FERRARI CONSULTING GROUP

SUPPLY CHAIN MATTERS

The Ferrari Consulting and Research Group LLC and the Supply Chain Matters© Blog

January 2020 Research Advisory Report

2020 Predictions for Industry and Global Supply Chains

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Background and Introduction

Since our inception in 2008, and on a consistent annual basis, ***The Ferrari Consulting and Research Group*** provides a series of supply chain management focused annual predictions which are monitored, updated and scored for actual occurrence throughout the calendar year.

Such predictions are provided to clients, technology providers and *Supply Chain Matters* blog readers in the spirit of advising senior and line-of-business executives, multi-industry cross-functional supply chain management and supporting information technology teams a sensing of what to expect during the year. Our goal is to depict how likely global, regional, economic, industry and advanced technology trends will impact, and likely influence required supply chain management actions. They further provide the baseline of our added research and advisory topics during the coming year, along with continuous blog updates.

The context of these predictions include a broad cross-functional umbrella of what is today considered supply chain management, and includes areas of leadership and strategy, product management, strategic sourcing and procurement, supply chain planning and customer fulfillment, manufacturing, logistics, transportation and customer service management.

Executive Summary and Summarized Themes

Predictions for the year 2020 umbrella an overall business climate reflecting considerable economic and business uncertainties to be evident in the year 2020. Many of our themes of 2018/2019 carry over to the new year but in more problematic dimensions.

Our predictions factor and include:

- Indications of a cautious global economic outlook in 2020, with specific concerns about prominent downside geo-political and financial risks, and the ultimate future of global-wide trade over the coming 2-3 years.

- Continued unparalleled levels of global supply network management challenges, especially centered on components and products produced in China, that will continue to lead to ongoing structural sourcing shifts during 2020-2021, and eventually result in more near shored geographically centered multi-industry supply networks.

- Talent management and recruitment strategies turning more towards retention, training and reskilling as headcount budgets likely begin to tighten and businesses prepare for an eventual economic recession.

- Proactive cyberattack defenses and information security safeguarding across supplier, contractor, and customer demand networks remaining a mandatory requirement in 2020.

- *Supply Chain Digital Transformation* strategies, while continuing to have strategic connotation and directed efforts for lines-of-business and cross-functional supply chain management teams, likely having to focus more on near-term objectives and meaningful interim benefits.

- The multi-year transition toward *Digitally Enabled Response* Networks similarly will become more business process specific, weighted either by near-term line-of-business, customer demand fulfillment or supply network process response needs.

- With 2020 providing higher levels of business uncertainties, we anticipate that advanced technology buying, and adoption strategies will turn more conservative and far more focused.

- The technology-enabled disruption of global transportation contracting and services processes, specifically transportation brokerage, general, shipper, online retailer or third-party logistics will reach broader dimensions of technology-enabled disruption.

- The positioning for global online retail platform dominance being scaled back toward more geographic or regionally focused online fulfillment, federated logistics and last-mile delivery capabilities. The battlegrounds will continue to center on the most lucrative growth markets for online retail such as India and certain other *Far* and *Middle East* markets.

Industry Specific Predictions

As in prior years, for the year 2020, we include specific industry sectors that we anticipate will undergo industry unique supply chain management related challenges in strategy, business process, talent or advanced technology dimensions. Such industries will be:

Global Automotive and Truck Industry's continuing complex multi-year transition toward producing and benefitting from market needs for more electrically or hybrid powered vehicles, while at the same time managing the effects of a likely multiyear downturn in global vehicle demand levels.

Commercial Aircraft Industry and the dual challenges of both shifting airline market demand among aircraft categories, and the likely significant consequences of the ongoing *Boeing's 737 MAX* aircraft grounding crisis on industry product design, monthly production and supply network operational strategies.

Consumer and Packaged Goods Industry in continuing to meet the challenge of permanent changes in consumer requirements in food products, a continued move toward more direct-to-consumer or retailer distribution, and how product and process related sustainability strategies continue to be more strategic toward long-term growth.

High-Tech and Consumer Electronics Industry now caught in the apex of a likely more entrenched trade war involving China and the United States in areas of intellectual property protection, key technology dominance in strategic components including semiconductors, and the implications of a plateauing smartphone market.

Summary Takeaways

The bottom-line is that 2020 will once again challenge individual industry and globally based supply and customer demand networks. Supply chain management teams, and respective value-chain networks should again anticipate another year of supporting business change and risk mitigation needs.

Teams will once again be asked to contribute to more meaningful cost reductions and increased productivity while preserving critical capabilities related to retaining talent, meeting digital business transformation needs and investing in the most critical business processes and enabling technologies needed to deliver all of the expected capabilities.

Supply chain leaders and their respective teams must focus on a renewed emphasis on assuring overall agility and resiliency of associated customer demand and supply networks, more seamless integration of business processes and more-timely, risk-aware decision-making capabilities.

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Summarized Key Global Supply Chain Indices

	End of 2016	End of 2017	End of 2018	End of 2019	2018-2019 Change	2017-2018 Change
Equities						
Dow Jones Industrial Average- DJIA	19763	24719	23327	28538	18.26%	-5.97%
S&P 500 Index	2239	2674	2506	3231	22.44%	-6.70%
Key Interest Rates						
Federal Funds Target Rate (FFTR)	0.75%	1.50%	2.50%	1.75%	-42.86%	40.00%
U.S. Prime Rate	3.75%	4.50%	5.50%	4.75%	-15.79%	18.18%
Currency Markets						
Wall Street Journal U.S. Dollar Index	$92.94	$85.98	$96.47	$89.47	-7.82%	10.87%
Value of Euro to U.S. Dollar	$1.05	$1.20	$1.14	$1.12	-1.79%	-5.26%
Value of China Yuan to U.S. Dollar	$6.94	$6.50	$6.88	$6.96	1.15%	5.52%
Key Commodity and Energy Markets						
Dow Jones Commodities IndexTR	273.80	282.34	260.28	286.63	9.19%	-8.48%
S&P GSCI Index	2417.3	2556.7	2206.9	2591.9	14.85%	-15.85%
USD Price of Brent Crude (per BBL)	$56.75	$66.63	$53.80	$66.00	18.48%	-23.85%
U.S. Avg. Retail Price Diesel (per gal.)	$2.51	$2.91	$3.12	$3.07	-1.63%	6.73%
U.S. Avg. Retail Price Gasoline (per gal.)	$2.25	$2.59	$2.65	$2.57	-3.11%	2.26%
Global Supply Chain Activity						
J.P. Morgan Global Manufacturing PMI	52.7	54.5	51.5	50.1	-2.79%	-5.83%

2020 Predictions In Detail

2020 Prediction One: Indications of a cautious and subdued global economic outlook coupled with specific downside Geo-Political and market risks, will test the overall agility and resiliency of multi-industry customer demand and supply networks.

Prediction Summary

At the beginning of 2019, we predicted that industry and global supply chains would encounter a lot more uncertainty relative to global trade, currency, geo-political and climate change risks. Most all of these occurred including an escalating trade war involving the globe's two largest and most influential economies and consequential supply networks.

The year 2020 is sizing up to be just as challenging with indications of more downside geo-political and market risks. Supply chain management teams will need to be further prepared for needs to demonstrate added agility and resiliency across end-to-end customer fulfillment and support supply networks.

Global and Regional Economic Outlooks

The consensus of 2020 economic forecasts that we have reviewed indicate that economic activity and overall momentum remains subdued. Throughout 2019, we highlighted for readers a discernable downturn in global manufacturing and supply chain activity, and by the end of the year, various *PMI* indices pointed to a state of manufacturing-led recession among developed regions. The catalyst is generally escalating geo-political trade and tariff tensions and what Economists point to as unpredictable policymaking resulting in a persistent state of high uncertainty.

The International Monetary Fund (IMF) World Economic Outlook published in October 2019 indicated that the adjusted global growth forecast for 2019 was expected to be 3 percent by year end and characterized as a significant drop from 2017-18 levels in emerging market and developing economies. Just before we published this *Research Advisory*, the agency was compelled to revise global 2019 economic growth downward to 2.9 percent. The updated revision was attributed negative surprises to economic activity in a few emerging market economies, notably India.

In the October 2019 report, global wide economic growth was forecasted to be 3.4 percent in 2020, primarily driven by expected improvements among certain emerging market economies in *Latin America*, the *Middle East* and developing *Europe*. As we publish, the *IMF* global growth forecast has been adjusted to 3.3 percent. The agency continues to point to a projected slowdown involving *China* and the *United States*, a likely more subdued pace of global activity with prominent downside risks.

Among advanced economies, the agency forecasts 2020 growth to remain broadly stable at 1 ¾ percent on average, with a modest pickup in the *Eurozone* offsetting a gradual decline in U.S. *GDP* growth. *Eurozone* growth is expected to grow from a meager 1.2 percent in 2019, growing to a 1.4 percent level in 2020. The U.S. economy is forecasted to decline from 2.4 percent in 2019, to 2.1 percent in 2020, primarily driven by declines in overall exports.

China's growth is expected to be 6.1 percent in 2019, declining to 5.8 percent in 2020. While that latter number may seem by some to be respectable, it presents considerable challenges for China's leaders, since the bulk of that growth is expected to stem from a consumer goods vs. a manufacturing-led export economy.

The** Chief Economist* at the ***Organization for Economic Cooperation and Development (OECD) commented in September 2019 on why growth is taking a dangerous downward turn:

"For over 18 months, since the outbreak of trade hostilities, growth has been weakening, slowly but surely." Further noted: *"The proliferation of tariffs and subsidies and the increasing unpredictability of trade policies have destroyed growth in international trade, triggering a sharp slowdown in industrial output and investments. When companies do not know what tomorrow will bring, they exercise their "wait and see option.""*

Stepping back to view the bigger economic picture, Economists observe that the United States and Europe are essentially in similar economic positions with respective economies showing various increased signs of faltering and a high dependency on low interest rates, tax or stimulus policies to attempt to spur growth. Hence to these notions of significant downside risks.

View From Supply Management Community

Contrary to some global economic forecasts, ***The Institute for Supply Management (ISM) Semiannual Economic Forecast*** published in December 2019 provides a consensus view from a reported 58 percent of U.S. based supply management and purchasing professionals that once again and similar to last year, reflects increased optimism entering the new year.

The report points to an expected 4.8 percent manufacturing revenue increase during 2020, somewhat lower than last year's initial 2019 forecast of 5.7 percent manufacturing revenue growth. The report once again points to continued optimism for growth in the coming year, with revenues expected to increase in all 18 manufacturing industries.

Also similar to last year, the *ISM* panel anticipates both imports and exports to grow in 2020. This is despite the *U.S. ISM Report on Business November 2019* report indicating a *PMI* value of 48.1, representing the fourth consecutive contraction in *PMI* activity levels coupled with various leading indicators pointing to continued contraction moving into the new year.

A concerning sign was that manufacturing and supply capital expenditures are forecasted to decrease 2.1 percent over 2019 levels. Last year's forecast for 2019 capital expenditures called for a 13.4 percent increase in 2019. Overall capacity utilization among U.S. manufacturers was reported as 83.7 percent, which is 1.5 percentage points below last year's levels in December.

Threat of Recession

Most economists indicate that the risk of economic recession remains elevated for 2020, with recession more likely in the late 2020 or early 2021 time period, depending on whether it is the U.S. or the Eurozone. Both of these economies are already showing definitive signs of manufacturing recession.

A reinforcement of building concerns for economic setback once again came from a ***Duke University CFO Global Business Outlook Survey*** released in mid-December 2019. The survey indicated that 56 percent of U.S. *CFO's* are preparing for recession with more than half anticipating that recession will occur in the U.S. economy by the end of 2020. Upwards of 80 percent of U.S. *CFO*'s lean toward recession occurring by the end of 2020. According to this report, finance teams are strengthening relationships with lenders for added liquidity, preserving cash and doubling down on core business initiatives.

European *CFO*'s likewise have turned less optimistic on future growth related to earnings and employment with concerns related to added cost burdens. Top concerns expressed were similarly economic uncertainty, attracting and retaining qualified employees, weak demand for products/services and employee productivity, among others.

A November 2019 survey conducted by the ***Association of International Certified Professional Accountants*** reflected a view from finance executives anticipating lower expectations for revenue and profit growth as well as caution relative to capital spending.

Across the *Eurozone*, an increasing decline in manufacturing and supply chain activity during 2019, with growing uncertainties related to a potentially messy *Brexit*, coupled with the continued aggressive stance on tariffs by the United States, will likely have many financial executives on edge.

As we pen these predictions, after the results of a snap general election held across the *United Kingdom*, the *Conservative Party* won an overwhelming major of parliamentary seats, assuring that *Brexit* will occur in early 2020 after several delays in 2019 due to parliamentary gridlock.

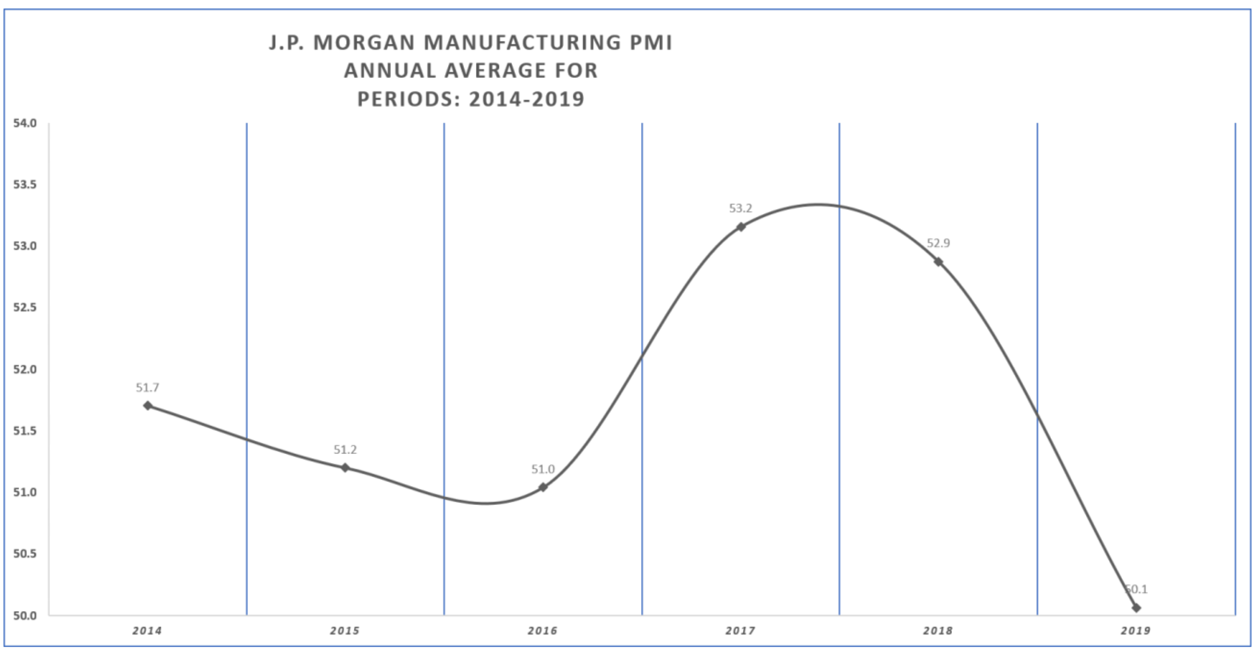
The re-constituted *United States, Mexico and Canada Trade Agreement* (*USMCA)* faces a more positive outlook for 2020 ratification after a prolonged delay in the *U.S. Congress* over certain labor and other industry specific tenets.

State of Global Supply Chain Activity Levels

Indices for global-wide manufacturing and supply chain activity in November 2019 further pointed to both subdued activity levels and continued shifting of geographic sourcing to buffer the impacts of ongoing tariffs.

The closely watched ***J.P. Morgan Global Manufacturing PMI***, a broad indicator of global manufacturing and supply chain activity, posted an average value of 50.1 for the final month of December 2019, after eight consecutive months of being at contraction levels. The report headline reflected global manufacturing conditions remaining weak by the close of the year, while the authors pointed to recovery efforts centered on consumer goods sectors. Intermediate and capital goods manufacturing growth remained in contraction, the latter being an important indicator of future growth momentum. Business optimism was described as relatively subdued, continuing the 2019 second-half trend of lackluster confidence. The exception is noted as business confidence among certain steadily growing emerging markets regions such as *India* and *Vietnam*. One of the most concerning areas in terms of manufacturing and supply chain activity remained the *Eurozone*, as the average *PMI* value during Q4-2019 was 46.4, the lowest of all major regions.

Figure 1 below plots the annualized average J.*P. Morgan Manufacturing PMI* indices for the 2014-2019 time period.



Summing Up

Consensus indications of a somewhat cautious 2020 economic outlook with discernable downside business, industry and geo-political risks likely point to a wait and see perspective among individual businesses along with preparation for a global economic downturn at some point over the next 12-18 months.

The implication is that multi-industry supply chain teams will be expected to demonstrate added agility and resiliency in responding to many market unknowns related to growth and profitability.

Teams will once again be asked to contribute to more meaningful cost reductions and increased productivity while preserving critical capabilities related to retaining talent, meeting digital business transformation needs and investing in the most critical business processes and enabling technologies needed to deliver all of the expected capabilities.

2020 Prediction Two: Unparalleled levels of global supply network management challenges, especially centered on components and products produced in China, will continue to lead to ongoing structural sourcing shifts during 2020-2021.

Prediction Summary

In both 2018 and again in 2019, we predicted a challenging year for managing direct material costs and global-based supply networks. Our 2019 prediction was that with the likely threat of a far more escalated trade war involving the United States and China, industry supply chain teams would encounter unprecedented levels of added global supply network challenges as import tariff levels expanded. We predicted that *Chief Supply Chain Officers* along with strategic sourcing, supply management and strategists will be compelled to position *C-level*, *line-of-business* and product teams for alternative sourcing strategies options.

The term '*unprecedented*' turned out to be the appropriate descriptor given the level and scope of tariff actions involving both countries.

U.S. And China Trade War

As the year 2019 winded down, it became clearer that despite *Wall Street* and general media headlines, the U.S. and China trade war and other global trade tensions were not at all subsiding, and neither were the implications.

We anticipate the beyond the announcement and approval of a termed '*Phase One' U.S. and China Trade Agreement* in early 2020, currency, trade and other economic and intellectual property protection related tensions among these two global powers will extend into 2020 and likely into 2021 as-well. Supply management along with *sales and operations management* (*S&OP*) teams will need to continue to be diligent to such an environment with a number of appropriate migration strategies in constant focus.

Among certain industries, the shifting of component or finished goods sourcing has already begun in order to overcome the uncertainties of heightened tensions and prolonged tariffs. Regions such as *India*, *Malaysia*, *Vietnam* and others have already benefited but at the same time, are not fully prepared to be able to match China's deep manufacturing, supply network capacities and in-country logistics capabilities. Among certain industries supporting proprietary or advanced technology laden components, we anticipate more alternative sourcing decisions favoring a regional or near-shored supply network strategy, affording mitigation for increased geo-political uncertainties or trade disputes.

South Korea and Japan
The escalated trade dispute and tensions specifically involving *South Korea* and *Japan* extended through 2019 with no clear signs of easement. We believe this will extend into 2020 and precipitate additional supply sourcing changes for certain high tech and consumer electronics supply chains. It will likely take until the second half of the year for such sourcing changes to take effect while single sourced, proprietary technology components will remain a challenge.

The Eurozone and Brexit
Other continuing areas of global challenge involve the *United Kingdom's* eventual exit from the *European Union* or *Brexit*, which encountered legislative and political gridlock throughout 2019 resulting in multiple planned implementation postponements. With results of the December 2019 snap national election solidly favoring the ruling *Conservative* party, signs are clearer that *Brexit* will most likely occur in early 2020, and the open question is to what extent.

There are real possibilities of cross-border disruptions and interruptions in just-in-time material flows involving the back and forth movement of goods among the *UK* and the European continent. Depending on severity and the ultimate consequences, we predict some alternative supply sourcing shifts to begin to occur in the second half of 2020. We do not envision a smooth *Brexit* transition, quite the opposite.

Regarding trade relationships among the U.S. and the broader *Eurozone* region, we anticipate added trade tensions and tariff actions as the *Trump Administration* shifts its focus to that region, particularly the automotive and aerospace sectors.

With U.S. based *Boeing* deeply ensnared in one of its most significant corporate business crisis with the ongoing global grounding of the *737 MAX* aircraft, the expansion of tariff tensions is a real possibility as a means to blunt arch competitor Airbus's current market momentum. Commercial aerospace interests often make leverage of nationalist geo-political environments.

Small and Medium Business Impacts
Small and medium manufacturers, retailers and businesses were especially impacted by increased tariff costs in 2019. With leaner budgets and supply needs, these organizations lacked the tools, resources, time and leverage necessary to analyze rapidly changing pricing of inbound supply or to analyze various alternative sourcing scenarios. Looking toward 2020, such businesses will need to step-up their analytical and assessment capabilities. In that light, we predict an uptick in participation in *SMB* buyer consortiums or buying groups.

Finally, we anticipate tense supplier negotiations and an uptick in supplier lawsuits as a result of the squeezing of suppliers to adsorb added tariff costs.

Added Global Supply Management Quantitative and Qualitative Perspectives

Global Commodity Supply Stream Forecasts
The *World Bank Commodity Markets Outlook* published in October 2019 indicated that commodity prices during 2019 trended lower, driven by trade tensions and ongoing weaknesses in global trade, manufacturing, and output growth. Energy prices were expected to average nearly 15 percent lower in 2019 and continue to decline in 2020.

Non-energy prices were projected to decline 5 percent by the end of 2019 and stabilize in the coming year.

In the all-important category of oil prices, the report points to a projected average of $60 per barrel of crude oil in 2019, after initially forecasting a $74 per barrel average in last October's report. The report has forecasted a $58 per barrel average in 2020. The downward revision was attributed to a weaker outlook for global growth and consequent oil demand. The usual downside risks are indicated related to threats of heightened conflicts in the *Middle East* as well as terrorist acts. Readers may recall that in 2019, there were terrorist acts involving ships traversing the *Gulf of Hormuz* and believed to be the byproduct of heightened tensions among the U.S. and Iran. We publish our 2020 predictions amid news of heightened hostilities among the United States and Iran as a result of the assassination of a the highest high-raking Iranian general in a U.S. drone attack. Whether such hostilities escalate will be another determinant to the stability of oil prices during the upcoming year.

Metals prices are projected to fall by 5 percent in 2019 and fall even further in the coming year, due to slowing global demand, and especially demand cutbacks from China.

The report points to agricultural prices stabilizing in 2020 following a projected fall in 2019, on reduced crop plantings. A resolution of trade tensions, presumedly among the U.S. and China were noted as upside risks for some commodities such as soybeans and corn.

The Institute for Supply Management (ISM) Semiannual Economic Forecast published in December 2019 and reflecting the views of U.S. based purchasing and supply management executives included a mixed outlook for raw material prices in the coming year, depending on specific industry represented.

In the category of *Manufacturing* related supply, respondents predicted a net average increase in prices paid of 1.1 percent between December 2019 and December 2020. Fifty percent of respondents expect an average price increase of 5 percent for the full year of 2020, while 24 percent expect an average price reduction of 5.9 percent.

In the category of *Non-Manufacturing* related supply, non-manufacturing supply management executives expect their prices to increase an average of 1.9 percent in 2020. Fifty-seven percent of respondents expected increases averaging 4.6 percent, while 12 percent anticipated prices to drop an average of 6.6 percent, while the remaining 31 percent foresee no change in prices during the coming year.

The report indicates that in the category of labor and benefit costs, Manufacturing focused purchasing and supply executives expect slightly higher overall labor and benefit costs for 2020. Sixty-six percent of respondents expect increased labor and benefit costs and expect them to grow by an average of 3.6 percent for all of 2020, while the 7 percent forecasting lower costs see them decreasing by an average of 22 percent.

Regarding the strength of the *U.S. Dollar* vs, major trading currencies, purchasing and supply executives are expecting that the dollar will strengthen in 2020 against all the foreign currencies. The average diffusion index for this forecast is 59.6 percent, a decrease of 7.1 percentage points over the December 2018 forecast average of 66.7 percent for 2019.

Global Final Production Site Changes

In our 2019 predictions report, we noted a growing need to source final production and/or product assembly processes to be located closer to major customer concentrations within global regions. We carryover that perspective for the coming year as well.

Increased investments in higher levels of manufacturing process automation and additive manufacturing techniques provide added flexibilities in production siting or alternative sourcing among global regions depending on geo-political risk factors. Closer proximity of final manufacturing further contributes to savings in transportation costs to end customers.

Added Supply Management Challenges

For the most part in 2018, and again in 2019, procurement and supply chain planning teams attempted to manage the added impacts of tariffs by front-ending procurement needs prior to tariff implementation dates or by attempting to route international buys through tariff non-impacted global regions.
In the specific case of China, some may be leveraging the falling devaluation of the *Chinese yuan*. By late August 2019, the country's currency fell to an eleven- year low amid the escalating trade war with the United States. The policy was attributed to *The People's Bank of China* allowing such currency depreciation as a means of offset the impact of added tariffs. China's leaders have vehemently denied the existence of such a policy. There are expectations that the slide in China's currency will moderate in 2020 amid increased scrutiny. Shortly after the joint signing of the *Phase One U.S. and China Trade Agreement* in early January 2020, the U.S. formally dropped its designator of China being a currency manipulator. It is widely believed that this removal was a Chinese stipulation toward reaching the initial agreement.

U.S. manufacturers and retailers once again attempted to manage tariff impacts by either squeezing suppliers for added cost concessions, absorbing added costs, or passing such cost along in higher prices for finished products. Entering the new year, purchasing commitments for 2020 will be further scrutinized in light of the now evident ever-changing and volatile tariff landscape. We anticipate that supply contracts will reflect more short-term timing, which often occurs in times of elevated business or economic uncertainty.

2020 Prediction Three: Talent Management strategies turn more towards retention, training and reskilling as headcount budgets begin to tighten and certain work becomes more automated.

Prediction Summary
During the year 2020, as businesses step-up efforts to prepare for an eventual economic pullback, we predict that supply chain management related talent management strategies will turn towards an emphasis on retention, training and reskilling as headcount budgets begin to tighten and certain work becomes more automated.

For the past three years, we have included various aspects supply chain talent management in our annual predictions for obvious reasons. Specifically, within the U.S., with a technical condition of full-employment levels reached in 2019, the challenge and the talent crisis intensified.

For 2018, we predicted the need for businesses and teams to focus on more skills-based recruitment vs, specific job recruitment, because of the reality that a specific job will more than likely change multiple times over the next few years. As noted in our 2019 prediction, the needs surrounding talent management became ever more visible, and in some organizations reached levels that impacted ongoing initiatives especially those related to digital transformation.

The good news was that companies and their respective supply chain management organizations stepped-up efforts to recruit candidates from junior colleges and universities , military veteran outplacement programs, governmental training and other sources. Manufacturers, retailers and other businesses were in many cases, able to address added compensation needs. The ongoing boom in online fulfillment continued, with retail employment shifting toward skilled people needs in customer fulfillment centers, increased online logistics and transportation service needs. All such efforts were important.

As noted in *Prediction One*, indications of a rather cautious and somewhat guarded economic outlook in the coming year, with much downside geo-political and market risks, will prompt many businesses to become more conservative in establishing operating and headcount budgets in 2020.

We predict that this will imply three broad impact areas in the existing area of talent management.

Three Levels of Emphasis

The first will be an increased focus for improved overall productivity of the existing supply chain management wide workforce. That will invariably result in increased automation of certain tasks either related to production, administration, certain areas related to supply chain planning and execution, or customer fulfillment. Increased automation implies that existing employees whose jobs may be impacted, will require the skills to be able to contribute in different roles or different skills areas related to a changed business process.

The second impact will be a likely increased priority in the specific areas of supply chain agility and risk mitigation, including a broadened leveraged use of predictive or prescriptive based analytics in decision making processes especially those related to *sales and operations planning* (*S&OP*), global supply management and supply risk mitigation coupled with global trade and tariff expertise. Specifically, regarding the latter category, there were reports of a critical shortage of global trade management skills across multiple supply chain management teams.

The third area relates to a recent *Harvard Business Review* survey report foretelling that companies were about to experience a retention problem among younger, energetic *Gen X* employees. That study pointed to perceived frustrations related to lower levels of promotion and recognition than that of *millennial* and *baby boomer* employees. With overt needs for increased productivity and likely restricted headcount budgets, the tension and frustration levels within existing teams is likely to escalate in the coming year. Supply chain management leaders will face some tough and difficult decisions relative to realignment of staffing or flexibilities to promote existing younger employees.

Small and Medium Businesses Especially Impacted
Here again, small and medium sized businesses will continue to be the most impacted in talent management and retention, not having the financial resources to be able to compete with far larger businesses. Neither, for various business-related factors, has the majority of *SMB*'s adopted the newest most advanced technologies available to supply chain management teams.

Experience in working with various advanced technologies remains attractive for younger employees in terms of upward advancement opportunities. In-demand skilled employees will likely seek opportunities that offer clearer career paths, competitive compensation and broader job retention prospects.

2020 Prediction Four: Proactive cyberattack defenses and information security safeguarding across Supplier, Contractor, and Customer Demand Networks remain a mandatory requirement.

Prediction Summary

Background Perspectives
For years 2018 and 2019, we predicted that cyber-related risk and information security safeguarding would consume business, *IT* and industry supply chain teams, not so much by choice, but from compelling needs dictated by stockholders, boards and *C-Suite* executives.

Hackers and state sponsored cyber thieves have moved toward a new fifth generation of attacks that is now surpassing the defensive capabilities of individual businesses. Cyber and national security experts continue to reinforce that cyber threat incidents are going to get worse before they get better because of the added sophistication of cyber predators. *Chief Information Security Officers* are similarly concerned about the ongoing next generation threat sophistication.

One brute reality that continues to be evident is that many supply chain management and *IT* teams have had little or no visibility into suppliers among multiple tiers of supply networks, including various system interfaces. An April 2019 report from *Cybersecurity News* indicated that 50 percent of attacks that target supply chains seek lateral movement or "*island hopping*" where hackers target not just the primary organization but those connected along the various tiers of the supply chain. That will continue to be a vulnerability without active defenses and countermeasures.

Added Manifestations in the Coming Year

Proactive cyberattack defenses and information safeguarding across supplier, contractor and customer demand networks remain a mandatory requirement.

We continue to predict that cyber-risk and information security safeguarding will consume 2020 management attention at all levels. Since supply, manufacturing, services and demand networks each have multiple points of vulnerability, they will likely remain the weakest links in cyber-risk management. As we have noted in published *Supply Chain Matters* blog posts and updates, the likelihood of additional incidents of supply chain targeted cyber-attacks impacting businesses and industry remains high as are the business implications of compromised sensitive data.

We further predict that with the increased adoption of *Cloud* and *B2B* technology among various supply chain management technology landscapes, such cyber and information security defenses will invariably include any technology provider network platforms as well. Third party platforms will need to include provisions in services contracts for active security measures and safeguarding along with designated security audits to be conducted and reported by *Cloud* platform companies.

Small and medium businesses are especially vulnerable in this area, having to mostly rely on smaller in-house *IT* support teams with limited bandwidth to address the increased sophistication of hackers, and with having for the most part, reliance on specialized *IT* contractors for either defenses, or actual mitigation of incidents. This remains a vulnerability point among networks without supplemental security focused technologies.

We further predict that in 2020, consideration must be given to retiring some rather old legacy systems and now vendor unsupported software applications that are identified as likely information security risks.

Advanced Technology Factors

New technology factors for consideration on the cyber-security landscape in 2020 will be the continued leveraged use of *artificial intelligence* (*AI*) and *machine learning* (*ML*) technology on both sides of the threat spectrum.

Sophisticated, often State-sponsored of financed hackers will increasingly leverage *AI/ML* to exploit vulnerabilities and weak security links among targeted businesses. That will make the threat of and scope of attacks even more prevalent.

At the same time, individual companies and their supply chain management focused *IT* groups, as well as *Cloud* based technology providers themselves, are increasingly able to leverage similar use of *AI/ML* technology in areas of cyber and information security to automate defense mechanisms and quickly identify and respond to threats before they become far more damaging. As an example, *Enterprise technology* and data management provider *Oracle* continues to have a dedicated emphasis in leveraging advanced *ML* in these specific defense areas for both overall data management and applications security. *Microsoft Azure* and *Google Cloud* have various efforts underway to leverage advanced technologies to more quickly identify and respond to cyber intrusions. Similarly, a host of emerging and specialty *AI/ML* technology providers are similarly focusing on targeted areas of cyber and information security defense and response.

2020 Prediction Five: Supply Chain Digital Transformation initiatives will focus more on near-term Line-of-Business or tactical financial objectives.

Prediction Summary

Background and Perspective

We predicted that in 2018, digital transformation timetables would accelerate because of compelling business forces accelerating such changes. Feedback that we received and assessments that we conducted at the time pointed to loosening purse strings related to the ability to invest in digital transformation, but internal challenges related to skills and process readiness delaying meaningful investments. Teams essentially felt that they were not ready as-yet to embark on full-scale efforts without taking the time to address foundational needs.

For 2019, we predicted that many broad-based supply chain management teams would require and seek more definite transformation roadmaps related to overall digital business transformation. Overall advanced process and technology investment efforts needed to be guided by short- and longer-term line-of-business alignment needs. Once again, observations, client discussions and external survey data indicated to us that in 2019, many multi-industry teams indeed stepped-up efforts in road mapping overall supply chain digital transformation or actually initiating initial phases. Some external survey data point to perhaps 10 to 15 percent adoption rates and mostly concentrated toward larger, globally based firms. In such firms, the efforts are focused on specific-lines of business process areas as opposed to organization-wide.

As we continually remind teams, business cases drive the technology agenda, while transformation team efforts manage to the transformation timeline. Technology, process investment and workforce decisions should be governed by short and longer-term timelines. In other words, teams will search for the most leveraged benefits for meeting short and longer-term needs. Technology and data architectures will thus have far more meaning, which will move investment decisions to more top-down consensus, with the top being line-of-business as opposed to functional.

The needs for transforming to digital-based business models remains compelling, but with ongoing increased supply chain process complexities as well as business uncertainties in the coming year, prioritizing initiatives to the most compelling line of business and functional needs will be a dominant agenda.

Broad Vision but More Near-Termed Focused

Our belief is that *supply chain digital transformation* initiatives, will decidedly focus more on near-term objectives in the coming year, specifically due to the high levels of business uncertainty currently prevalent across multi-industry settings. We anticipate that senior management support will focus more towards either achieving line-of-business tactical or business-wide functional financial objectives. At the same time, it will be important that companies do not sideline supply chain digital transformation efforts since they remain critical to support required new digital business growth models. A focus toward near-term tactical should be viewed as an interim step toward longer-term business process and decision-making requirements.

Specific needs in 2020 would likely relate to improving efficiency and productivity as well as clearly defined opportunities for either transforming existing business processes or improving customer fulfillment streams among key customers.

In either of these cases, the *LOB* or senior management sponsorship and success outcome criteria will in many cases be predicated on delivering measurable and meaningful savings and outcomes in shorter-term tactical timeframes. Such savings will likely provide the added budget resources and sponsorship to move on to subsequent transformation phases in the years 2021 and beyond.

Line of Business Prioritization Areas

The digital transformation roadmap has to address both short and longer-term business outcome and process transformation needs while addressing action planning to augment organizational talent, data and process alignment requirements. In the year 2020, the realities of budgets will be a more definitive factor, especially if long-term business outlooks, added tariff or currency fluctuation risks continue to escalate across the global economy.

Organizations with predominant direct-to-consumer business models will likely continue to prioritize omni-channel customer fulfillment transformation in areas of customer data mining, increased automation of pick and pack processes and overall logistics and transportation transformative processes. Likewise, logistics and transportation services businesses directly supporting online customer fulfillment will focus on similar investments including elements of artificial intelligence and machine-learning support for early warning and resolution of logistics network bottlenecks.

Manufacturing-intensive business will likely focus on edge operational systems transformation leveraging *Industrial Internet*, *Internet-of-Things* and Additive Manufacturing based technologies and processes. The business case will not be solely investing in the advanced technology but rather the compelling need to shore-up cyber and data-security defenses with more updated advanced technology including *AI/ML* autonomous systems that detect data breeches or vulnerabilities.

Equipment and capital equipment industries may prioritize *Internet-of-Things* enabled operational systems embedded in equipment to further drive operational management and maintenance business models that provide added revenue streams. This is an area requiring more robust data management and analytics capabilities tied to backbone operational and business systems.

Business Wide Cross-Functional Prioritization
From our perspective, the two most prevalent forms of digital transformation that are addressing cross functional supply chain or edge operational systems landscapes are either planning and materials management, or logistics and customer fulfillment focused digital transformation. Each represents a fundamental leg of business process and decision-making, digital process characteristics, as well as important change management considerations. They can each address needs for increased productivity, overall efficiencies, mor agile decision-making and significant cost savings.

They further represent two fundamental aspects of business performance, one related to overall business, manufacturing and supply chain operations, the other being service and responsiveness to particular customer needs, especially in a highly uncertain business environment subject to constant changes in customer needs.

Other cross-functional teams will continue to focus on the need to step-up the synchronization of supply chain management business process and decision-making across either product value-chains, *B2B* supplier and trading networks and external *B2B* supplier and key customer networks. An area of likely opportunity will be concurrency and synchronization of planning among multiple functional and line-of-business areas.

Enterprise and Technology Provider Landscape Implications
Among enterprise and digital transformation technology landscapes, the realities of highly uncertain business outlooks and consequent needs for more tactically focused supply chain digital transformation will require toning-down the enterprise-wide transformation messaging.

Instead, assisting various customers in continuing to develop both long-term vision, in the context of meaningful and definitive interim tactical steps that can address *LOB* as well as business wide functional productivity and most prominent cost savings opportunities will be essential.

Larger enterprise technology providers would be wise to lean more on specialized boutique supply chain management consulting and systems integration firms for such needs, and for maintaining closer customer relationships.

2020 Prediction Six: Advanced technology buying and ongoing adoption strategies will turn more conservative, laser-focused and driven by business priorities.

Prediction Summary

As has occurred in the prior two years, various industry and global supply chain management teams will remain confronted with needs to adopt more advanced technology to support ever more complex physical and digital based process needs. Investment priorities will continue to be based on individual line-of-business or other functional priorities which we predict will turn more conservative and likely laser-focused in the year 2020.

As noted in *Prediction One,* and again in *Prediction Five*, indications of a very cautious and highly uncertain global economic outlook will test the agility and resiliency of multi-industry customer demand and supply networks. With all of this uncertainty and looming concerns on the part of senior business and financial executives, there will likely be a tendency to hold-off on major investment or change initiatives pending some signs of stability in overall geo-political and trade environments.

Thus, in the year 2020, our prediction is that the emphasis of advanced technology investments and ongoing business process transformation initiatives will lean toward addressing near-term compelling business priorities and more *Cloud* focused applications and corresponding *IT* infrastructure. As *previously outlined in Prediction Five*, supply chain digital transformation initiatives will similarly lean toward nearer-term interim objectives while preserving a common longer-term vision.

Business *CIO*'s will be under added pressure to reduce even more overall IT maintenance costs, but at the same time, have a similar direct focus on near-term compelling business priorities vs. longer-term, larger-scope in-house internal development or deemed expensive systems transformation initiatives. Technologies that are perceived as still maturing or requiring added development timelines will likely not make the prioritization criteria without compelling evidence. However, technologies that can enhance current available data, or democratize data needs across multiple business process areas are likely to be more favored. A likely continued attractive strategy will be one of deployment of *mini applications* built on existing available data, directed at solving a critical business process need.

Our belief is that the notions of near-term will equate to opportunities for improving productivity and efficiency of processes and work teams, accelerating the speed of overall decision-making as well as identifiable and obvious cost savings opportunities. Continuing needs to support key customer requirements, adhere to regulatory compliance or other deemed business critical needs will remain in the forefront, as will solving problems that have a measurable value to desired business outcomes.

Likely areas of such priorities will be:

- Opportunities related to added business process automation, productivity of assets and people or transfer of process responsibilities to key suppliers.
- Near-term new business revenue generation opportunities such as digital enabled business models, automated equipment services and maintenance, or other subscription-based services.
- Efforts directed at better informed and more agile decision-making including more prescriptive, predictive or scenario-based decision-making capabilities applied to either sales and operations, supply and customer demand network operations planning. In this same context are efforts that are described as either democratization or concurrency of planning and decision-making across broader business and functional teams.
- Product-level track and trace processes needed to satisfy either business, regulatory or industry mandates or prioritization needs.
- *Cloud*-based technology investments that address both applications and avoidance of existing or added *IT* infrastructure, facilitating more ongoing expense or cash savings.

A final area of impact related to advanced technology adoption prioritization in the coming year specifically relates to the small and medium business segment where many *B2B* supply and customer demand partners reside. Many of such businesses were already at a disadvantage in technology due to restricted resources and technology investment resources. With the year 2020 likely to provide more supply chain complexity and uncertainties, not investing in the noted priorities could run the risk of being left behind.

For the overall advanced technology provider and implementation services communities, the key competency in 2020 will be the ability to succinctly message and demonstrate a specific technology's business outcome value to collective *C-Suite*, *Line-of-Business*, as well as cross-functional business communities. The positioning of broader *Cloud*-based technology and applications technology suites will serve as assuring longer-term technology deployment consistency, but at the same time, the ability to deploy at the cadence required by existing business conditions.

In the following paragraphs we address specific technology areas and their implications.

Artificial Intelligence (AI) and Machine Learning (ML) Enabled Processes

Our belief is that *AI* and *ML* enabled processes will garner the most attention in the coming year in supporting customer fulfillment, sales and operations planning, supply chain planning, physical process and other applications and decision-making processes. The goal will be to change how processes and decision-making are managed and how teams can free-up time to focus on the most important and business impact decision needs.

Elements of machine-learning have successfully be applied to supply chain planning process support where advanced analytics and process learning can provide planners with far more timely insights. Technology providers are leveraging this technology to enhance integrated business planning processes that bring together sales, operations and business financial planning integration and synchronization. Likewise, this technology can be leveraged into areas of increased automation, productivity or efficiency needs, freeing-up existing teams to perform more value-added work beyond transactional maintenance.

At the same time, technology providers have rightfully toned-down their overall *AI* hype and instead are focusing on how such technologies can address business challenges for added worker productivity, efficiency or assurances for removing drudgery in day-to-day processes. That stated, there is a noticeable groundswell of concern being raised on the applicability and wider deployment of these technologies will remain a challenge for the technology provider community. Also, in the current year, overall *AI* enabled technology and deployment costs will become an important business determinant criteria.

We believe that businesses will be more attracted toward packaged and proven *AI* applications vs forms of technology toolkits. Thus, *AI* enabled packed applications stand the best opportunity for momentum. Opportunities to leverage AI/ML with chatbots or *Internet of Things (IoT)* technology in packaged applications will remain attractive. Expect to see added 2020 merger and acquisition activity in this specific area among various specialty technology providers.

Our belief remains that *AI* based technology will be deployed to initially support obvious process challenges. Wider scale multi-industry deployments remain within a two to three-year window depending on industry and business size determinants.

One of the more active areas of deployment that will show promise will remain in the leveraging of *AI/ML* within advanced robotics in automating physical pick and pack activities associated with higher levels of online orders incurred by retailers and direct-to-consumer product providers. The business case focuses on overcoming shortages of customer fulfillment labor required during peak order periods, the ability to conduct customer order fulfillment in a combination physical and online retail facility, or the ability to compete more directly with *Amazon* which is reported to be working on more advanced and broader capabilities across its business areas. A grouping of innovative start-up vendors continue to leverage millions in start-up funding to develop automated mechanical technology that leverages advanced machine learning.

Internet of Things (IoT) Technology Enablement

For 2018 and again in 2019, we predicted some pause or narrower scope in *IoT* technology deployment efforts because of the increased sensitivities toward data security or data vulnerabilities. We observed that wider-scale, multiple-process or line-of-business deployments will remain deferred until the cyber-threat landscape has built more creditable defenses to assuage stockholders. Individual *IoT* technology providers further needed to address more obvious business use case opportunities in addition to addition more comprehensive data and information protection safeguards, including conformance with global-wide information security standards that include encryption and autonomous monitoring of data security.

Our belief is that in 2020, *IoT* technology enablement among potential customers will be prioritized toward support of specific promising new digitally enabled business process opportunities. We further view *IoT* as not so much as a stand-alone technology, but one complimented by other technologies such as AI/ML or *Blockchain*.

One of the more obvious process opportunities for leveraging *IoT* remains across *B2B* supply chain network platforms, but *B2B* technology provider readiness in areas of overall applications integration, deployment costs and world class information security standards conformance will be the determinant as to whether the year 2020 is a breakout year.

Blockchain Technology

Our belief is that in the year 2020, *Blockchain* enabled technology deployments will remain in proof-of-concept pilot stages despite ongoing technology vendor hype.

As with other advanced technologies, compelling business cases are the primary driver of technology adoption. While *Blockchain* has the potential to address specific business case needs for proof-of-custody, product traceability as well as process trust and validation, there remains a number of unknows related to transactional scalability and overall short and longer-term deployment costs. of the technology. As to what occurred in 2019, the lack of generally accepted global standards related to distributed ledgers, along with underlying technical platform components remain.

While we continue in the belief that pilot uses cases applied in item-level food or product safety traceability, supply management traceability of banned materials or forced labor, or deemed ocean container custody and traceability of hazardous cargoes, we have adjusted our expectations for broader application and deployment of this technology to the 2021-2022 timeframe.

B2B Supply Chain Business Networks

Supply chain management teams can anticipate leading *B2B Business Network* platform technology providers to continue to broaden their support of end-to-end supply and customer demand process areas, beyond specific functional focused areas of either supply management and procurement, logistics and transportation, end-to end planning and customer fulfillment support processes. Our belief remains that the most attractive business case opportunities remain in connecting broader end-to-end process areas in near real-time dimensions.

In order to accelerate that objective, much emphasis is being place on any-to-any data, information and decision-making support needs in areas of external transactional, identity, decision-support and operational *Edge* systems integration. That will likely continue to include *Application-to-Application*, *Cloud-to-Cloud*, *Device-to-Cloud* and streaming data stream integration capabilities across networks.

More quickly evolving areas include industry Clouds focused on operational systems, actual customer machines and equipment operating in respective industry environments generating rather useful data related to use, conditions and purpose.

Data Governance and Management

Building concerns and legislative efforts directed on the overall accountability of safeguarding personal and customer data will remain a global-wide concern in the coming year. The *European Union's General Data Protection Regulation (GDPR)* adopted in May 2018 remains the forerunner to other significant country, state legislative mandates that will occur. The continuing fallout as government and business interests gain more understanding of the growing scope of cyber-security threats, adds to the increased emphasis of having a defined and effective data protection plan for any business.

Data protections invariably lead to the supply and customer focused networks, and thus we remain of the belief that supply chain management and cross-functional teams will be caught in the middle of such forces, causing redirection of technology priorities that are likely top-down initiated.

Technology Market Developments

Last year's prediction addressing the advanced technology area called for additional merger & acquisition activities among large enterprise, industry-specific and specialty best of breed *Cloud* platform providers in areas addressing supply chain management. Most of the M&A activity in 2019 involved the hot online *B2C* customer fulfillment and consequent logistics and transportation segment areas, where a lot of private equity and other investment monies flowed freely. Upwards of $1 billion in U.S. venture capital funding was targeted toward logistics and transportation technology start-up funding thus far, with many of these start-ups aggressively attempting to change traditional industry process paradigms of traditional transportation and logistics contracting, information and tracking processes.

For the year 2020, we predict a lack of elevated M&A activity primarily because of the ongoing uncertainties surrounding global financial and investment markets. Reports indicate a growing groundswell among investors towards perceived high growth technology start-ups that cannot demonstrate a record of consistent profitability prior to the desire for public listing in equity markets. Thus, for many technology and *Cloud* services providers, 2020 will be a year of concentration on sustaining growth in recurring subscription revenues and profitability. For smaller up and coming players, overall exit strategies will more than likely be postponed until financial markets return to levels of longer-term confidence.

The exceptions may be major enterprise and specialty technology players that have the internal cash and financial leverage to conduct tuck-in acquisitions, but here again, we anticipate such activities to not match year 2018-2019 levels. A further exception will be transportation carriers and brokers committed to investors to vertically-integrate transportation and online enabled logistics services. Here again, we do not anticipate any blockbuster M&A announcements.

2020 Prediction Seven: The technology-enabled disruption of global transportation, contracting and services processes will reach broader dimensions of technology-enabled disruption.

Prediction Summary

2019 Developments as Catalysts for Added Industry Disruption

In our 2019 annual prediction in this specific area, we declared that significantly increased annualized logistics and transportation costs that occurred in 2018 across global regions were unsustainable for individual shippers and consignees, with the industry model ripe for disruption and new thinking enabled by more modern and advanced technology applied to specific network challenges. In the *B2C* online buying sector, the aggressive presence of platform providers *Amazon*, *Alibaba* and some extent *Walmart*, and their quest for global-wide online retail platform dominance, added to the disruptive forces.

Essentially, our prediction amounted to the ongoing implications of a permanent shift by consumers toward a preference toward online buying, and all that this required a far different logistics, shipment and last-mile transportation processes. This has resulted in a convergence of forces between industry legacy thinking and digital based innovators.

By some accounts. In excess of $1 billion in U.S. venture capital funding was targeted toward logistics and transportation focused automation. Those start-ups have been aggressively attempting to change the paradigm of traditional transportation contracting, freight data and tracking processes in efforts to connect the physical and digital aspects of logistics and transportation movements. Such investments extended beyond the U.S. to include major online economies of China and India.

Two additional forces compounded the *B2B* supply chain sector in 2019.

The first was reductions in overall larger scale transportation movements, precipitated by a global-wide contraction in manufacturing and supply chain activity levels. The result was a significant moderation in surface transportation rates, especially the trucking sector. The second was the increased implications of an ongoing trade war among the U.S. and China that prompted retailers and manufacturers to quickly alter sourcing, logistics and transport patterns. From our lens, structural global-wide sourcing changes began to occur in 2019, and we predict that trend will most likely continue into 2020. China has become the obvious unknown, in terms of market access, or outright competitor in strategic supply chain components.

Backdrop- Logistics Managers' Index

The Logistics Managers' Index (LMI), a monthly survey of logistics managers and professionals which reflects broad-based activity, registered a value of 54 in December 2019, 9.5 percentage points below that of the year-earlier period. The average for all of 2019 was an overall 57.1 value. What further occurred in this industry-wide index in 2019 was a shifting of sub-indexes, specifically, declines in transportation pricing and inventory levels that drove the index lower in the second half of the year. The report authors pointed to declining inventories and high uncertainty as to economic growth in the coming year as dragging down the index. Noted was that while growth continued, the December number was at the slowest rate in the history of this index. Further stated:

"It seems to indicate that the U.S. is currently in an uncertain economic time. While it is possible that the we are through the "soft patch" we hit last year. Many CFO's are still concerned about a recession due to the ongoing trade wars and weakness in other parts of the world."

From the industry lens, such data points to a slow and uncertain start to 2020 for logistics and transportation activity.

Year 2020 Perspectives

In the year 2020, global logistics, transportation and third-party logistics entities will continue to confront the converging forces of industry business model disruption. Ongoing advanced technology and online enabled business and process disruption will add to more visible signs of either industry consolidation or added industry innovation.

A late 2019 assessment from *Morgan Stanley* declared that based on a current growth trajectory, *Amazon Logistics* will surpass an annual volume rate of 6.5 billion packages in three years. That volume surpasses the current rate of established carriers *FedEx* and *UPS*.

The industry has finally acknowledged that *Amazon* exists as significant disruptor. The dimensions span influencing of online hosted supplier transportation vendor choices, aggressive contracting of supplemental transportation services that ultimately influences spot market rates, and the online provider's continued aggressive investment in global-wide logistics and transport capabilities that increasingly will rival established services providers. We predict that in the coming year, the industry will move beyond acknowledgement of Amazon's threat, and more towards more succinct strategies on how to best compete. That well could include headlines reflecting added acquisitions of innovative logistics and freight brokerage start-ups on the part of established carriers.

At the same time, ongoing contraction in global-wide supply chain and production activity levels will lead to yet another excess capacity challenge among transportation assets across the industry.

In the coming year, traditional third-party logistics and brokerage industry players must not only deal with the overall changing operational dynamics of the global landscape but must also meet the challenges of up and coming and well-funded technology driven start-ups. We would not be surprised it one or two significant acquisitions occur in this area.

Added Unknowns

Just as we begin to share the details of this specific prediction on Supply Chain Matters, a new and somewhat concerning unknown as emerged. The early January headlines of heightened tensions among the United States and Iran concerning the assassination of Iran's top-ranking military general has caused tensions among these two nations to rise significantly and for global oil prices to consequently spike. Whereas, the price of *Brent* crude oil closed at $61 per barrel on December 31, 2019, after Iran launched ballistic missiles striking two U.S. military bases located in Iraq, the *Brent* price immediately spiked upwards of 5 percent. As to whether ongoing tensions continue among the two nations, and as to a spillover involving broader *Middle East* hostilities is a big unknown. Obviously, this will be a significant impact affecting global logistics and transportation industry interests as well as multi-industry supply chains in terms of added cost and services implications.

Ocean Container Transport

In the coming year, ocean container industry players must once again manage the realities of declining global trade and consequent cargo movements. A belief that trade tensions will subside would be ill advised. The industry will further be impacted in 2020 with the initial implementation of new global emissions and fuel burning regulations, termed *IMO 2020.* This new regulation calls for marine transportation to burn fuel with a *sulfur* content that does not exceed 0.5 percentage, compared to the former use of bunker fuel that had a limit of 3.5 percent. Ships can either burn ultra-low *sulfur* diesel (*ULSD)* or utilize scrubber technology to limit *sulfur* emissions. Industry experts indicate that vessels that have been outfitted with new scrubber technology with have a significant economic advantage over ships that elect to burn *ULSD* because of the large spread of pricing of crude vs. refined diesel. Since carriers have already made their technology choices, the dynamics of the market will play out. In either case, container shipping rates were already spiking at the start of 2020, because of the added cost impacts of *IMO 2020*. All of these dynamics imply added ocean transport costs for shippers, the question is how much?

Industry leader *Maersk Line* must not only manage global excess ship capacity but make good on the carrier' business objectives to horizontally integrate services that include more land-based logistics and last-mile delivery. *Maersk* declared to investors that half of the carrier's earnings will stem from inland logistics in coming 2-3 years. That strategy likely implies increased technology investment including added acquisition activity in the coming year.

Trucking Industry

As we prepared these predictions for 2020, it was clear that the U.S. trucking industry would face added business challenges in the coming year after what industry media has described as the bloodbath of 2019. with reduced market demand meeting excess capacity. Such challenges will continue to play out in carrier financial results in the first half of 2020.

A further compounding factor was the influence of online retailers such as *Amazon* and *Walmart* in market capacity demand and in driving down trucking rates by aggressive contracting. Reported were hundreds of smaller trucking firms having to suspend operations with corresponding lost truckdriver jobs. There were two noteworthy bankruptcies that caught the attention of industry observes, *New England Motor Freight* and *Celadon Group*. The former believed to be caused by a decision from Amazon to move trucking needs in-house and the latter being financially self-inflicted. We predict that in 2020, there may well be other headlines.

Longer Term

In the two to three-year window we foresee efforts in managing dynamic networks, networks that peak and ebb with planned and unplanned business or retail industry events in the economy or natural disasters causing network disruptions. When network capacity levels peak or ebb, the challenge turns to optimizing any and all lanes and movements of that network. Real-time end-to-end network visibility is paramount not only for accommodating customer shipping needs but in identifying load opportunities from a variety of networks.

Our belief that multi-industry and global supply chains will eventually witness the creation of *Network of Networks* as business strategies and advanced technology that aligns to future levels of capability. Such scenarios begin to apply to logistics fulfillment platforms with branded names. Consider online customers being offered choices such as same-day or next-hour virtual courier, *FedEx, UPS,* national postal carrier, each with a cost and service bid offered to the customer. Consider existing online retailer platforms offering the similar choices with contracted carriers as capacity opportunities make themselves available in online tendering. We may will see discernable signs of such strategies being percolated in the 2021-2022 period.

2020 Prediction Eight: The multi-year transition toward Digitally Enabled Response Networks will similarly be more Line of Business focused.

Notions of Digitally Enabled Response Networks

In 2018, we initially described the notions of ***Digitally Enabled Response Networks*** as a multi-year effort in business response processes, talent and advanced technology capabilities directed at the automation and synchronized decision-making responsiveness of either end-to-end customer demand fulfillment, supply network response, or combinations of both capabilities. They are representative of a foundation for *Supply Chain Digital Transformation* enablement but are specific to businesses focusing on *direct to consumer* or *business to business* customer fulfillment, or services focused business models that cater to end-to-end automation of product or services fulfillment.

Overall, such networks represent unified capability that moves beyond "*chain*" to that of dynamic network ecosystems linking near real-time customer demand to available supply in an autonomous process driven response. Such capability includes extensions of planning and fulfillment processes externally, involving key customers, suppliers and services providers in a federation of highly connected and integrated supply and product demand response networks. In many cases it requires *Cloud* based *B2B* connectivity linking various networks, including the notions of *Internet of Things (IoT*), Artificial Intelligence and *Machine-Learning (AI/ML)* enabled capabilities, or often. combinations of both.

Initial examples of such capabilities that we have researched and written about include machines that communicate their operational state and trigger the need for either needed consumable products or repair parts. Other examples are retail or online outlets that communicate inventory replenishment needs directly to supply network partners based on anticipated or actual demand patterns. The notions of smart appliances, automobiles and trucks, intelligence-laded industrial machines communicating specific needs all fall into this umbrella. They all embrace the connecting of physical to digital processes in various forms of process automation and peer-to-peer collaboration and synchronized decision-making.

Year 2020 Prediction

Similar to *our previously noted 2020 Prediction Five* addressing *Supply Chain Digital Transformation* initiatives in the coming year, our belief is that *Digitally Enabled Response Network* focused initiatives will similarly be more line-of-business or specific business level objective focused in the coming year.

We predict that priorities will be weighted either by near-term line-of-business, customer demand fulfillment or supply network process response needs. End to end extended supply chain visibility and coordinated decision making will remain as the predominant objective, but in definitive scope initiatives that have measurable and meaningful business benefits relative to directly supporting top-line revenue growth or building strategic capability that can be leveraged among multiple business lines.

The above stated, we continue to believe that such capabilities will be fundamental to business future growth, regardless of the highly uncertain economic environment that *C-Suite* executives must navigate. Thus, the continuation of momentum in such capabilities will remain strategic in a pre- or post-recession environment. However, in the current year, we anticipate that initiatives will likely be more focused on a chosen few, most important network response capabilities that will address the most promising top-line revenue expansion opportunities.

We therefore believe that *Digitally Enabled Response Network* capabilities will likely be positioned under the umbrella of increased business efficiency, productivity and market responsiveness categories of budgeting and resource allocation, and likely tied to near-term, succinct identifiable and quantified business benefits.

Technology Support Landscape

For *B2B* platform and enterprise advanced technology and services providers, the obvious implication is that the focus enabling *Digitally Enabled Response Networks* in 2020 must be keenly focused on assisting customers and prospects on enablement of near-term business objectives while assuring said buying groups that platforms are flexible enough to meet both long and shorter-term objectives. A critical consideration will be the ability to integrate a customer's data and information stacks spanning both internally installed legacy systems and existing, multi-vendor *Cloud* based systems.

Promises of long development timelines or elongated solution timetables related to information integration, by our lens, will not be well received other than to seek other market alternatives, likely with log-term recurring cost as a significant determinant. Subscription based pricing for *Cloud* based platforms must be market competitive or market differentiating, since proposals for rigid elongated multi-year platform payments without considerations for an unpredictable business or industry environment are not going to be favorably looked upon by individual *C-Suite* executives.

2020 Prediction Nine: The positioning for global online Retail and B2B Presence will scale back toward more geographic, Omnichannel and regionally focused online fulfillment, federated logistics, payment and last-mile delivery network capabilities.

Prediction Background and Context

This specific prediction is somewhat of a carryover from that of 2019, when we predicted that the positioning for global online *B2C* retail and *B2B* platform presence among ***Alibaba, Amazon***, ***Walmart*** and select others would meet the realities of domestic and international geo-political forces, the investment community and ongoing trade tensions.

We identified to three overriding forces in 2019 which carryover to the current year in different dimensions of market realities:

1) China's dominant online providers *Alibaba* and ***JD.com*** as publicly held companies were accountable for delivering expected revenues and profits. In the second-half of 2019, *Alibaba* raised an additional $20 billion of equity in non-U.S. markets in order to reduce U.S. investor influence in light of the continuing trade tensions among China and the United States. In spite of an expected slowdown in China's online economy, both providers managed to achieve impressive revenue growth, while continuing strategic investments in more geographic regional based capabilities.

2) The same growing fears of an ever more escalating trade war involving what could likely be two very large online market communities resulted in different mercantile alliances such as China and Russia, or China and select Middle East or African regions. China's own domestic economy continues to show strains of economic stress as consumers reportedly have cut down on overall spending. The implication is that Alibaba would continue to focus a growth strategy on other designated key geographic regions favorable to China. For all of the dominant global online players, strategic countries are identified, and strategies remain on garnering customer stickiness and market-share while fending off domestic and international competitors, or concerns among local governments for too much foreign influence.

3) The market prize remains that of ***India***, with an online market expected to eventually be upwards of $100 billion in the next three years. This country's retail sector it largely dominated by very large numbers of small retail shops and shopping stalls. Local food, grocery and merchandise shops termed "*kiranas*" largely dominate the brick and mortar landscape and retail economy. In this specific region, *Amazon, Alibaba, Walmart*, and to some extent local retail channels are fiercely competing for online market traction. National and local government political factions continue to favor India's domestic online and brick and mortar players with restrictions for investments in domestic retail players by foreign entities. In 2019, India was the area where global online players met their match with domestic political

forces neutering strategies for increased presence, forcing most all of these players to adapt or modify their plans and effort

All three of these global market forces will indeed carryover in 2020 with perhaps added nuances and specific regionally based developments. With a lot of money interests at-stake, this remains an evolving area to watch closely since global-wide *B2C* and *B2B* market influences are the table-stakes.

Year 2020 Prediction

We predict that efforts among *Alibaba, Amazon, Walmart*, and to some extent, select domestic and other online players seeking international growth, will scale-back toward more clearly defined geographic or regionally focused online customer fulfillment strategies. Emphasize will focus on more of a complimentary *Omnichannel* presence, while at the same time orchestrating and continuing to develop forms of federated online payment, logistics and last-mile customer delivery or pick-up and pay capabilities. Complimentary implies a combined *B2C* as well as a *B2B* collection of capabilities, similar to what is occurring across China, the United States and other key regions.

The battlegrounds will continue to center on the most lucrative growth markets for combinations of both online B2B and retail commerce activities.

India Remains Key Battleground

In the case of India, after the lessons of 2019, online platform players will continue to seek and mature more *Omnichannel* focused strategies in order to gain competitive footholds.

Amazon continues to partner with existing dominant brick and mortar retail chains such as *Future Retail*. Both are partnering to extend the reach of the latter's more than 1500 stores across India with *Amazon India* becoming an authorized online channel, and for food and grocery, *Amazon's Prime* two-hour delivery platform will be operational in a number of large cities across the country. That stated, Amazon continues to be challenged by ongoing domestic political forces that seek to preserve the country's existing and emerging domestic online and physical retail players.

According to *a December 2019 report from online publication Quartz India*: *"China's two technology behemoths, Alibaba and Tencent, have been aggressively snapping up stakes in Indian startups in the last five years—and many of the firms they've helped fund have crossed the $1 billion threshold to become unicorns."* The publication indicates that collective Chinese investment in India based technology start-up reached $8 billion in 2019. *Alibaba*'s strategy is to reportedly continue to tackle the country's mobile commerce market through strategic partnerships and investments in key domestic online players. However, the report indicates that *Alibaba* has some disappointment in the performance of some of its start-up bets and will likely adopt a wait-and-see-approach during the coming year.

Walmart, which has a large equity investment in domestic online platform provider *Flipkart*, has recently had to modify its prior strategies for the country. Rather than opening more of a combination of online and physical store presence, a new focus is reportedly centered on online provider *Flipkart*'s focus on *B2B* commerce supporting wholesale sales to local brick and mortar *kiranas* or stall- based merchants. At the same time, local merchants are utilized as local pickup and pay or last-mile delivery entities.

Domestically, one of India's wealthiest entrepreneur is about to reportedly launch a new domestic online initiative leveraging the country's retail shops as active intermediaries in an online buying experience.

The United States and North America- New Online B2B Battleground
In July of 2019, *Alibaba* introduced its *B2B E-commerce* platform to U.S. based manufacturers, suppliers, wholesalers and retailers for the first time. This move was an attempt to seize a new battleground in *B2B* online commerce related to this region.

The effort focused on allowing U.S. based businesses the ability to create their own digital based businesses on Alibaba.com to a reported 10 million buyers located in 190 countries. The announcement was perceived as providing a competitive alternative to Amazon Business, which allows U.S. businesses access to a market involving eight countries.

The major differences in *Alibaba*'s strategy is that online *B2B* sellers have to incur an upfront annualized *Basic* or *Premium* services payment to be able to take advantage of the platform's services. *Amazon Basic*, on the other hand, allows businesses to sign-up for no-cost digital storefronts, but the platform extracts a percentage of all purchases transacted with domestic or global-based customers.

Alibaba further struck an alliance with office supplier retailer *Office Depot*, allowing that retailer U.S. based customer's buying access to a number of international office and general merchandise product providers and suppliers including China. *Office Depot*, in-turn, garners the ability to sell its products online leveraging Alibaba's online global presence.

During 2020, which is a *Presidential Election* year across the United States, the political backdrop of a China based online provider competing directly with *Amazon* in the online *B2B* market landscape may provide some political fireworks.

Growing concerns in *Washington* relative to Chinese based technology companies presenting cyber or data security threats are bound to spillover to the online commerce market if Alibaba gains market traction. Then again, *President Trump* has had an ongoing feud with *Amazon* founder Jeff Bezos, thus this market thrust could prove interesting to observe.

Our prediction is that the Alibaba U.S. thrust will likely fizzle in 2020, given the heighted political tensions among the two countries.

Other Key Regions

Other key regions to watch are those of Singapore and certain Middle East online markets. Prior investments in online focused federated logistics and last-mile customer fulfillment capabilities continue to be made. Here again, domestic political forces and the geo-political landscape in 2020 could lead to added moves or developments.

2020 Prediction Ten: Unique industry-specific customer demand fulfillment and supply network challenges over the coming months.

Each year, we reserve our last annual prediction to what we anticipate will be industry unique strategic, tactical or operational challenges or opportunities spanning industry customer demand fulfillment and supply network ecosystems in the months to come.

Many of our noted industry-specific challenges are carryovers from prior year predictions but in differing dimensions.

Global Automotive and Truck Manufacturing

Global automotive and truck manufacturing networks continue to address the various multiyear opportunities and challenges related to the complex and difficult transition toward producing more electrically or hybrid powered vehicles including those with autonomous or on-demand driving services. Such structural market transitions stem from the needs for more aggressive measures to combat global warming and carbon emissions.

In the area of customer demand, the three largest and most influential global automotive markets, that being *China*, the *Eurozone* sector and the *United States*, each declined in unit volumes during 2019. China, recognized as the world's largest, declined 8.2 percent in 2019 and is generally forecasted to decline again in 2020. Similar total unit declines are being reported for the two other major markets.

This general slowdown in global demand comes during the strategic transition to re-architect strategic supply, vehicle designs and components that will make-up the industry's future global supply networks. A carryover from 2018 is the sourcing of adequate and cost-effective supplies of the unique rare earths and metals required to support larger production volumes of electrically powered autos and trucks. Last year, metals analysts began to predict that given the strategic demand over the next 10-15 years, the supply of metals such as *lithium, nickel, copper* and *cobalt* would be a challenge. For some metals, shortages would not be due to a lack of raw material but rather a lack of mines available to meet market demand.

The largest portion of cost-of-goods sold are the cost of storage batteries and electrical components. Countries such as *China* and *South Korea* continue to compete to be to offer the globe's most advanced design and production sources of advanced batteries.

Various global auto and truck manufacturers continue to seek out and develop strategic alliances, sometimes with other manufacturers, sometimes with strategic suppliers, to lesson the financial burden of significant added investments in required new technologies. By some estimates, technology development investments for new models range from $150 to $250 billion. Likewise, *Tier One* suppliers are leveraging their own M&A strategies focused on strategic technologies while leveraging the cost of added innovation. Such moves are further perceived as leveraging broader strategic supply agreements with global *OEM* manufacturers. Recent examples are *Meritor*'s acquisition of integrated electrical drive manufacturer *TransPowe*r, and *Borg Warner*'s $3.3 billion acquisition of *Delphi Technologies* in early 2020 , targeting *Delphi*'s propulsion products capabilities.

In order to hold market share in key trucking markets such as parcel delivery vans, personal pick-up trucks, commercial and heavy-duty trucks, truck manufacturers confront similar challenges.

The other unique challenge for the industry is the continued overlap with high-tech electronics design and supply networks. As more and more electronics make-up the hardware composition of future automobiles and trucks, bot industry supply networks overlap. Such overlap is fueling added investment opportunities among major suppliers as well as added merger & acquisition moves. All of this is expected to continue over the next one to three years.

High Tech and Consumer Electronics Industry

Adding to our stated overlap of high-tech and consumer electronics with automotive customer demand and supply networks, the primary challenge for 2020 resides with this industry's supply networks being caught in the apex of likely entrenched trade tensions among the *United States* and *China*. Despite the signing of a termed *Phase One Trade Agreement* among these two nations in January 2020, tensions related to technology dominance surrounding termed strategic industries, enhanced intellectual property protections and global market access will likely remain throughout the year 2020.

A new twist in trade tensions that developed in 2019 was the declaration of certain technologies as either strategic or subject to national security considerations. The most visible examples was the ban placed on Chinese high-tech manufacturer *Huawei Technologies* U.S. based supplier network related to specific components, and we anticipate that among other key strategic components such as semiconductor devices, battery and alternative energy technologies, domestic supply networks will be considered as tenets of national security. This trend will invariably lead to more domestic sourcing of such strategic components, especially those related to semiconductor, battery technology and alternative energy focused key components.

Semiconductor and packaged circuits segment will especially be embroiled in such ongoing geo-political tensions. In 2019, the seminal acts impacting escalating tensions was the U.S. imposed restrictions on the ability of *Huawei Technologies* and other deemed China based high-tech manufacturers to buy deemed market strategic components from U.S. suppliers, in essence cutting-off the U.S. supply network of key components. In mid-2019 the *Economist* commented that the ongoing conflict among these two nations may well be transitioning from one of trade to that of an advanced technology war, that will invariably impact high tech supply and multi-industry customer demand networks. U.S. semiconductor and packaged chip suppliers including *Advanced Micro Devices*, *Broadcom*, *Intel* and *Nvidia* were caught in the crossfire of such elevated tensions. Industry sources and high-tech focused supply chain leaders now indicate a growing concern as to whether strategic supply networks will turn toward a more near-shoring presence, diluting global expertise or economies of scale.

Another growing concern has been the multi-year plateauing of smartphone global markets, with the emphasis now shifting more toward a replacement market of less unit volume and overall profitability. The battle for dominance of termed strategic markets therefore becomes more strategic in areas such as artificial intelligence, advanced displays, battery and autonomous operations hardware technology. We anticipate added tensions and developments among these areas in the coming year.

Commercial Aerospace Industry

The ongoing multi-year challenge of this industry remains the scaling-up of volume production of more fuel-efficient commercial aircraft to meet multiple-year backlogs of airline customer orders.

During the last two years, the industry has been dealing with more succinct signs of shifting airline market brought about by the slowdown in overall global trade and heightened geo-political tensions.

Previous demand for large wide-body aircraft primarily driven by global based airline hub-to hub operating strategies has been waning while demand for point-to-point single aisle aircraft remains robust. Without attractive new aircraft designs, the impact of declining wide-body demand cannot be buffered. That alters the strategic financial and operational planning for the globe's two dominant manufacturer's: *Airbus* and *Boeing*.

Two years ago, *Boeing*'s cash flow generation was extraordinary, while *Airbus* was consumed by new aircraft design, volume production ramp-up and supply network challenges. In 2019, Airbus became the undisputed industry leader in inbound order intake and annual commercial aircraft delivery performance because of the unprecedented self-inflicted corporate crisis enveloping rival *Boeing*. What a difference in just a short period of time.

The ongoing corporate crisis surrounding *Boeing* and the elongated global groundings of the *737 MAX* aircraft have been the worst-case manifestation of disruptions to industry product design controls, monthly production and supply network strategy impacts. Despite *Boeing'*s best or what some would argue, worst efforts, the crisis has spilled over to the year 2020, with billions of added expenses impacting Boeing's expense lines. How this crisis is eventually addressed and resolved, and the subsequent learning and reforms that Boeing's senior leadership teams foster, and implement will determine how long it will take for *Boeing* to be once again considered a viable industry manufacturing leader and competitor.

Our 2020 prediction is that *Boeing* will continued to be consumed by its ongoing corporate crisis in multiple areas, and without significant management attention and commitment to needed reforms, this manufacturer will not successfully recover for quite some time, certainly beyond 2020. That has significant implications for the manufacturer's supply network partners and corresponding ecosystems.

Airbus faces a different but perhaps more enviable challenge, one of consistent and flawless execution in ramping-up existing production of in-demand single-aisle aircraft, timely testing and introduction of newly announced extended versions of the manufacturer's highly successful *A320-A321* aircraft, while having to deal with the likely geo-political fallout of a faltering prime competitor.

We predict that the hidden gem of Airbus in the year 2020 will be the *A220* series aircraft, previously identified as the *C-Series* aircraft that was acquired from *Bombardier Aerospace*. If Airbus can successfully execute the opening of new manufacturing capacity scheduled in 2020, this aircraft could serve as the interim global airline alternative for existing *Boeing 737 MAX* unfulfilled order demand.

Consumer and Packaged Goods Industry

This industry remains in the midst of challenges related to ongoing changing consumer tastes for more healthy food choices, confronting the challenges of direct-to-consumer distribution of products brought about by market shifts to online buying preferences, along with ongoing power shifting among the consumer products focused retail landscape.

Discerning customers armed with advanced technology tools seek more socially sustainable, regionally focused products along with more intimate reaction with brands. They demand full supply network visibility as to origin of food and products.

More agile, innovate product producers have been outperforming global-wide producers in revenue growth and product attraction which has led to elevated industry M&A activity over the past two years. The need for standing out in product innovation, more frequent and market-timely new product introduction cycles targeted to regional global tastes remains an ongoing objective.

At the same time, the continued presence of activist investors with emphasis on added cost reductions, higher levels of efficiency and productivity, the termed "*3G Effect*" , named after *3G Capital* and its aggressive *M&A* strategies took a decided turn in 2019. The significant financial stumble and multi-billion brand goodwill write-off incurred by *Kraft-Heinz*, provided a testament to the critical importance of providing innovative products and supplier networks.

Extended supply as well as contracted production networks need to be more aligned and responsive to continued market segment and distribution channel shifts. Our prediction is that this challenge will become more visible in 2020.

At the retail end, global grocery chains continue to invest in marketing and supporting higher levels of online order support, including added investments in either highly automated and robot laden regional distribution centers or mini-distribution centers that involve the physical store as a key component. Consumer product supply networks will likely be impacted by requirements for more flexible or customized packaging of products suitable for automated pick and pack, while at the same time demonstrating sustainably responsible use of materials.

Similar to our 2019 prediction for this industry segment, the challenge for attracting required new supply chain talent will be predicated on opportunities for added advanced technology enhanced process adoption and by demonstration of more vibrant leadership.

About the Author

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