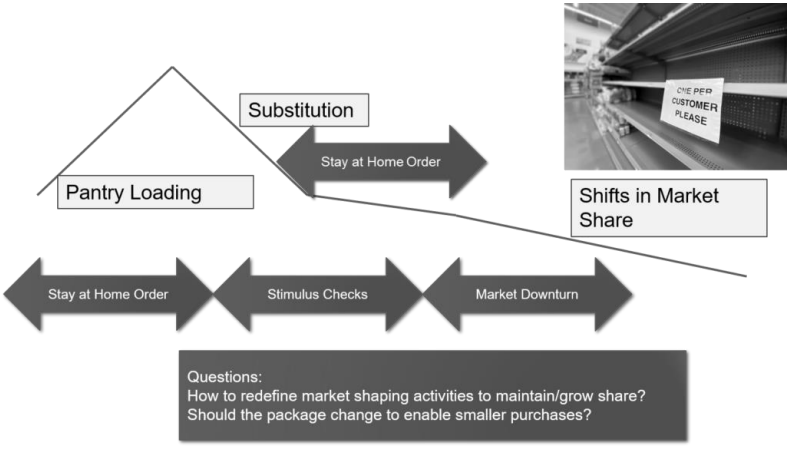
For some, the recovery will be V-shaped: fast and furious. There is pent-up demand for teeth cleaning, hair cuts, and elective surgery. For others with one out of ten unemployed, demand will plummet. Bottom line? Don't expect order demand to be predictable. In the shutdown, demand surged for toilet paper and guns. In the upturn, demand patterns are not apparent. For example, how long will it take for the restaurant and food distribution

supply chain to restart? The airline industry? How do we help the healthcare supply chain reach a new normal?

The answers are mostly unknown. Fundamental to our reformatting of supply chain capabilities is reducing the time to sense channel consumption. Demand latency reduction—time to detect market consumption—will be vital to the supply chain recovery. As a result, companies need to realize that historical processes are not adequate. The order is no longer a good proxy for demand. And, in consumer products industries, the latency of syndicated data is deadly.

Figure 5. 6 is an example of a potential market signal. The response is a series of ups and downs. The demand drivers will be anything but constant.

Figure 5.6. A Sample Demand Pattern for Consumer Goods



In the ramp-up, the pre-pandemic assumptions are no longer valid. Expect border friction and logistics to be an issue. Border crossings will be challenging, and the infrastructure for the ocean and air freight tumultuous. The only certainty is the level of uncertainty with

continued surprise. Historic assumptions are no longer valid.

The answer? There are no easy answers, but here are three actions to take to get started:

Action #1. Implement Demand Sensing. Build outside-in processes to use market data/consumption insights with minimal latency. Translate this data into decision support technologies. (For example, abandon using logic to translate order signals into Distribution Requirements Planning (DRP). Instead, use demand sensing technologies to detect patterns with minimal latency into inventory requirements. Consider technologies like 1010 Data in consumer goods in conjunction with demand sensing technologies to replace rules-based consumption of demand into an inventory signal.

Action #2. Simplify Product Portfolio. The longer the product tail, the more difficult it is to translate demand. A simplified product portfolio is easier to manage in times of uncertainty.

Action #3. Minimize Demand Shaping Programs. During the quarantine, I laughed at the recent Instacart add for a buy one get one (BOGO) free promotion for toilet paper. I would pay a premium for one roll. A BOGO with an empty shelf is nonsense.

Simplify demand translation by eliminating trade promotion and price management programs. Instead, focus on the market presence on contactless forms of shopping. During my quarantine, I was shocked at how few companies had great descriptions and images on Instacart. Form teams to improve on-line presence.

Action #3. Redesign? As the economy shifts, restarting the supply chain requires a redesign. The global pre-

COVID-19 supply chain was long, outsourced, and complicated.

Historically there was a narrow focus on efficiency. The lowest cost drove decisions. This design is not sufficient for the upcoming time of uncertain demand. As a result, evaluate inventory buffers, location of inventories, and the need for push/pull decoupling points.

What To Do?

As you formulate the next steps, consider these recommendations:

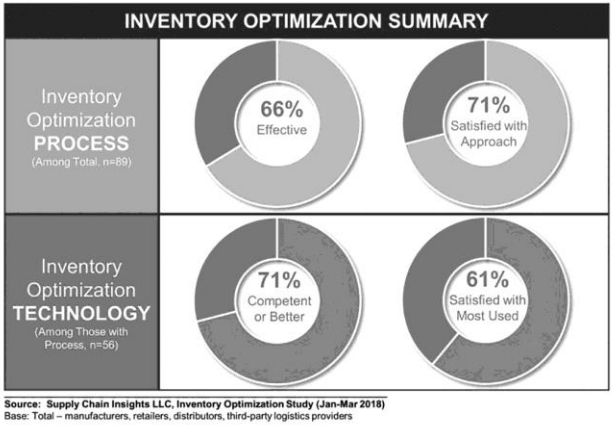
1. **Build a Master Data Planning Database for Planning.** Build a simple database to track lead time and border crossing shifts. Use this data to improve planning.

2. **Drive Consensus Through Visualization of Simulation and What-if Capabilities.** The supply chain is a complex, non-linear system. As a result, the trade-offs are not clear, and Excel spreadsheet modeling hides the complexity. Build simulation models to understand the intricacies and assumptions for the restarting of the economy, and bring them into the board room to inform decisions. Tie this modeling to supply chain execution.

3. **Evaluate Inventory Positions.** Evaluate inventory health weekly. One thing will be sure on start-up: the warehouse's current stock will be an incorrect mix. Recommendation? Don't depend on historic Distribution Requirements Planning and Materials Requirements Planning (DRP and MRP) signals. Translate regional demand models into

inventory mix health weekly through the recovery. As shown in Figure 5.7, while 2/3rds of companies felt that their inventory technologies were effective before the pandemic, I forecast that lesss than ten percent will find the same approaches to be effective through the market restart.

Figure 5.7. Pre-pandemic Inventory Optimization Satisfaction



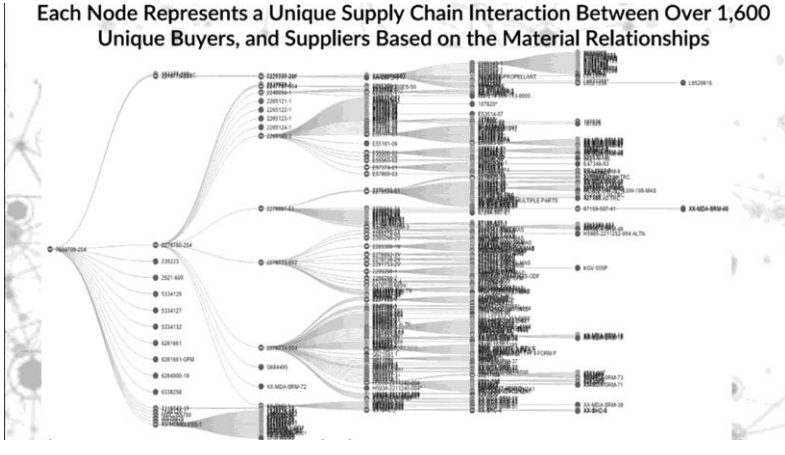
4. **Improve Visibility/Eliminate Black Holes. Document your supply chain black holes. Redefine Visibility.** Visibility means different things to different people. Put butcher block paper on the wall and draw your supply chain from the customer's customer to the supplier's supplier and then start to document your black holes or areas where you cannot see supply chain data at the speed of business. Explore alternative analytics and data sources to eliminate black holes.

5. **Focus on Safe Manufacturing.** While planning and operational teams can shelter at home,

manufacturing groups do not have this luxury. Help the organizations to improve health and safety by minimizing change-overs and schedule changes. Focus on schedule reliability and the delivery of a feasible plan. If you have finite scheduling technologies, use it. Move away from OEE to schedule adherence. Focus the planning team on minimal schedule changes and the operational team on first-pass yield and schedule adherence.

6. **Manage Supply. Map End-to-End Supply Networks.** Early into the downturn of the economy, we are drawing down inventories. With many manufacturing plants shuttered, map the supply chain to understand the intricacies in your supply chain. A shown in Figure 5.8, supply chains are complex with multiple suppliers at multiple nodes. Recognize it as a network. For this client, there are over 1600 suppliers. (Notice the number in second and third-tier relationships.)

Figure 5.8. Supplier Mapping



Use your supplier development teams to contact each supplier to understand the current state of asset utilization and plans for the start-up. Map the time for recovery. Expect it to be variable. Use ranges based on supplier feedback. Input these times into the supply chain models to understand the bottlenecks.

As you do this work, evaluate options like alternate sourcing, bill of materials, and the discontinuance of products—work cross-functionally to align supply with demand.

Help suppliers to be financially viable. Back away from the honorous payment plans and invest in recovery. Use your supplier development teams to have the right conversations with suppliers and set-up weekly calls to understand the health of the supplier base. Take ownership of your demand signal and hold the organization accountable for improving supplier flows. In the recovery, you will be competing with many other manufacturers for supplies—relationships and cash matter.

Summary

These are my thoughts. I welcome your ideas.

Stay safe. Just as data and science are the best paths to improve public health, they are also the best prescription to drive supply chain effectiveness in these uncertain times. I firmly believe that those wed to historic practices will fail.

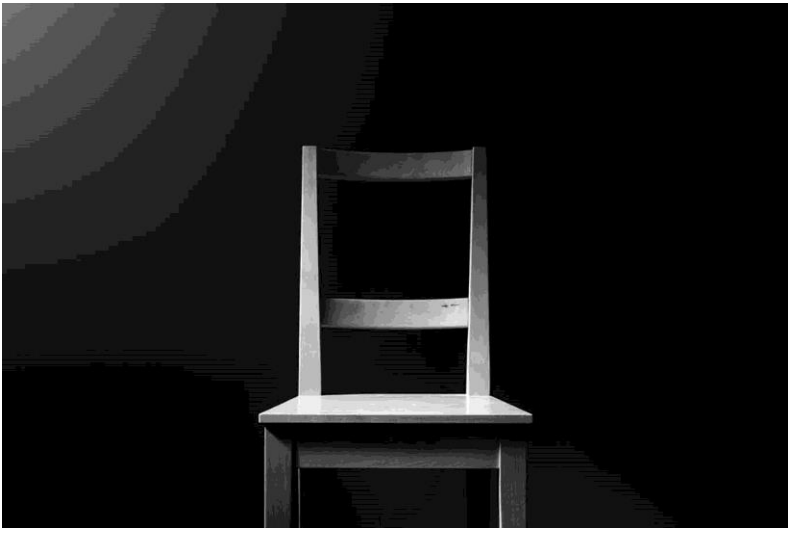
Section 6

Redefining Logistics

Redefining Logistics

Logistics processes are inside-out with a focus on reducing costs for the company. However, the process of logistics, by definition, is dependent on a network. However, network automation is not today's reality.

The Empty Chair



Across from me sits an empty chair.

Sadly, there are many empty chairs. Five people canceled at the last minute due to travel restrictions.

Today, I am facilitating the Network of Networks share group in Antwerp. The reason the seats are empty? While all supply chain leaders are interested in building value networks, only a few companies are actively investing in building data architectures to enable the extended supply chain. As a result, while there is a desire to learn, the interest is higher than plans to execute. Here I want to share my perspective after three years of facilitating the group.

People come and go in the group based on company dynamics. The network of network share groups has included manufacturers like BASF, Berry Plastics, Dow, Grace, Evonik, Intel, MARS, P&G, and Schneider Electric.

Through the effort, I have learned a lot. I give thanks to my readers for helping with this experience.

A Review of History

The words *end-to-end supply chain* easily rolls off the tongues of supply chain leaders. The definitions are usually different. Where efforts start and end vary.

The visions are more far-reaching than the execution. While companies articulate the words end-to-end, the focus is usually on executing a four-wall strategy.

While we bandy the words *end-to-end in our conversations*, current technology and process innovation end at the enterprise's doorstep. The reality? The goal is an efficient enterprise. The problem? A productive enterprise is not sufficient.

In contrast, my vision of end-to-end is a supply chain that operates seamlessly and bi-directionally from the customer's customer to the supplier's supplier crossing over the processes of sale, plan, source, make and deliver. In my vision, the process flows are multi-tier.

My goal with the group is to make this a reality. There are many obstacles:

> **Focus.** Current IT investments are four-wall centric. ERP upgrades are sucking up the energy of the enterprise. Unfortunately, ERP is an enterprise platform that is not suitable as a value-chain connector. Companies are so busy working on ERP that there are no resources or monies to tackle building value networks. After all, an organization just has so many hours in the day. As a result, ERP investments are an opportunity cost

for the company to drive innovation and build value networks.

Confusion. Everyone uses the term network. Few ask what it means. When I was a Gartner analyst in 2001, there were over 120 B2b platforms. Then we termed them trading exchanges. Today, two decades later, only 10% of these initial start-ups survive. With the evolution of VANs and trading exchanges at the turn of the decade, Electronic Data Interchange (EDI) became the workhorse of the industry to move data between companies. (EDI is an electronic interchange of business information using a standardized format; a process that allows one company to send data to another company electronically rather than with paper.) In an ideal state, trading partners work together to drive value in networks.

Shifts in Technology. Business leaders use terms like business networks, a supply chain operating network, value-added networks, portals, marketplaces, control towers, and network visibility interchangeably. However, they have very different definitions. The discussion becomes even more confused with the introduction of new technologies of blockchain, the Internet of Things (IoT), and cognitive computing.

Organization. Organizational capabilities to build value networks are low. One of the issues in building value networks is clear accountability. Within a typical organization, there is usually an EDI analyst in B2b commerce within IT, but there is seldom a supply chain leader driving capability building. These roles are far and few between. Even when there is a digital supply chain initiative, there is rarely a focus on building

effective networks. As a result, the EDI analysts feel the pain but lack the power to drive improvements. Many are retiring. Employees are attempting to pass the baton but struggling to find a replacement.

Dance with Shiny Objects. Supply chain leaders love shiny objects, and process excellence is a tough slog. Buying technology is easy. Making it work is not. The market is fraught with technology vendors selling snake oil.

For over a decade, I have written about the building of value networks. My frustration? The focus today is continued investment in the traditional applications-- legacy applications with those old-fashioned three-letter acronym names like ERP, CRM, APS, and SRM.

Rethinking architectures is an opportunity cost for 98% of companies. These legacy architectures are not capable of connecting to drive value network interoperability.

Why Is This Investment Important?

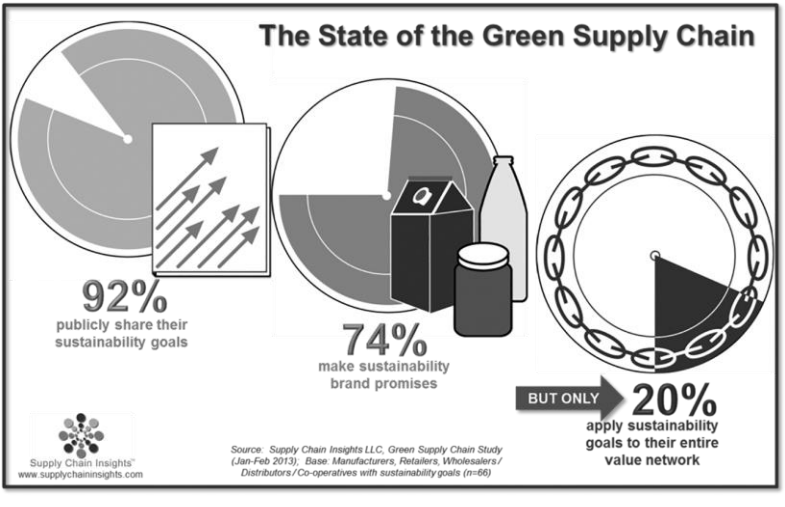
So, if you are drinking your coffee, you might ask, *"Why should I care?"* The answer is threefold:

1. **Outsourcing Increased.** External flows are more important. Over the last decade, this increased by 15% in manufacturing and 25% in transportation. Without automation, these outsourced operations are islands. Data moves manually through spreadsheets and sneaker-net creating errors and introducing latency.

2. **Results.** 95% of companies are stuck in driving improvement—efforts circle. Ironically, the most significant opportunity for companies to drive down costs and improve inventory lies outside the organization's four walls. Still, most companies lack the leadership to change metrics systems to drive outside-in innovation.

3. **Save the Planet.** As shown in Figure 6.1, 92% of companies have a corporate social responsibility document, 65% of carbon and waste lie outside the four walls of the organization; yet, only 20% of companies take responsibility for their extended network's sustainability impact.

Figure 6.1 Current State of Social Responsibility



What Have I Learned?

As I facilitated the Network of Networks group for the past three years, I learned:

Portals Are Ineffective. Many companies are investing in a dead-end street, termed a portal. A portal assumes that a trading party has the time and energy to use a portal. The issue? Portals lack a system of record. As a result, as business conditions change, there is nothing to track the shifts. While a portal sounds like a good idea, it is not scalable. Many clients that I work with have over one hundred portals to view all requiring work. This situation is untenable.

Integration is the Wrong Goal. Focus On Interoperability and Synchronization. While most leaders will state the goal as the integrated end-to-end supply chain, the business requirement is synchronization (harmonization and reconciliation of master data, calendars, and rules). The goal is seamless interoperability between trading partners with minimal latency.

Does this mean real-time? Probably not. Yes, speed is essential, but the goal needs to be the delivery of information at the speed of business. Not all processes are real-time.

ERP is the Wrong Platform to Serve as the Network Connector. The data model for ERP is enterprise-centric and inside-out. As a result, it cannot model network activity and move outside-in signals bidirectionally. Value-chain solutions require secure multi-tier process enablement. By definition, this is not the role of ERP solutions.

Cloud Is An Enabler, but Cloud Providers Are Not Coming to the Party. Technology providers like Kinaxis and Oracle, while championing cloud-based architectures, are not building value network solutions. I am fiercely trying to recruit

help from Google founders and Amazon. There is a need for new thinking.

Many SAPs. None Equal to the Mission. Each session that I facilitate usually includes off-hand comments about SAP Ariba. While I try not to let the group dwell on the gaps with the Ariba platform, the issues are painful for manufacturers. SAP ERP does not easily connect to SAP Ariba, and the Ariba solution is problematic. The first and crippling issue is the architecture. The Ariba architecture, originally designed as a portal technology, is a barrier to driving bi-directional interoperability. It is clumsy and complicated.

ISO 8000 Standards Promising. Low-level of Industry Understanding. Lots of Promise. Banking operates seamlessly using a routing number and account information. Within supply chain management, there is no equal. The ISO-8000 master data standard for the company identifier is the ALEI. The ALEI is the authoritative legal entity. DUNs numbers and the GTIN are proxy identifiers.

Our work with a major manufacturer with 40 ERP systems found that despite the organization's focus on managing company master data, they had a 30 % over-lap on supplier numbers preventing transparent accounting of price variance or tracking aggregate spend by a supplier for contract compliance. Switching to the ALEI ISO, 8000 standards cured the issue. However, it is not easy. A large manufacturer that we work with has 293 ALEIs. The average company with greater than 5B$ in revenue has more than 150 legal tax identities. In global corporations, tax-efficient supply chain strategies increased the number of

legal entities make the tracking supplier master data more difficult. The reason? There are far more entities for invoicing and payment than most supply chain leaders realize. If only it was as simple as banking.

Blockchain Not Ready for Prime Time. Even If It Was, the Business Process Is Not Ready. Blockchain technologies are advancing. The most common use cases are visibility within the enterprise across systems (like M&A), contract compliance using smart contracts to accelerate payment, lineage, and track and trace (an example is tracking the cleaning of vessels like tank cars or sourcing coffee), and multi-party verification. In our testing, we find that blockchain is expensive and lacks scalability. However, if we fix the technical issues, the supply chain multi-tier process is not ready for blockchain. The issue? Blockchain requires the democratization of data and the sharing of data across parties.

The development of multi-party processes involves trust. Unfortunately, despite decades of talk on collaboration, companies lack confidence. They are not ready to validate data on an immutable ledger. Companies want to elongate payables, not accelerate payment. Blockchain is part of the answer, but not a panacea to solving the issues of value chain architectures.

Venture Capital Makes the Market Riskier. In the past decade, the Value-added Networks (VANS) consolidated and Supply Chain Operating Networks received venture capital funding. Each investment weakened the technology market's ability to respond to the need to deliver value

chain architectures. To illustrate, let's examine the investments:

- Value-Added Networks: In the Van market, IBM purchased Sterling Commerce, Opentext purchased GXS (after the acquisition of Inovis), and True Commerce purchased Datalliance. This consolidation slowed innovation.
- Supply Chain Operating Networks: In the Supply Chain Operating Network market, Thoma Bravo purchased Elemica and GHX slowing commercial efforts and awareness campaigns. In parallel, Insight Partners invested in E2open. Shortly after the investment in E2open, the Company went on a buying spree of enterprise applications. (These application purchases are a head-scratcher. The solutions don't complement the E2open B2b platform, and it is like a collection of misfit toys diverting the Company's focus on interoperability.) Similarly, Infor purchased GT Nexus, slowing market penetration.

For the buyer, it is a tough market to navigate and understand.

Dependency on Service Providers Slows Progress. Many companies have outsourced supplier onboarding, payables, and transportation management. The greater the outsourcing within a company, the more significant the gap in current understanding of value networks and how to build capabilities. Service providers are not the answer to building value networks. Companies need to own their processes.

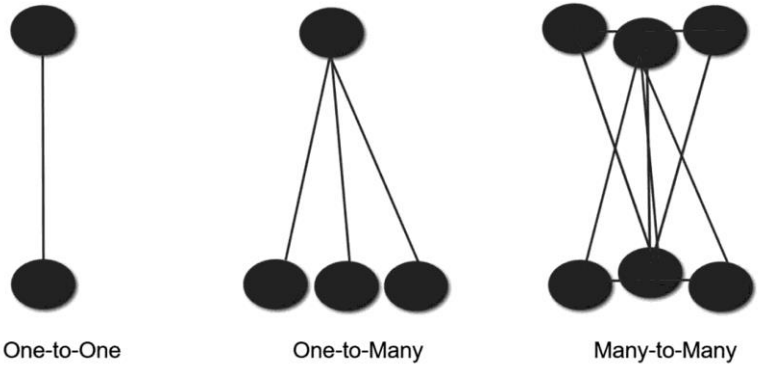
Interoperability Between Networks is Non-existent. There is no pathway forward to connect

the existing supply chain operating networks. Each operates as an island. There is no business incentive for the networks to work together to build interoperability. Why is this a problem? The current Supply Chain Operating Network strategy is an extension of functional processes and does not harness the potential value.

The scope of the networks is limited. No solution combines make, source, and delivery capabilities in a consolidated network. Similarly, the solutions are very industry-specific. The network requirements vary by industry, but if we are going to build effective networks, we need to have answers that embrace all industry sectors.

Network Definitions Confusing. Companies use terms like Value-Added Networks, Networks, and Supply Chain Operating Networks interchangeably. The term Value-Added Network typically describes an EDI provider. The connections are one-to-one.

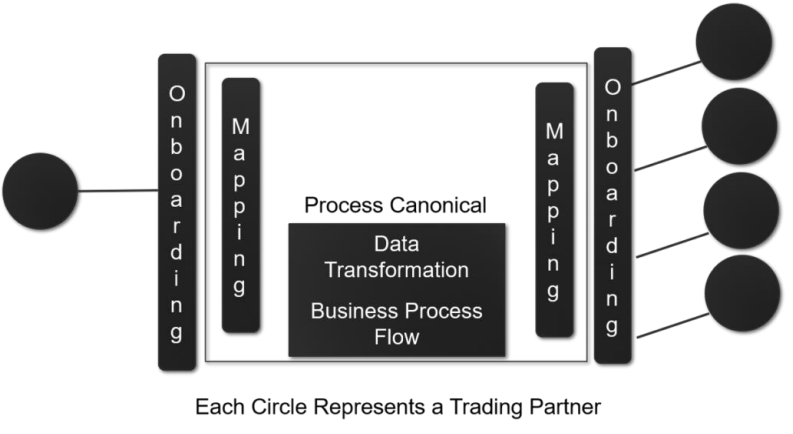
Figure 6.2. Network Types



The value-added capabilities within a VAN are for mapping and onboarding with limited data transformation. Data moves by batch processing. In contrast, a business network moves data for a specific purpose with limited data transformation.

In contrast, the Supply Chain Operating Network shown below has more robust mapping capabilities. The focus is on data transformation using a multi-tier data model.

Figure 6.2. Supply Chain Operating Network Definitional Model



In a Supply Chain Operating Network, data moves more frequently than in a VAN that is crippled by batch processing/job overhead.

My Recommendation?

Take your seat at the table. Own your network. In the future, networks will compete against networks. Build a competitive advantage.

Minimize the dependency on outsourced services and invest in Supply Chain Operating Networks. Pressure the Supply Chain Operating Network providers to drive interoperability and build multi-tier processes between networks. Do this even though it does not fit today's business models.

Make solving this problem an organizational focus. Put a person in charge. Drive change by tackling the challenging issues. Don't get sidetracked by shiny objects. Do the hard work.

Defining Logistics Outside-In

Today's supply chain is inside-out. (The automation of a company's process across sell, deliver, make and source within the four walls of the enterprise. Traditionally, the focus was on functional automation to improve efficiency.) While supply chain leaders speak of the need to build value chains, this is incongruous with organizations' traditional focus on the efficient enterprise processes primarily focused on transactional processes enabled by ERP.

The challenge is that teams will find that most of their current technology is obsolete in building outside-in processes. The reason? Outside-in signals do not readily fit into the methods and techniques implemented previously when the goal was to create an efficient enterprise. The objectives have changed, and so do the architectures.

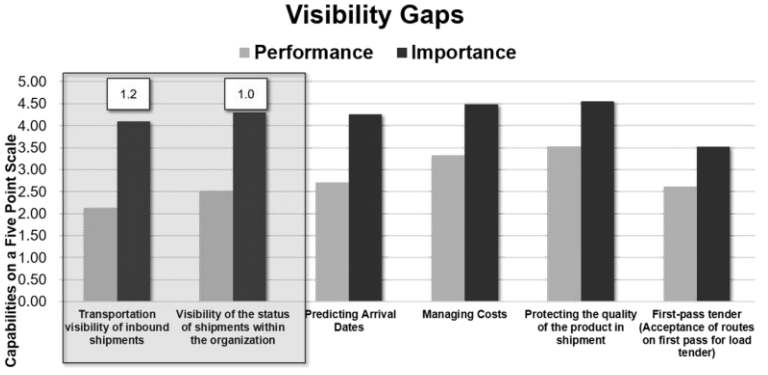
Why Should This Be A Discussion Now?

The COVID-19 economic recovery is dependent on strong supply chain capabilities. In the restart of the supply chain from a deep coma will be anything but ordinary. Companies will quickly find that signals within the enterprise's four walls are not sufficient to fuel the required capabilities for economic recovery. The reason? Logistics will be more turbulent, and suppliers are ramping-up capacity. There will be many ups and downs.

Historically, supply chain leaders worked with government leaders to make border frictionless. We have not operated supply chains with as much border friction and lead time variability in the past decade.
This week, I completed a quantitative study of fifty-seven companies on logistics visibility. Data collection occurred before the COVID-19 shut down, and the data sample is primarily North American manufacturers.

Today 83% of companies are working on visibility. However, it means different things to different companies, and most companies do not have a clear definition. Without a clear explanation, it is almost impossible for companies to implement a visibility project successfully. I write this "tongue in cheek," but I know that improving this capability is essential for supply chain recovery. In Figure 6.5, I share the gaps. The most significant weaknesses are in the areas of inbound logistics and shipments within the enterprise. Companies do better on outbound shipments to customers. However, all of these forms of visibility matter because reliable outputs require precise inputs.

Figure 6.5. Performance on Elements of Visibility



Source: Supply Chain Insights LLC, Transportation Visibility Study (April 2020)
Base: N=31 Manufacturers
In your opinion how important are these factors on supply chain performance?
In your opinion, what is the performance of your organization on these factors?
Sharing ratings on a 5 point scale

What Did I Learn?

In the process of tabulating the data and reviewing it with business leaders, I learned three things:

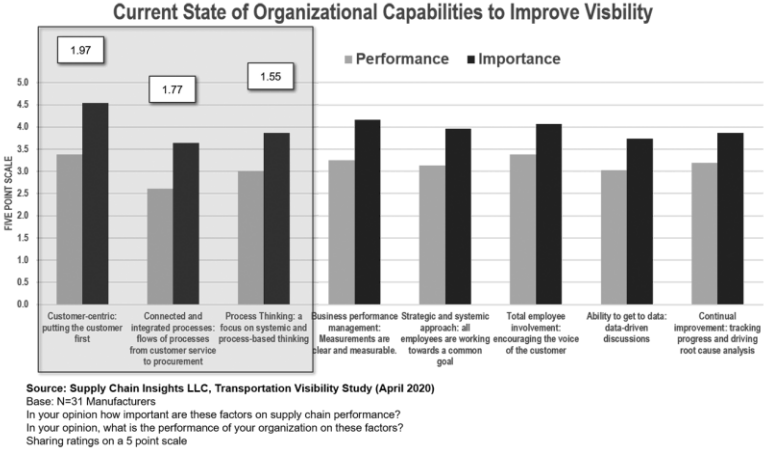
Companies Dependent on 3PLs Rate Themselves Significantly Worse on Logistics Visibility Elements. Pre-COVID data available at the speed of business to drive logistics decisions was significantly worse for companies more dependent on 3PLs. (90% confidence level for companies reliant on 3PLs in North America for more than 65% of volume.) Visibility will become worse post-COVID-19. How so? The more nodes and the more parties in the supply chain, the harder it will be getting data. Data latency and interoperability with 3PLs is a barrier.

No Easy Answers. The dance with shiny objects is dangerous. There is no one technology to close the gaps. While companies brief me with over-zealous promises for their approaches, I struggle. Most technology innovators ae over-zealous without a

good understanding of the supply chain. Don't fall victim to platitudes. My advice? Be cautious.

Organizational Gaps Are the First Place to Start: Shown in Figure 2 are the gaps in organizational capabilities. While companies speak of customer-centric process flows, they are not clear for most teams. The first place to start is mapping outside-in process flows and adopting process-based thinking. Companies dependent on portals and EDI will quickly learn that the gaps. Portals are dead-in streets, and EDI is signals are mainly batch and out-of-step with business processes. Time and data currency are issues.

Figure 6.6. Organizational Capabilities to Build Visibility Functionality



Source: Supply Chain Insights LLC, Transportation Visibility Study (April 2020)
Base: N=31 Manufacturers
In your opinion how important are these factors on supply chain performance?
In your opinion, what is the performance of your organization on these factors?
Sharing ratings on a 5 point scale

Conclusion

As your organization works through redefining supply chain capabilities with the post-COVID-19 recovery, think holistically, and design outside-in. Prepare yourself for levels of turbulence that you have not seen before.

Building Value Networks. Stop the Backward Slide.

In the 1980s, I had a flip phone. Limited to voice/calls—the phone had no music, no text, and no apps. This flip phone was nothing more than a portable phone. The device increased my work mobility, but with limitations.

The telephone could not interconnect with other networks. As a result, I felt like I was on an island talking to others on, and only on, my network. Phone calls to Europe or Asia were costly and of low quality.
Today, with seemingly a click of the finger, the phone as a communication device is SO MUCH more than a phone. Similarly, with the break-up of "The Bells" in the United States in 1982, personal networks grew more open. By the early 2000s, phone calls to Europe from my cell were

expensive but manageable. Slowly, the systems became more interoperable, increasing consumer value for the participants and the companies involved.

Why Is There More Progress in Personal than Business Networks?

I struggle to understand why innovation in supply chain networks stalled. In my opinion, the evaluation of business networks never evolved past the portal. The portal--with all of its limitations--is analogous to the flip phone: functionally inadequate. A portal is a dead-end information street.

Integration is different than interoperability. While integration moves data across APIs, interoperability ensures the translation of the data to improve usability in multi-tier processes. Most companies' focus is on integration, not interoperability. I find that few think about the differences.

A Look Back At History

I was a Gartner analyst in the period of 2000-2002 when trading exchanges were hot. Like a rocket ship traveling to Mars, a new press release popped into my email each day. As a new analyst, I was part of a team studying the evolution of value networks. Fascinating times with much promise until the reality set in that providing a solution to enable trade across trading partners effectively required more depth that the solutions provided.

In 2001, there were more than 200 offerings, then consolidation happened, and the number became 112. Today, there are seven--Ariba (now a part of SAP), Blume Global(renamed from Rez-1), Covisint (acquired by

OpenText), E2Open (purchased by Insight Venture Partners), Elemica (purchased by Thoma Bravo and then acquired by Eurazeo Capital), Exostar (recently purchased by Thoma Bravo), GT Nexus (purchased by Infor), GXS (purchased by Thoma Bravo) and SupplyOn. Also, Value-Added Networks (VANS) morphed. IBM purchased Sterling Commerce. GXS purchased Inovis, OpenText purchased GXS, Descartes Systems Group purchased numerous assets to form the GLN (Global Logistics Network), and TrueCommerce purchased Datalliance. If this looks like a messy world, you are right; it is. Nothing about this is easy.

The only progress, in my opinion, is the lining of the pockets of venture capitalists. Innovation for supply chain leaders in building value networks stalled.

In short, the market is confusing, but more importantly, no leaders are driving the industry forward. Each business model is self-serving: the individual solutions work in isolation. The Venture Capitalists skimmed profit but have not driven innovation. Today's networks are like my flip phone in capability, but moving backward.

Start With Definitions

To begin any discussion in this market, the buyer should start with definitions. All solutions, irrespective of capabilities, call themselves a network. A network is not a network: each form is different. Generalities sink a project.

Table 6.1. Definitions

Type of Network	Connections	Transparency	Functionality	Example Technologies
Business Network	One-to-one	Closed network based on onboarding permissions	Onboarding Mapping Data Movement Delivery Analytics	TraceGains TraceLink Elementum Ratelinx Shippeo Fourkites
Value-Added Network (VAN)	One-to-one	Closed network requiring authentication	Onboarding Mapping EDI encryption Data Movement EDI decoding Delivery Analytics	OpenText (GXS and Inovis) IBM (Sterling Software) True Commerce (Datalliance) SPS Commerce
Marketplace	Many-to-many	Open network for sharing across multiple parties	Catalogs of goods and services in an open market with a focus os buying and selling goods as a transaction	Amazon Alibaba
Supply Chain Operating Network	One-to-many or many-to-many	Permission-based sharing of data and processes based on trading partner definitions	Trading Partner Onboarding Mapping Data transformation based on process conicals using a multi-tier data model Data Movement Delivery Analytics	Covisint Elemica E2open Exostar Infor (GT Nexus) SAP Ariba Supplyon
Enterprise Advanced Planning Solutions	Enterprise optimization	Optimization within the enterprise	Four-wall optimization in demand and supply planning	JDA Logility Kinaxis SAP IBP OM Partners

So, What Should You Do?

As a business leader, ask the right questions. Don't assume that an enterprise application has network capabilities, and for proof points on interoperability with others. The most insular and the least likely to play well with others is Ariba. In second place is OneNetwork.

In this pandemic, building value networks is more critical. Supplier reliability and the bi-directional flow of data at the speed of business improve agility and decrease the issues with having the wrong inventory or aligning inbound transportation logistics with manufacturing scheduling. As you work through the problems, here are some rules of thumb:

1. **Realize that it is a messy market.** There is no network capable of connecting sourcing, logistics, manufacturing, and distribution together in the market today. Make interoperability a priority and push the network providers to drive information across networks.

2. **Don't assume that onboarding will be easy.** While each provider has a logo slide, and most have the same logos, just because your trading partner is on a network, don't fall in the trap that the information shared will be meaningful. Dive into the details.

3. **Get involved.** If you have invested in network capabilities, hold the venture capitalists accountable for driving value. Get active at the board level and drive accountability and innovation at the corporate level.

4. **The devil is in the details.** Gain insights into how quickly data moves through the network and the inherent latency of data conversion. A Value-Added Network operates on batch jobs; thus, the data is not current as it is in a Supply Chain Operating Network.

5. **Invest in multi-tier process capabilities.** Buy based on multi-tier process capabilities from the outside-in process view, not from the inside-out. What you have as an ERP architecture is mainly irrelevant. A network that just shares data but lacks process capabilities is a weak investment. The goal is to connect trading partners in meaningful ways to unleash higher levels of value.

6. **Build talent.** You will find the organizational skill to build networks scattered in the organization. The baby boomers that made EDI networks are retiring, and the digital transformational teams lack an understanding of what it takes. Form cross-functional teams and focus on building value.

7. **Avoid slick presentations.** If the presentation sounds too smooth, it probably is. Value networks are hard work that few companies understand.

8. **Use standards**. Understand the standards available and maximize the use of GS1 and ISO-8000 standards. With increased contactless shopping, escalating security and piracy issues, and the shift to last-mile delivery, standards matter more than ever, but they are not a panacea.

9. **Leverage your clout.** Form a guiding coalition with other trading companies. Stop the slide. Social responsibility and supplier reliability in uncertain times require it. The industry will only move forward if business leaders take action.

10. **Don't waste your time chasing industry clouds.** Connecting to your peer group is less valuable than meaningful connections to customers and suppliers. Actively work with your value network--crossing industry boundaries--to define multi-tier processes.

11. **Define your outside-in processes.** Companies worked hard on making the enterprise efficient. Gleaning additional value from working and reworking these processes offers less value than harvesting the waste in inter-enterprise automation. Crack this code through your digital innovation group. Make it a business, not an IT initiative.

12. **Drive holistic thinking.** Challenge the team to ideate on the value proposition of bringing source, make and deliver together through multi-tier and multi-party processes. Then look hard at last year's performance. What gaps can you close in

driving new value for the business through this type of initiative? Don't get off track by chasing shiny objects like blockchain; instead, start with driving value by extending current initiatives. Let me give you some examples. Have VMI? Connect it to logistics and redefine demand management to be outside in. Are you experimenting with real-time transportation signals? Connect this to order data and measure customer service in the eyes of the customer and reduce deductions. Have strategic JIT relationships? Connect materials ordering to cycle stock management in production planning and improve inbound visibility to plants.

I could go on and on, but I am sure that you get the point—best of luck in your journey.

Summary

Walmart and Taiwan Semiconductor (TSMC) built the only two successful and transformational public networks. While the industry talks about value networks, the traditional investment focus is on enterprise technology, which ironically lacks the capabilities to drive value network interoperability. Now is your time to make history. Get past the flip phone stage and build your value network.

Section 7

Supply Chain 2030

Supply Chain 2030

How do supply chain leaders prepare for another decade? What drives success? Here we share some insights.

Preparing for Supply Chain 2030

In preparation for the Supply Chain Insights Global Summit, I take the best-read blog posts and create a soft copy book--The Shaman's Journal. As I sign the books at the end of the event, it enables an intimate discussion with each attendee. It is my favorite part of the conference. The one-on-one time makes the hours-and-hours of writing and editing the book worthwhile.

I ask attendees questions as I sign the books, *"What did you learn this week? What spoke to you from the conference in the design of Supply Chain 2030?"*

Here I share some snippets from this dialogue.

Background

We connect business and technology leaders in new ways; the Supply Chain Insights global conference focuses on extreme networking (tours, table discussions, and imagining activities). We hand-pick the speakers and use new research to stimulate new discussions.

On stage, twelve business leaders shared insights on their digital transformation journey. No two were the same.

The event is costly and risky for a small firm. Personally, it is draining. As I sit down after the fact, to rest my weary feet, I wonder if it is worth it.

My answer is, *"Yes."* Here is my reasoning. In the supply chain world, there are a lot of bad conferences. Repulsed by the "event model" of pay-for-play that includes

sponsorships, booths, and paid speaking slots, my goal is to deliver a better customer experience.

The traditional conference generates leads to drive pipeline activities. The Supply Chain Insights Global Summit is designed for business and technology leaders to learn together as equals. My goal is to unlearn the practices that have not worked in the past and to ideate the future state together.

My Insights

The answers to my question included:

> **The Only Constant is Change.** As we face the future, **s**tandardization and uniformity is not a meaningful goal. Instead, the supply chain leader learns to dance in the world of gray when the only known for the future is constant change.
>
> **Focus on Outcomes.** Traditional supply chains focus on product sales. The future shifts to focus on outcomes. It varies by industry. For automotive, it is a shift from selling cars to providing rides. In healthcare, it is a focus on wellness and care in the home. Whereas in food and beverage, the shift is to custom diets and food as a specialized diet to drive wellness.
>
> At the conference, **Sleep Number** spoke on their goal to deliver a good night's sleep. For them, selling mattresses is a means to an end. The overarching goal of the supply chain team is to provide mattresses that improve wellness. The mission is improving the delivery experience by redesigning delivery, deploying late-stage postponement, and automating the last mile.

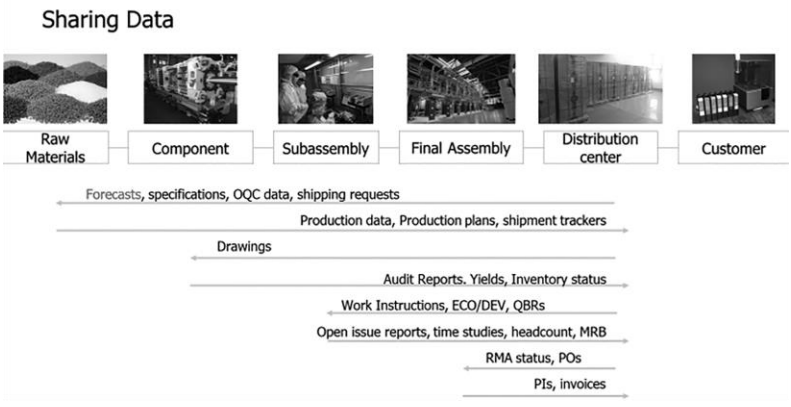
Shown in Figure 7.1 is their program to drive supply chain transparency using digital innovation.

Figure 7.1. Sleep Number Digital Supply Chain

Take Responsibility for The Value Network. To build the end-to-end value chain requires ownership of the entire supply chain. The design starts with knowing the customer and the supplier. (I continue to be surprised with how few supply chain leaders know their suppliers and customers.) In the process, relationships matter.

I loved the presentation from **Formlabs**. Their strategy, shown in Figure 3.2, is to use supplier development techniques to produce a 3D printer at 1/3 the cost of their competition. Their tactics are simple. Buy materials at a lower grade and adapt manufacturing to embrace variation. The supply chain stretches the globe 1 1/2 times, but each stage connects through a value network. Only 7% of companies have this level of value network enablement.

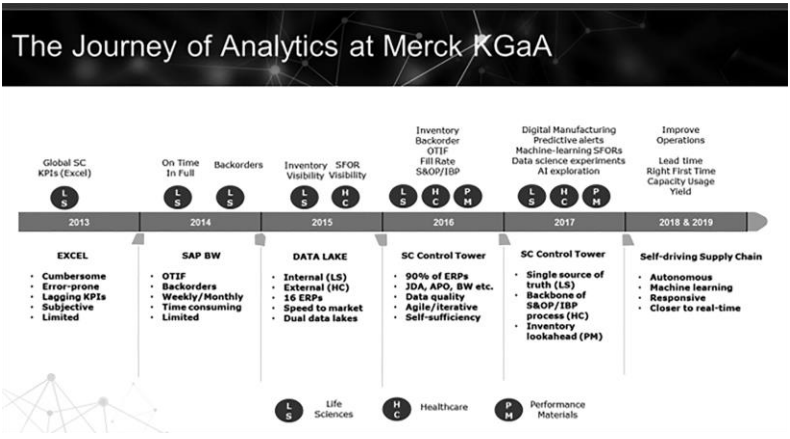
Figure 7.2. Formlabs Extended Supply Chain Data Sharing



Grow A Thick Skin. Teams do not like change. As a result, driving an agenda to actualize Supply Chain 2030 requires a strong leader to ask those that cannot get done to get out of the way of people driving change. It often means admitting that the current state is legacy and asking the organization not to let the need to write-off legacy technologies to stand in the way of building digital capital. Driving the change is uncomfortable.

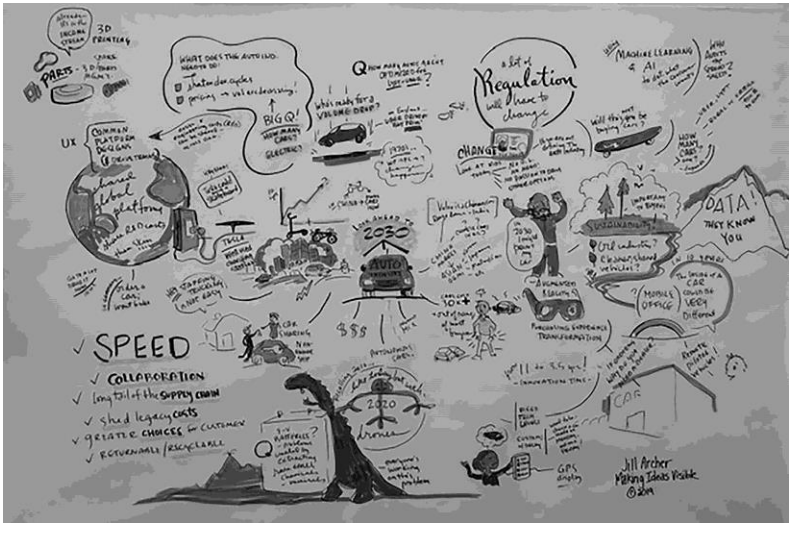
Get Started. No company has a perfect starting point. Every organization has dirty data, but the group agreed don't let perfection stand in the way of progress. Even if the data is wrong, the pattern is right. Data patterns don't lie. The consensus? Get started. Communicate the journey. Clarify the "Why?" Build a Guiding Coalition for change and communicate a roadmap. Shown in Figure 7.3 outlines the Merck analytics journey. Merck started by cleaning up inputs and then aggregating data into a data lake to automate into a control tower.

Figure 7.3. Merck's Analytics Journey



2030? We Don't Know the Answer. At the conference, we divided into three groups and worked with a visual facilitator to draw a vision of 2030 by industry. The answer? Leaders need to be open to the outcome. When a supply chain leader is confident that they know the answer, it is time for them to retire. Ideating with a visual facilitator like the 2030 vision of the auto industry inserted below in Figure 7.4 helps companies to gain alignment to drive change.

Figure 7.4. Visual Artist Rendition of the Automotive Industry in 2030



> **At a Tipping Point.** Companies are starting to adopt new technologies. Slowly, it is finally happening. New solutions require a shift in selling techniques from solution selling to missionary selling tactics based on relationships. Traditional selling and marketing tactics are not sufficient.

I hope that these insights help you and your team.

About The Shaman's Journal

The Shaman's Journal, now in its seventh year of publication, is a collection of best-read blog posts by Lora Cecere for the prior year. Previous Shaman's Journal publications are available through Amazon as ebooks.

Supply Chain Insights LLC

Founded in February 2012 by Lora Cecere, **Supply Chain Insights LLC** is in its eighth year of operation. The Company's mission is to deliver independent, actionable, and objective advice for supply chain leaders. Our goal is to help leaders understand supply chain trends, evolving technologies, and which metrics matter.

About Lora Cecere

Lora Cecere (twitter I.D. @lcecere) is the Founder of Supply Chain Insights LLC, and is the author of the popular enterprise software blog Supply Chain Shaman is currently read by 18,000 supply chain professionals. She also writes as a LinkedIn Influencer and is a contributor to Forbes. She has written seven books.

With over eighteen years as a research analyst, first with AMR Research, Altimeter Group, and Gartner Group and now as the Founder of Supply Chain Insights, Lora

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