The Pivot
to Digital
Transformation

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Harnessing digital technologies will be key to manufacturers' future success

Digitalization is rapidly transforming how companies operate and the way they go to market. The Internet of Things (IoT), big data, embedded sensors and geo-spatial tracking are just a few of the technologies that companies are using to gain greater customer insights, deliver better service, and drive competitive differentiation and revenue growth. Many manufacturers have started deploying some of these technologies on their journey to digital transformation.

Yet, to truly succeed in today's digital world, manufacturers will need complete supply chain visibility, from planning to execution, and the ability to leverage digital signals for real-time decision-making and collaboration. These capabilities are becoming increasingly important as the industry adapts to address the following trends.

The empowered consumer

Savvier about price and more informed than ever by digital research, today's consumers expect to buy anything, from anywhere, and have it delivered in two days or less (or within hours in some urban areas). As a result, manufacturers are facing shorter lead times with retail partners and tighter supply and planning constraints. Digital control tower capabilities enabling centralized visibility and traceability across all supply chain nodes, with real-time insights into inventory and asset positions, will become increasingly important as manufacturers adapt to these new planning and execution requirements.

Continued geopolitical uncertainty

U.S. President Trump's administration policies, as well as the negotiations between the United Kingdom and the European Union before and after "Brexit," reflect the rise of protectionism across the U.S. and Europe. There are also continued negotiations between major trading partners over import and export tariffs, further fueling geopolitical

uncertainty. In response to this ever-shifting geopolitical environment, manufacturers will need to rethink their supply chain network strategies. The ability to digitally simulate near-shore and offshore network models will enable manufacturers to evaluate the cost and tax implications of various network strategies and determine the most cost-effective approach.

Demographic shifts

According to PwC, there are two major demographic shifts occurring: up to 21 percent of the population is expected to be over the age of 60 by 2050, and the rate of population growth is predicted to slow.[1] These two factors mean manufacturers will soon face stiff competition from other industries when recruiting millennials and Generation Z. The differences between what generations value will also impact how manufacturers approach future product development, as younger generations value factors like a product's green footprint or fair-trade quality as much as, if not more than, its features, functions or price.
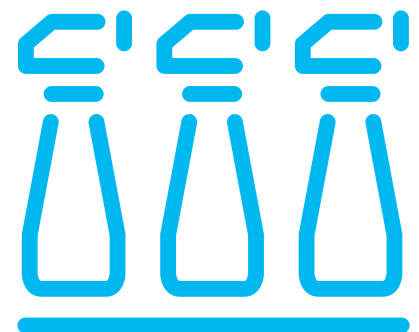
The rise of urbanization

Additionally, PwC is starting to see companies develop strategies around cities instead of countries or regions.[2] The United Nations predicts that by 2050 the percentage of people living in urban areas will grow by more than 10 percentage points, a migration of approximately 2.4 billion people.[3] Urbanization will have major implications on the service strategies that companies offer, especially when considering consumers' expectations for same-day, "within hours" delivery is already the norm in some urban areas.

Greater order fulfillment expectations and penalties

Many leading retailers have started pressuring manufacturers to deliver orders in-full and on-time, or face fines for late deliveries. Even with compressed lead times, manufacturers will need to invest in supply chain solutions that enable them to confidently meet their delivery commitments. On-time, in-full delivery is quickly becoming a table stake, and manufacturers that cannot do this effectively will likely be fined out of business.

The rapid pace of technological change

The current pace of technological change is astounding. Machines communicating with people and other machines has resulted in a massive amount of data. Market research varies widely on this topic, but estimates are that between 30 billion and 75 billion devices are connected in 2020, with those numbers growing exponentially. All these connections, coupled with the availability of faster and cheaper computing power and storage, have resulted in an abundance of data. Many companies will soon be drowning in data, if they aren't already. Manufacturers will need to have a strategy in place to mine this growing volume of data for supply chain insights and leverage it into competitive advantage.

How digitalization is driving the future of manufacturing

Based on these trends, we predict that the likely future state of manufacturing will center around three themes: connected, intelligent and autonomous. As machines, systems and devices become increasingly more connected and intelligent, it will be possible for certain supply chain functions to occur more autonomously. As we consider the future, we envision the following events occurring.

Digitalization of the supply chain

The use of IoT in manufacturing will become commonplace. Along with the projected increase of connected devices, there will be an exponential rise in real-time data from social media, news, events and weather (SNEW), IoT sensors, product ratings, pricing information, geo-spatial tracking, radio-frequency identification (RFID) and more. This real-time data can then be mined to predict future events such as equipment maintenance needs, potential supply chain outages, impact of weather on demand, supply delays and more. There will also be an acceleration of digital sales platforms, enabling manufacturers to directly serve their customers and grow revenue.
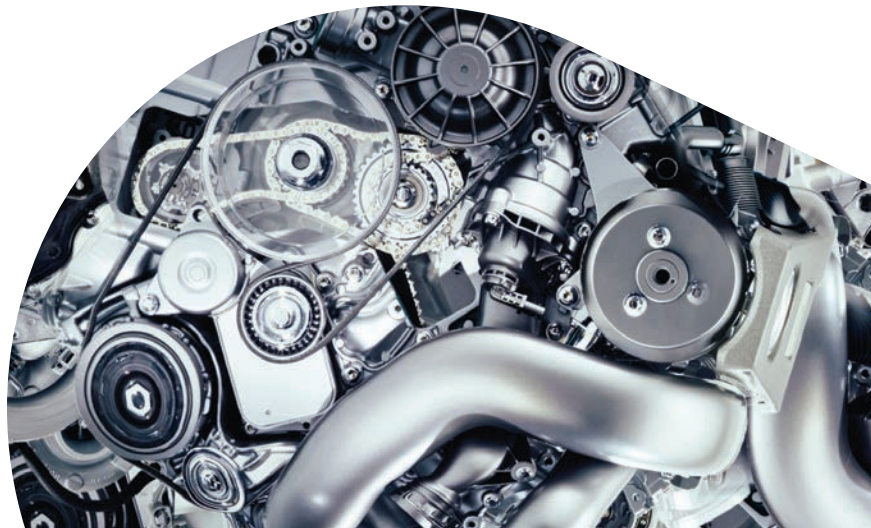
The availability of cloud computing will further fuel supply chain digitalization. Cloud computing enables "limitless" computing power, and it will continue to become cheaper to store big data in the future. Additionally, cloud computing is always-on, secure and reliable and can be coupled with managed solution services for various supply chain activities. The use of data science and cognitive computing has given rise to self-learning algorithms such as artificial intelligence (AI) and machine-learning (ML) that can help planners make better decisions, as well as prescribe solutions for unplanned supply chain events and disruptions. Planners will no longer need to sift through hundreds of thousands (or in some cases, millions) of exceptions as part of the decision-making process. These advancements will further fuel complex and automated decision-making, self-discovery of patterns and segments, and attribute-driven insights.

Evolution of linear supply chains into digitally connected networks

The traditional, linear supply chain will fully evolve into digitally connected supply chain grids. The empowered consumer and geopolitical uncertainty make this evolution a virtual certainty, as current supply chain configurations will no longer be profitable or effective to deploy. Instead, relationships among supply chain nodes will become digitalized, enabling multiple virtual supply chains to be created using a single set of physical assets. A network-based supply chain enables manufacturers to quickly respond to market disruptions or demand changes, while considering profit and business needs. As part of this evolution, companies will reevaluate the location of their physical assets, and consider moving their factories and distribution centers (DCs) closer to consumer demand.

Additionally, multiple companies will interoperate as one, providing consumers and business-to-business (B2B) customers with a greater variety of pickup and delivery options, all designed to meet the individualized needs of the end-consumer. Blockchain and distributed ledger technologies enable decentralized trust across a network of disconnected and untrusted entities. This is executed by making all transactions and state changes publicly documented, immutable and verifiable. Blockchain provides a full lineage of assets and transactions to better understand true product provenance and path through the supply chain. In addition, blockchain's shared ledger technology has the capability to expose an entire network as a map of interacting and connected nodes.

More informed views of their operating network will enable companies to become more vertically integrated, resulting in the convergence of the manufacturing, wholesale distribution, logistics and retail supply chains. This is already occurring as most manufacturers have started selling direct to consumers via e-commerce.

Smarter factories

The convergence of digital connections, intelligent systems and automation technologies will result in smarter factories. By connecting planning, production and digital interaction, these data-driven factories will have visibility into potentially disruptive supply events. Predictive analytics will enable a manufacturer to sense a potential delay or disruption before it happens, and then prescriptive analytics can be used to mitigate that risk. Additionally, sensors on everything will provide greater insights into equipment maintenance needs. As sensors become cheaper, they will be used on all assets and products within the factory to provide real-time visibility into all aspects of the supply chain, further enhancing organizations' planning and execution capabilities. As smarter factories evolve, the pace of technological change, combined with demographic shifts, will also result in fewer people in the factory.

Smarter warehouses

Smarter warehouses will use sensors to enable continuous visibility and monitoring. Already becoming a mandate for temperature-sensitive products such as pharmaceuticals and food, this type of tracking will eventually extend to all inventory types. Sensors will also be used to continuously monitor inventory quality and the maintenance needs of warehouse equipment. As personalized products grow in popularity, 3D printing will become an integral part of the smarter warehouse by providing last-mile customization.

Autonomous guided vehicles (AGVs) are already being used in some DCs to automate the pick paths for orders, and will soon become mainstream. Self-driving trucks will be used to autonomously transfer inventory between warehouse locations. The adoption of these new technologies will be driven by necessity as the demographic shifts previously mentioned will result in fewer warehouse employees. RFID will be leveraged to understand the real-time proximity of both human and robotic workers in a DC, and then AI will be used to facilitate task interleaving. Additionally, AI and real-time proximity data can be used to redefine labor standards and performance into automated, engineered standards, streamlining productivity of both human and robotic workers and AGVs.

Smarter transportation

Along with smarter factories and warehouses, there will be smarter transportation. Dynamic and predictive planning based on real-time constraints, such as traffic, port congestion and other weather-related events, will become the norm. Increased use of sensors and weather analytics will drive these iterative planning capabilities. As use of predictive insights grow, real-time updates will focus on details such as sequence of stops and appointments. Transportation-as-a-service will become more common, as drones are used to support last-mile deliveries. Drone fleets could be the first step toward enabling autonomous, driver-less deliveries. Additionally, last mile delivery will expand to include various location options such as locker systems. Amid all these changes in logistics, new collaborative networks will form that make it easier to develop and maintain carrier relationships.

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Personalization of the supply chain

Big data will offer greater insight into the path to purchase, enabling companies to better understand how they can serve their customers more effectively. Digitalized supply chains and factories will need to enable mass customization of products and support the "lot size of one" approach while delivering omni-channel engagement. In the B2B realm, segmentation enables companies to better understand the difference between high-cost-to-serve customers and low-cost-to-serve customers and enables them to realign supply chain strategies to better serve those unique segments.

Many manufacturers are becoming more vertically integrated by creating a digital commerce channel, or acquiring one. With this vertical integration, a new level of merchandising and assortment management expertise will be required from manufacturers, as well as real-time pricing and promotion optimization capabilities. Yet, as manufacturers sell direct to consumers, they will still need to operate with their largest, most important retailers as a category captain or as a

trusted advisor. The ability to leverage big data for greater consumer insights, especially when it comes to advising on shopper-centric, localized assortments, will become critical.

Risk and opportunity management will become a formal supply chain discipline

Continued geopolitical uncertainty will force companies with multinational operations to reexamine their network and inventory strategies more frequently. A new tax code or tariff, for instance, could impact where future plants are built, or where safety-stock inventory is positioned across the network. Given the complexity of today's global supply chains, the ability to evaluate trade-offs between different network and inventory strategies is invaluable. These capabilities will be aided by real-time scenario management, and supervised and deep machine learning will help mitigate risk and accelerate remediation for supply chain outages.

Embarking on digital transformation: your path to success

Digitalization will impact every part of your supply chain, from your policies, processes and network strategies to how you collaborate and deploy your assets and labor. To get started, you need to build a digital journey map that identifies the core business problems that must be resolved and the financial value to be gained. Next, you'll need to determine which systems and digital technologies will be required to support this transformation. Recruiting talent with digital science skillsets, as well as plugging into a partner ecosystem with access to data both within and outside your company, will be critical success factors to enable this evolution.

By starting your digital transformation now, competitive advantage, profitability and market differentiation are yours to gain. Delay in adapting to this new digital reality may have serious consequences. According to McKinsey & Company, "As digitization continues to progress, its expected effects on revenues seem pronounced. When respondents were asked how much of their companies' revenues would be at risk in the next three years if those companies took no further action to address digital pressures, they estimated that almost one-third could be lost or cannibalized."[4]

In this new digital world, digital technology and talent investments are no longer optional. The time has come to finalize and deploy your digital supply chain strategy. Connecting the digital threads across your supply chain will help your company not only survive, but thrive in this ongoing environment of disruption.

1. B. Misthal, PwC, "Influence of megatrends at leading industrial manufacturing companies," 2015.
2. Ibid.
3. S. Gold, Mediaplanet, "5 Megatrends That Are Transforming Manufacturing in 2017," 2017.
4. Digital McKinsey, McKinsey & Company, "How digital reinventors are pulling away from the pack," Oct. 2017.

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