

Automotive

July 2021

Global Automotive Supply Chain Outlook



CONTENTS

1	Introduction: Automotive Supply Chain	4
2	Global Automotive Industry Outlook	6
3	Regional Automotive Industry Outlook	8
4	Impact of COVID-19 on Automotive Supply Chain	11
5	Disruptive Trends & Challenges	15
6	Modern Supply Chain's Response to Challenges	21
7	Future of Automotive Supply Chain	25
8	M&A as a Solution to Supply Chain Challenges	27
9	Trading and Transaction Comparables	29
10	Team & Experience	37



Summary

The automotive sector plays an essential role in the global economy; it accounts for 5.7% of the economic output and more than 7% of the exported goods. In addition, the sector is the second-largest consumer of steel and aluminum among end-markets.

The global automotive supply chain is an interconnected ecosystem with production plants spread across different locations in Asia, Europe, North America, Latin America, the Middle East, and Africa.

Further, this mature industry has been amid a technological revolution with the emergence of autonomous vehicle (AV) technology, electric vehicles (EVs), and hybrid propulsion technologies. This revolution has caused leading original equipment manufacturers (OEMs), such as GM and Volkswagen, to pour billions of dollars into the development of new technologies and supply chains to support their ultimate mainstream production.

The breakdown of traditional trade agreements and production policies has created obstacles for global trade. The pandemic has caused additional challenges, and it has restricted global travel and the free flow of goods.

Reacting to the challenges faced, OEMs and suppliers have looked for creative solutions to solve global and regional supply chain challenges. A few remedies being pursued are:

- Alternative sources for goods and services
- Shortened supply chains
- Utilizing mergers and acquisitions (M&A) strategies to control important aspects of the supply chain

This report explores the challenges and solutions in managing a global supply chain and how M&A can be an important tool in a company's arsenal to address these changes.

1. Introduction: Automotive Supply Chain

Introduction

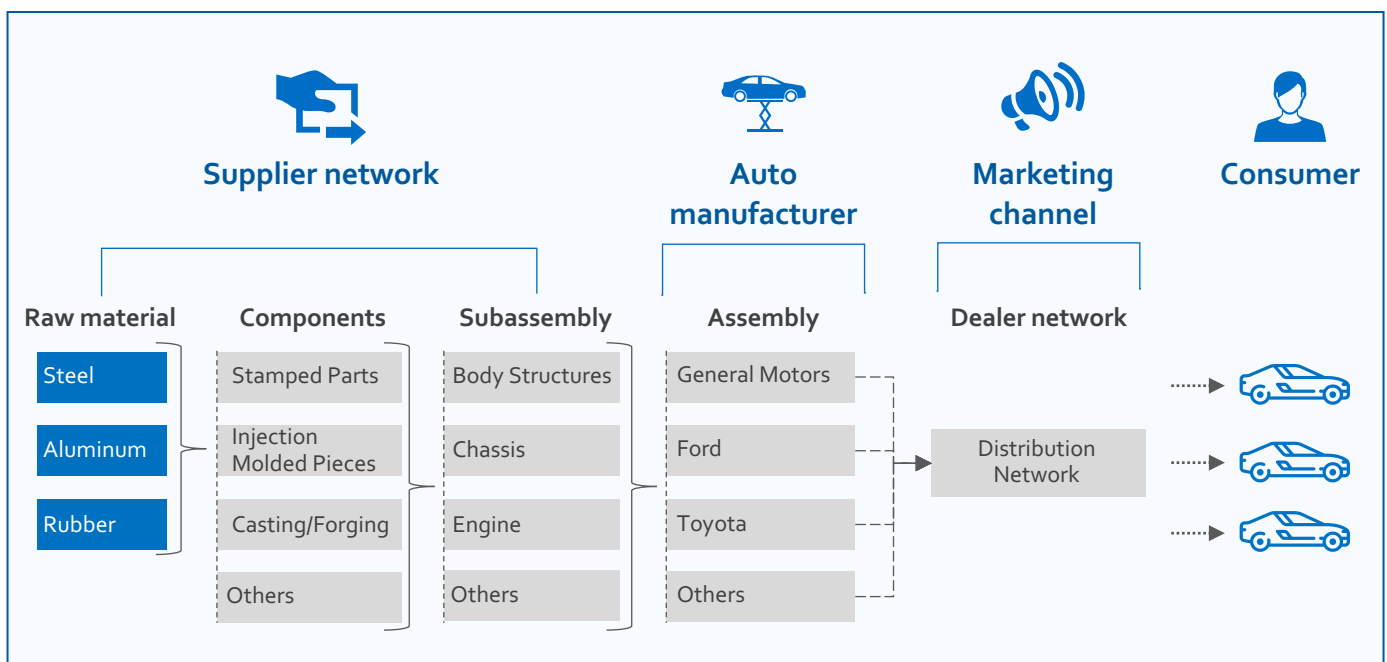
The automotive supply chain will experience a radical transformation in the future. Any change in the supply chain structure will significantly impact world trade and numerous national economies. Changes in manufacturing processes, disruptive trends, and the evolving consumer demand will impact the supply chain network with regards to raw materials, parts, and finished automobiles.

The automotive supply chain is one of the most complex in the world because each vehicle contains more than 30,000 parts developed from thousands of different suppliers across diverse global locations. Globalization and the emergence of advanced technologies have led to some unique complexities in the supply chain. Automotive suppliers need to adopt and invest in advanced technology to gain a competitive edge amid these growing complexities.

The automotive supply chain includes 1,000s of suppliers that offer ~30,000 parts required for manufacturing a single vehicle.

Car manufacturers procured more than 75% of parts from small suppliers in 2017.

In the automotive industry, effective supply chain management ensures that the required automotive parts arrive at the production sites on time. The average vehicle has around 30,000 individual parts. A delay at any one of the stages of the supply chain can slow down the production and distribution of critical components, which can result in a disruption of the entire automotive production line.



1. Introduction: Automotive Supply Chain

As automobile manufacturers move toward just-in-time manufacturing, any impact on the smooth construction and distribution of vehicles would mean inventory shortages and revenue loss. It is vital for automotive supply chain managers to work well with thousands of manufacturers and suppliers to streamline parts production and distribution.

Optimization of supply chain costs in the automotive industry is one of the most basic steps to improve the financial performance of a company. Due to increasing globalization, companies need to become more competitive in order to sustain in the market. The only way to stay competitive and retain customers is to offer products at reasonable prices. Supply chain costs' make up around 55% of the total product cost.

Automobile companies are moving toward lean manufacturing in order to reduce production costs. The concept of lean manufacturing involves focus on several principles, such as eliminating overproduction, reducing wait times, improving transportation systems, and reducing over-processing. The adoption of lean manufacturing processes essentially requires a top-notch automotive supply chain.

COVID-19 has disrupted the automotive supply chain, while creating new opportunities to regionalize supply chains as well as automate and implement other new technologies to address the pandemic-induced challenges.

2. Global Automotive Industry Outlook

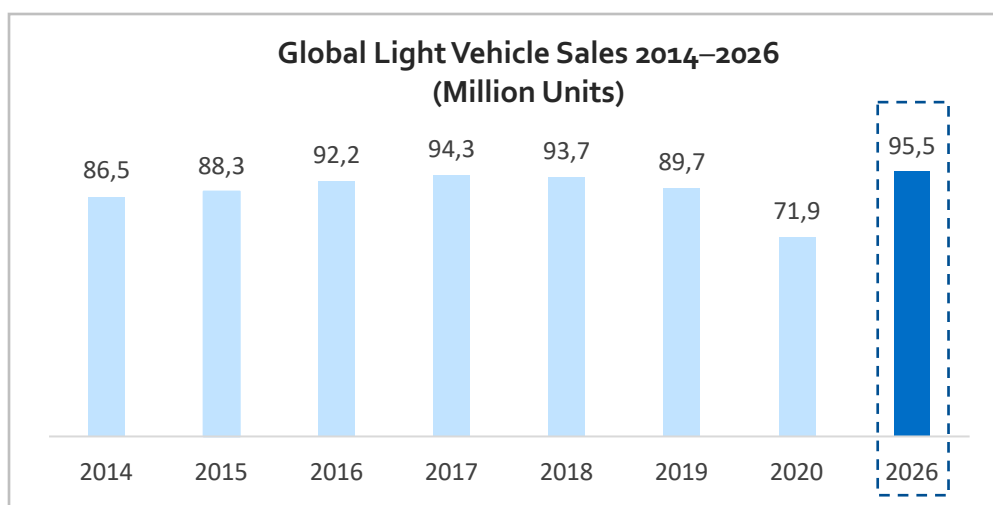
The global automotive industry slowed down significantly in the first half of 2020 as COVID-19 caused economies to close and eroded consumer confidence worldwide. Numerous production plants temporarily shut down and automotive companies and suppliers cut costs wherever possible. Suppliers experienced a drastic and unexpected revenue decline of up to 25% or more in the first half of 2020.

Even so, the reopening of local markets led to an increase in local production. Vaccine rollout induced optimism and has led to a substantial increase in automotive demand as economies step out of lockdowns.

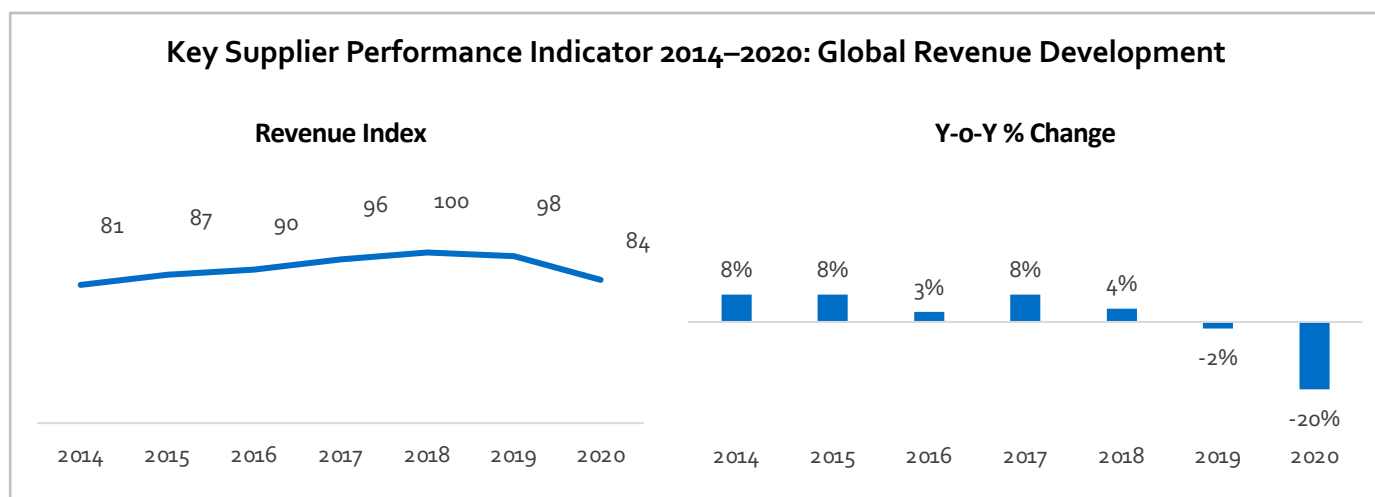
COVID-19 Hinders Global Sales While Uncertainty Looms

COVID-19 has rigorously impacted automotive sales. In March 2020, automotive sales flattened across all regions. The North American and the European regions experienced a huge decline in sales, which is indicated by a Y-o-Y decline of 21% and 24.0%, respectively. China also witnessed a similar scenario in the beginning of the year (2020).

The below diagram depicts global light vehicle sales from 2014 and 2026 and the decline in 2020 due to the pandemic.



Source(s): Roland Berger/Lazard



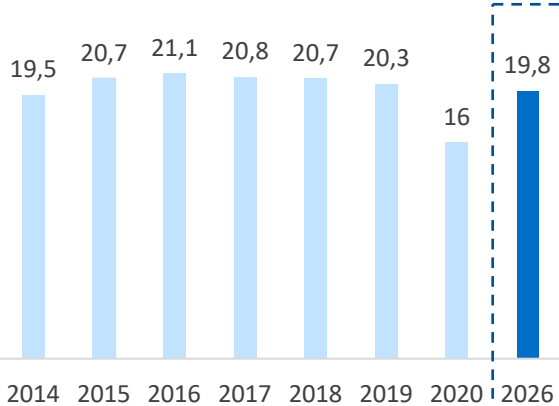
Revenue Index: 2018 = 100
n ~ 600 Suppliers

Source(s): Roland Berger/Lazard

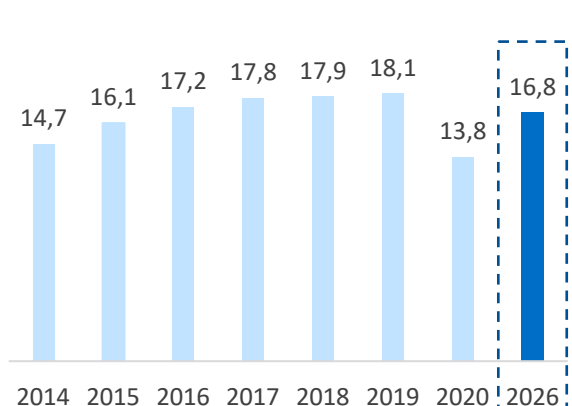
Light Vehicle Sales Projections by Region

Automotive industry volumes peaked in 2017–18; such levels to rebound by 2026

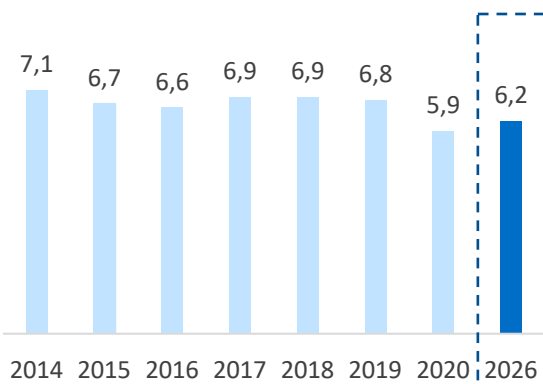
North America Light Vehicle Sales 2014–2026
(Million Units)



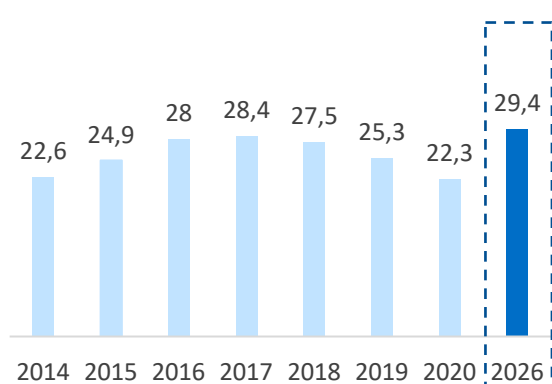
Europe Light Vehicle Sales 2014–2026
(Million Units)



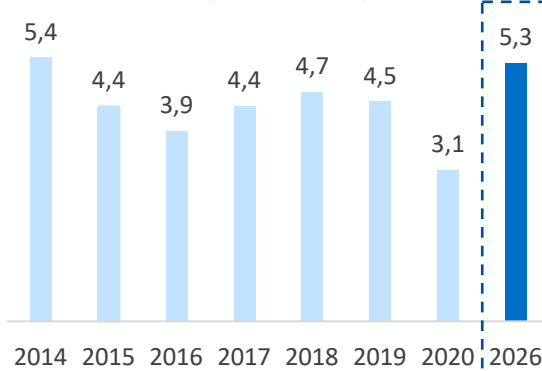
Japan/Korea Light Vehicle Sales 2014–2026
(Million Units)



China Light Vehicle Sales 2014–2026
(Million Units)



South America Light Vehicle Sales 2014–2026
(Million Units)



3. Regional Automotive Industry Outlook

Impact of Local Environmental Factors and Market Dynamics on Automotive Suppliers, Performance by Region

Differentiating Factors	Analysis	China	North America	Europe	Japan
Recovery Speed	• How are regions recovering from COVID-19 on short-term basis and with government crisis support?				
Sales Volumes	• How are light vehicles sales expected to develop in mid-term and long-term periods?				
Government Agenda	• How do government agendas and legal frameworks impact local suppliers and improve their businesses?				
Current Supplier State	• How is the current financial state of local suppliers and how are they positioned for future competition?				
Access to Capital	• How easily can suppliers access the capital for their growth plans?				

Strongly Negative

Negative

No Impact

Positive

Strongly Positive

Source(s): Roland Berger/Lazard

Government Initiatives and Recovery Speed

Types of Crisis Support

China

- Subsidies to encourage hydrogen roadmap
- EV subsidies and tax exemption prolonged by two years to 2022
- Gasoline-electric hybrids reclassified as more efficient than gasoline and diesel to help OEMs meet quotas
- Radical lockdowns of cities/areas to keep local COVID-19 outbreaks under control

North America

- Internal Revenue Service rolled out economic impact payments
- Deadlines for making 2019-tax-year contributions to Individual Retirement Accounts and Health Savings Accounts postponed
- Tax credits worth up to 50% of the wages paid during the crisis for retaining employees

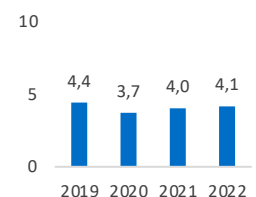
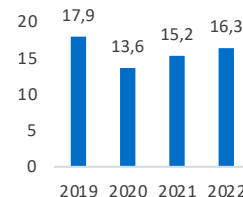
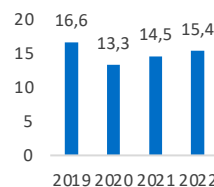
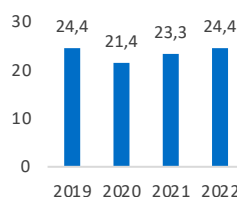
Europe

- France announced EUR 8 Bn in aid of auto industry; including consumer incentives for EVs
- Incentives and reduced taxation on EVs by the German government to promote low emission vehicles
- Implementation of reduced VAT (19% to 16%) in 2H 2020 and short-term plan to extend options further into 2H 2021
- Joint EU bailout plan worth EUR 750 Bn paid out until 2024

Japan

- Extension of environmental tax cut on automobiles being considered
- Employment adjustment subsidy program to support employers; maintaining employment by paying leave allowance and offering partly-paid leaves, rather than dismissing them
- Loan plans for COVID-19 hit firms and other support worth EUR 800 Bn

Light Vehicle Sales Recovery (Million Units)



Impact on Automotive Suppliers



3. Regional Automotive Industry Outlook

Regional Outlook

Americas

- **US–China Trade War and Revised Trade Policies to Drive Plans for Alternative Sourcing:** Faced with uncertainties over price and availability of parts from China, manufacturers in the US have no choice but to develop plans for alternative sourcing. Automakers in the US may soon be contending with a variety of new trade restrictions proposed in the recently renegotiated US–Canada–Mexico Agreement (USCMA), which is intended to encourage more domestic manufacturing.
- **Adoption of EVs:** The demand for EVs varies significantly from country to country. Manufacturers in the US are trying to maintain a balance between investments made in EVs and internal combustion engine (ICE) vehicles. Incentives and exemptions are offered across 39 US states on purchase of EVs, while over 90% of the states offer EV charging incentives. However, the situation in South America differs in terms of EV adoption, and is also expected to significantly lag in the foreseeable future.
- **Focus on Improving Job Skills and Knowledge Transfer:** Automakers and their suppliers rely on a wide range of highly skilled workers all along the supply chain to maintain the consistency and quality of the vehicles they produce. Manufacturers are taking steps to fill in the skill gaps in their workforce along their supply chains. For example, BMW has introduced German-style apprenticeship programs at its South Carolina plant, while Ford, GM, and Toyota work with the Automotive Manufacturing Technical Education Collaborative (AMTEC) to arrange program partnerships with community colleges near their US plants.
- **Autonomous Vehicles to have Significant Impact:** Some of the biggest proponents of AV technology in other industries, primarily Google and Uber, are scaling back expectations for the widespread adoption of AV technology. Meanwhile, manufacturers continue to invest billions into AV R&D. While Tesla already sells AV-ready vehicles, most manufacturers state that they will have them prepared for highway driving by early 2025, which indicates the significant impact of AV technology on the automotive supply chain industry.
- **Transportation Options and Modality Shifts:** According to the American Trucking Association, there were 60,800 unfilled trucking positions in the US in 2018. The number is projected to almost triple within 10 years as older truckers retire and fewer young people are eager to replace them. Thus, the shortage of drivers will affect supply chain logistics.

Europe

- **Adoption of EV-Friendly Environment:** Europe represents about 2% of the overall EV market. However, a rapidly evolving charging infrastructure, an EV-friendly regulatory framework, and broader cultural acceptance for EVs in general create a welcoming environment for electrification in the EU.
- **Effect of Brexit on Global Automotive Market:** Automakers worldwide braced for the consequences of Brexit. European parts suppliers and automakers, particularly with manufacturing facilities in the UK, found severe and even permanent supply chain disruptions. This created a climate of worrisome instability for supply chain professionals in Europe.

3. Regional Automotive Industry Outlook

- **Domestic Product Sourcing:** Shifting trade policies and stringent regulations in Europe have led to a general trend of sourcing materials locally. Political instability around the world is likely to result in continued domestic product sourcing. Furthermore, government incentives designed to encourage local business investment would reinforce this trend.

APAC

- **Complex Supply Chain Transition in the Era of EVs and AVs:** Increasing momentum of AV and EV technology adoption by OEMs is dramatically shifting the supply chain logistics. Despite the buzz for EVs, the consumer demand is unstable and depends on the cost of gasoline, government incentives, charging logistics, and shifting climate change policies. Based on a survey conducted by Thomson Reuters in 2019, 70% of the respondents agree that the transition to EVs is quite challenging due to the requirement of new parts and components, which complicates the traditional supply chain.
- **Rising Customer Expectations Affecting Supply Chain:** Factors such as the growing demand for advanced features in lower-priced vehicles, increased level of customizations, and quicker delivery of vehicles would exert pressure on the supply chain. 87% of the survey respondents agree that advanced features, such as cruise control, rear-view cameras, improved sensors, and collision warning are perceived more as necessity than luxury. Therefore, the growing demand for advanced features is expected to have an impact on the automotive supply chain.
- **US–China Tensions to Open-up Opportunities for Other Countries in the Region:** Trade conflicts between the US and China may benefit countries, such as Malaysia and India, which have more than 800 auto component manufacturers with the potential to serve as primary or secondary suppliers to Chinese counterparts. However, countries such as Japan and South Korea where cars are assembled might face challenges to ensure consistent and reliable supply of auto parts.
- **Changing Trade Policies to Ease Multi-Region Sourcing:** Although the international trade policies and the regulatory environment are highly volatile, trade professionals in the region are foreseeing increased supply chain reliability. 86% of those respondents agree that automotive supply chain companies will play a vital role in advocating favorable trade policies in the region to mitigate disruptions and stabilize the market.

Impact of Evolving Regional Government Regulations

United States-Mexico-Canada Agreement (USMCA) replaced the North American Free Trade Agreement (NAFTA) rules because the previous agreement discouraged automotive manufacturing and investment in the US. As per the new USMCA rules, automotive manufacturing factories and supply chains are shifting back to the US. According to USMCA, the sector will receive more than USD 34 Bn worth of investments and will create 76,000 automotive jobs in the US. Additionally, more than USD 23 Bn worth of automotive parts are expected to be purchased from the US automotive manufacturers between 2019–2023. The new agreement boosts the US domestic supply chain and encourages the development of automotive parts in the local market.

4. Impact of COVID-19 on Automotive Supply Chain

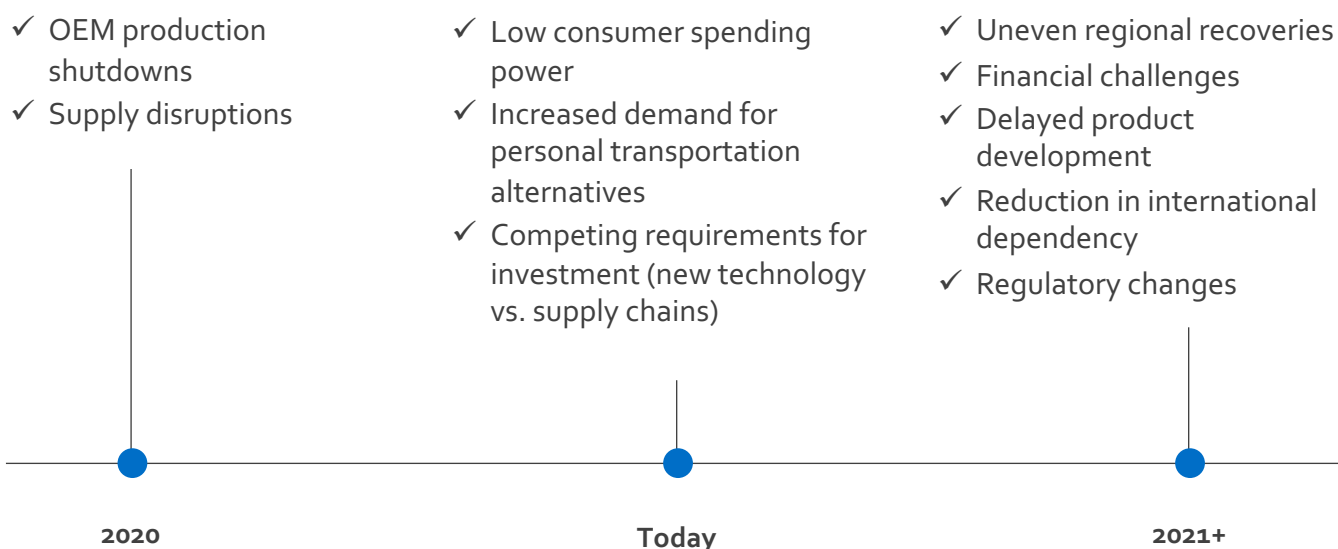
COVID-19 has shown how vulnerable automotive supply chains are to regional disruptions leading to enhanced scrutiny on extended global sourcing strategies. The abrupt closure of production centers in China and its domino impact, caused widespread chaos among global automotive companies where it was progressively felt in the Americas, Europe, and throughout Asia. Many suppliers are facing liquidity issues and were unable to recover substantially to meet the industry's need. This could potentially result in large disruptions and have dire consequences across the global automotive manufacturing ecosystem.

Manufacturers	Impact of Lockdown in 2020
Ford, GM, and Stellantis	Suspended manufacturing in parts of the US; repurposed production of COVID-19 medical devices
Nissan	Suspended production in the UK due to supply chain disruption and demand reduction
Toyota	Halted production in Europe because of government restrictions on the movement of people, supply chain disruptions, and falling sales
Honda	Closed four US vehicle plants due to anticipated decline in the market resulting from the pandemic
Daimler	Suspended European production due to disrupted supply lines
Volkswagen	Suspended production due to the pandemic

Source(s): Squire Patton Boggs

The impact of COVID-19 on the global automotive industry will linger for the next few years.

Current and Future Impact of COVID-19 on Automotive Industry



4. Impact of COVID-19 on Automotive Supply Chain

Impact in 2021: Chip Shortage in Automotive Industry

Waves of pandemic-related lockdowns in 2020 led to a shortage of microprocessor chips used in automobiles for infotainment systems, power steering, and brakes. Increasingly tight supplies of microprocessors are keeping auto factories idling at a time when the industry struggles to rebuild inventories. Considering the complexity involved in the chip business, setting up a new plant or expanding an existing facility is expensive and time consuming. Thus, it can be assumed that the shortages would take some time to be addressed, with the disruptions in automotive production likely to continue.

The shortage has led to a number of automotive companies, such as Ford and Stellantis in North America to shut down some of their plants. However, Nissan and Subaru in Japan and Volkswagen in the US, China and Europe are only reducing their production outputs.

General Motors expects the chip shortage will cut its earnings by USD 1.5 Bn – USD 2.0 Bn in 2021. Ford said the situation could lower its earnings by USD 1.0 Bn – USD 2.5 Bn in 2021. Honda Motor and Nissan Motor are expected to sell 250,000 lesser cars through March due to the shortage.

With the recent shortage of microprocessor chips causing production shutdowns across the globe, automakers and suppliers are trying hard to find alternative supply sources for chips in order to meet the rising demand.

1. Action Plan for Survival and Loss Mitigation

Risk Management Plans: Suppliers should quickly develop and implement a robust supply chain risk management strategy focusing on business continuity. Such strategies should include the following:

- Expansion of supply chains from a geographic perspective to limit risks from any one country or region wherever possible,
- Securing multi-sourced key commodities to reduce reliance on individual suppliers,
- Implementation of inventory systems to mitigate supply chain disruption

Protect Cash Flow:

Suppliers need to immediately develop detailed plans for cash management, which includes focus on collecting aged receivables and extending payables to conserve cash to the extent possible. Suppliers should also consider whether they will be eligible to receive relief funds setup by various governments around the world. Companies are encouraged to seek sophisticated public policy counsel to guide them through such programs in order to maximize their opportunity to receive such funds.

4. Impact of COVID-19 on Automotive Supply Chain

Attention to Supply Network:

Due to plant shutdown and ceased commute, suppliers at every level should expect significant decline in on-time in-full delivery performance from key suppliers. Increased attention to the status of inventory at the supplier location, supplier production schedules, and the status of supplier shipments will provide early warnings of shortage and allow upper-tier suppliers to respond accordingly. Companies that are not electronically connected to key direct suppliers and lack real-time data on the inbound flow of products and materials, will be required to quickly implement programs for accessing data and enhancing management and decision-making capabilities.

*In the US, the Coronavirus Aid, Relief, and Economic Security (CARES) Act provided almost **USD 350 Bn** in total for loans through the Small Business Administration; Phase 3 of the CARES package provides **USD 500 Bn** in loans, loan guarantees, and other financing for “distressed industries.”*

Implementation of Alternative Supply Sources:

Suppliers at all tiers should move quickly to secure secondary supplier relationships and strengthen additional critical inventory and capacity. Alternative sourcing markets will vary greatly depending on supply chain and manufacturing expertise. Countries in Eastern Europe, South and Latin America, and Asian geographies outside of mainland China have historically been the most likely markets to develop beyond China.

New Financial Projections:

Revising projections that consider the present scenario and the impact of OEM lockdown is important in making good operational and management decisions. While companies will now need to update projections more frequently to keep up with the ramifications of the outbreak, it is important to keep thinking about the best and the worst-case scenarios. A proactive approach is critical, especially in such fluid situations. In that manner, hiring experienced legal professionals and financial advisors early can not only provide credibility in dealing with lenders, trade creditors, and investors, but also preserve enterprise value.

2. Future Perspective and New Normal of Automotive Supply Chain

The effects of the pandemic have led manufacturers to rethink their whole supply chain in order to make it more resilient in case of another pandemic-like situation. Having offshored their manufacturing activities to cost-effective countries, many automotive OEMs and suppliers are on their way to establish shorter or localized regional supply chains.

Shift from Globalization to Regionalization:

Currently, most leading global automakers source 30–60 % of their parts including modules and sub-assemblies from China. OEMs, component manufacturers, and auto sub-system assemblers intend to establish alternative, flexible, and adaptable supply chains while mitigating single-source vulnerabilities

4. Impact of COVID-19 on Automotive Supply Chain

by looking to strategically source, assemble, and deliver from within their regional borders. Moreover, they are reconsidering the setting up of regional logistic hubs.

Focus on Shortening Supply Chains:

Even months before the COVID-19 outbreak, global automakers were keen to localize the manufacturing of critical components. With globalized supply chain networks currently programmed for the lowest possible price, most western companies had set up centralized manufacturing facilities in lower-cost economies, where final products are assembled competitively and are shipped to higher-income markets. The pandemic revealed the weakness at the core of such an offshore manufacturing model. Automotive companies have ever since put in more efforts on shortening their supply chains.

We will see a combination of traditional, extended supply chain models and the growing alternative network of short and localized supply chains. The latter model is most likely to be established in alliance with specialized suppliers that can deliver components and services and resiliently adapt to changes in the market conditions.

Challenges

Globalization of the automotive sector, change in manufacturing processes, evolving consumer demand, and disruptive technologies have created the following challenges for its supply chain:

Lack of Demand Foresight and Delays in Component Delivery

Automotive manufacturers need an average of 30,000 individual components to manufacture one vehicle. Each of those components or parts is either designed and developed in-house or sourced from a third-party provider. A delay in one stage of the supply chain can impact the manufacturing and distribution of critical components of vehicles and can result in a production line shutdown.

Moreover, the supply chain in the automotive aftermarket is more complicated than any other supply chain. Companies need to balance between the cost of stockholding and transport operations while offering aftermarket services for the customers at the right time and right place. However, most of the time, customers' expectations differ depending on a particular aftermarket part requirement used before. Therefore, the lack of foresight into customer demand may hamper the supply chain process.

Impact of External Factors on Automotive Supply Chain

The automotive industry has become global, which makes it very sensitive to political, economic, environmental, marketplace, and other external factors. Trade deals, tariff rates, and political direction can alter the import and export costs of parts and vehicles. In addition, natural calamity and environmental disasters disrupt the automotive supply chain to a significant extent.

Lack of Transparency at a Global Scale

Despite operations limited to select locations, automotive manufacturers have a brand presence in various countries, globally. As a result, their supply chains need to demonstrate the scalability to meet this demand across all markets. Cost considerations at every stage of the supply chain may compel them to move to a just-in-time operation style if they have a clear visibility of the supply chain. Deploying supply chain management and analytics software to ensure full transparency, traceability, visibility, and process automation to streamline the supply chain across all the countries, becomes cumbersome and expensive for manufacturers.

Low Quality Manufacturing

Over the last few years, automotive manufacturers have recalled products due to multiple reasons, such as engine fire, design defects, and safety defects. Oversight and lack of auditing in the supply chain may lead to quality issues and result in the underperformance of vehicles. Such issues damage reputation, hamper revenues, and result in inefficiency and waste, which lead to increased supply chain issues.

5. Disruptive Trends & Challenges

Disruptive Technology Trends

Disruptive technologies bring about digital transformation with the demand for it within the automotive industry being increased across the globe. This is mainly due to integration of several innovations, such as Blockchain, vehicle electrification, and AI into the automotive supply chain.

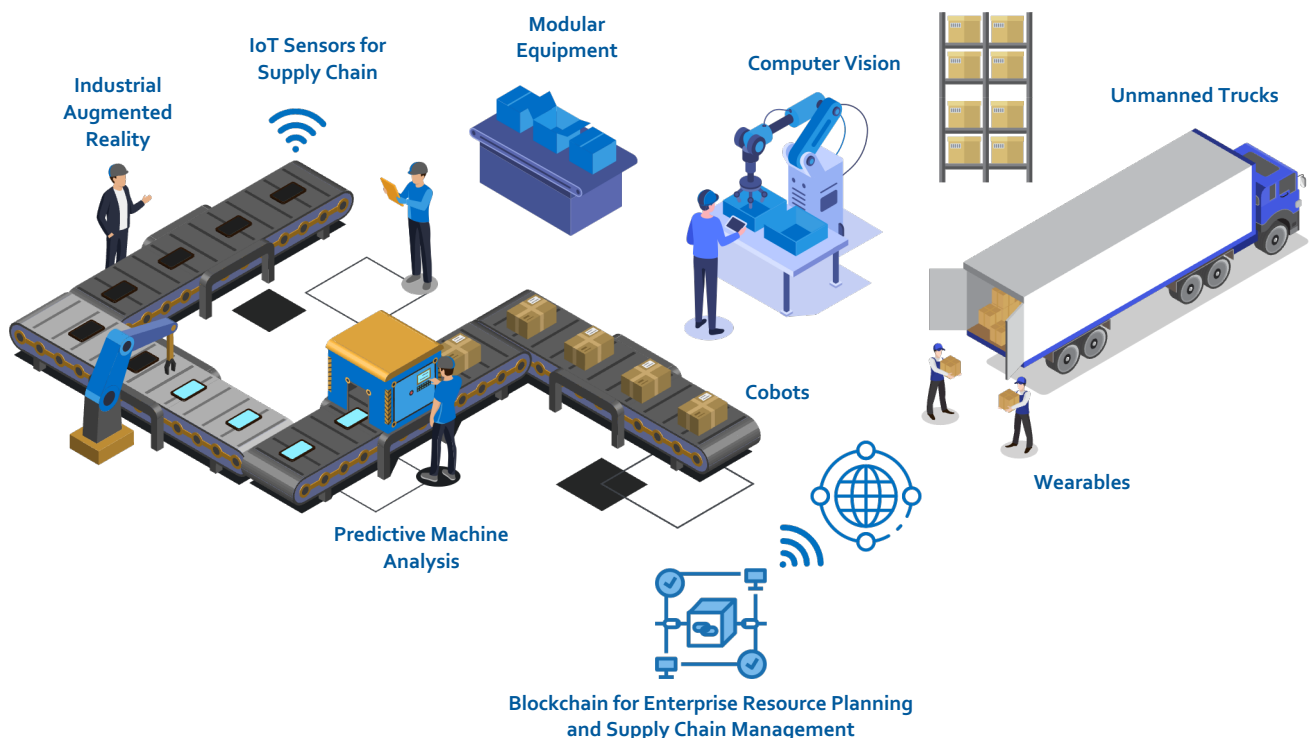
Entry of Technology Players to Transform the Industry

Large technology players are entering the automotive market and changing business models. Players such as Google, Facebook, Amazon, and Microsoft are disrupting the automotive industry. These new entrants have abundant capital and expertise in technology and have been upgrading their technologies and accelerating their investments. The creation of an Internet of Vehicles ecosystem using the various technologies at the disposal of these tech-giants is expected to transform the traditional supply chain.

Internet of Things (IoT) Brings Connectivity among Processes, Products, and Persons

IoT has positively impacted this industry by proving its usefulness in improving warehousing, inventory management, and product delivery. For instance, Volkswagen, the world's biggest carmaker, uses IoT and cloud computing technologies from Amazon Web Services (AWS) to connect and manage manufacturing plants and supply chain processes.

Future of the Supply Chain with Advanced Technology Integration



5. Disruptive Trends & Challenges

Supplier-driven Innovation

As the vehicles and manufacturing operations become more complicated, the automotive supply chain stages entail the use of innovative technology. Software engineers are as important as mechanical engineers for automotive parts suppliers keeping pace with modern vehicles' computerization. Component manufacturers are innovating new ways to stay relevant in the technology-driven industry through strategic partnerships and M&A with tech-savvy SMEs. In addition to this, most automotive component manufacturers are undergoing digital transformation to optimize production and operation, reduce waste, and share relevant data.

Integration of Advanced Technologies

Supply chain optimization is mainly driven by technology integration. Globally, OEMs, regional suppliers, and automotive vendors integrate IoT technology, wireless sensors, industrial augmented reality, advanced analytics, robotics, and modular equipment to monitor product movement in the supply chain.

IoT-enabled sensors are installed on the cargo to collect and transmit real-time information to a cloud-based user dashboard. Technology integration enables unprecedented visibility in the supply chain and data collected across the supply chain improves inventory management, logistics, and cost assessment.

Advent to Electric Vehicles

- The rapidly developing EV market will have an impact on automotive supply chains. Europe and China will lead the way on EV adoption; representing approximately 14% global new vehicle sales in Europe and China by 2025, up from 1% in 2017. Both England and France intend to ban the sale of fossil fuel-powered vehicles by 2040, and Germany is offering sizable financial incentives to consumers to purchase EVs.
- The rise of EVs poses a particular risk for auto suppliers. Major systems that are essential to vehicles with ICEs are seldom required in EVs. Components makers for vehicles powered by ICEs face the prospect of disruption if they do not adapt to the EV trend.
- The batteries used in EVs are heavy and cover the entire floor of the vehicle, making up about one-third of the EV's cost. As a result of their size and weight, EV battery packs have big implications for both logistics and supply chains. Apart from Tesla, who manufactures battery packs in-house, a majority of the lithium-ion battery production takes place in Asia.
- Currently, EV batteries remain one of the most difficult components to manufacture in-house and a vast majority of the raw materials and suppliers are based in China. As a result, Toyota, Volkswagen, and other firms are focusing on forging partnerships and joint ventures to get operations up to scale quickly and ensure supply is in place as overall manufacturing ramps up.
- With the exception of batteries, EV components are lighter and more easily managed than those used in their traditional counterparts. This has implications for supply chains. EV motors are likely to be more highly-commoditized than IC engines, with limited opportunity for manufacturers to use motor technology as a point of competitive differentiation. Such ease could encourage outsourcing and consolidation in manufacturing and make global supply chains easier to support.

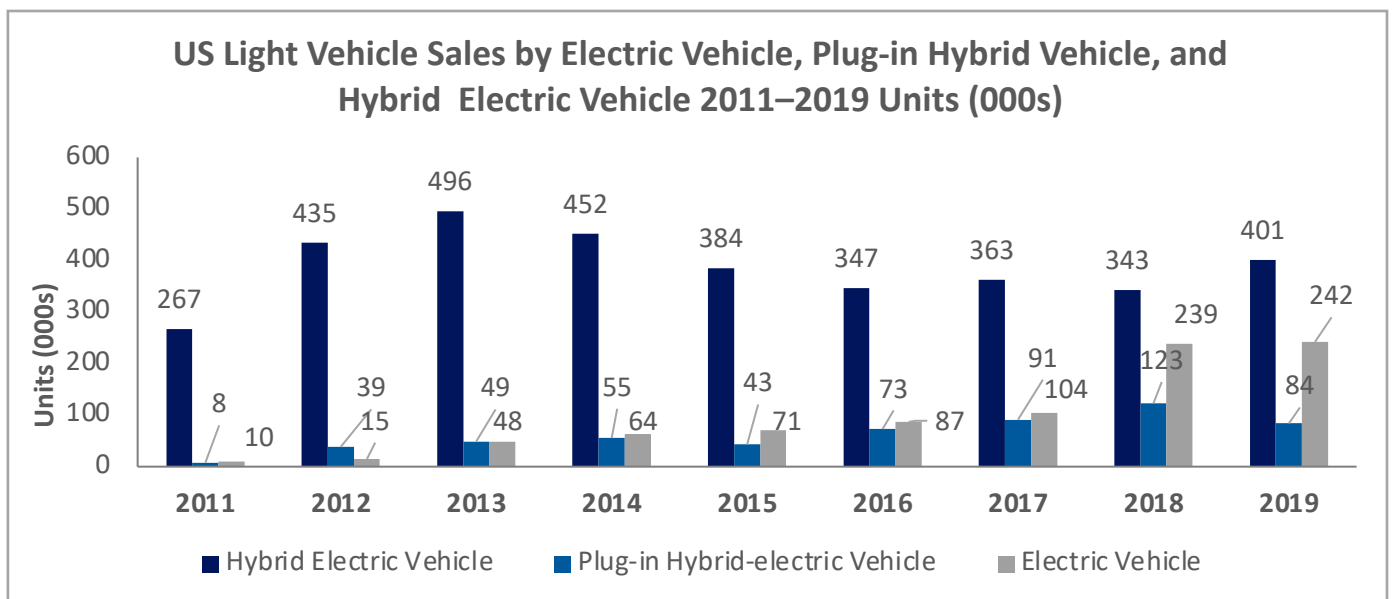
5. Disruptive Trends & Challenges

Vehicle Electrification Raises Investments and M&A in Automotive Supply Chain

Globally, the electric car demand is estimated to reach USD 25–30 Bn by 2025. According to the report published by Qinye Zhongxin, the number of vehicles with new power systems, such as pure electric power systems and hybrid power systems, will grow by an average rate of 34% in 2025. The demand for ICE and ICE power systems for use in traditional cars is decreasing rapidly. Electrification has encouraged several automotive vendors to jump on the digital transformation bandwagon, resulting in technology-related M&A along the supply chain. Conventional suppliers are restructuring their operations and non-traditional suppliers are increasing investments to develop a supportive supply chain.

Hybrid Gasoline-Electric Vehicles

- Hybrid vehicles are a temporary way to bridge the gap between traditional vehicles and EVs and make a difference where EV charging infrastructure is unavailable. Such cars are experiencing a quiet resurgence as the demand for EVs is increasing and automakers are giving a second look to older technologies in order to reduce costs.
- The basic components of the hybrid vehicles include prime movers, electric motors with DC/DC converters, DC/AC inverters, controllers, energy storage systems, and transmission systems. Therefore, the component suppliers play an important role in the hybrid vehicle supply chain. Globally, OEMs such as Mitsubishi, Volkswagen, Toyota, Nissan, Honda, Ford, and BMW among others, are developing hybrid vehicles in the market.
- The hybrid vehicle supply chain is a combination of the traditional vehicle and EV supply chains.



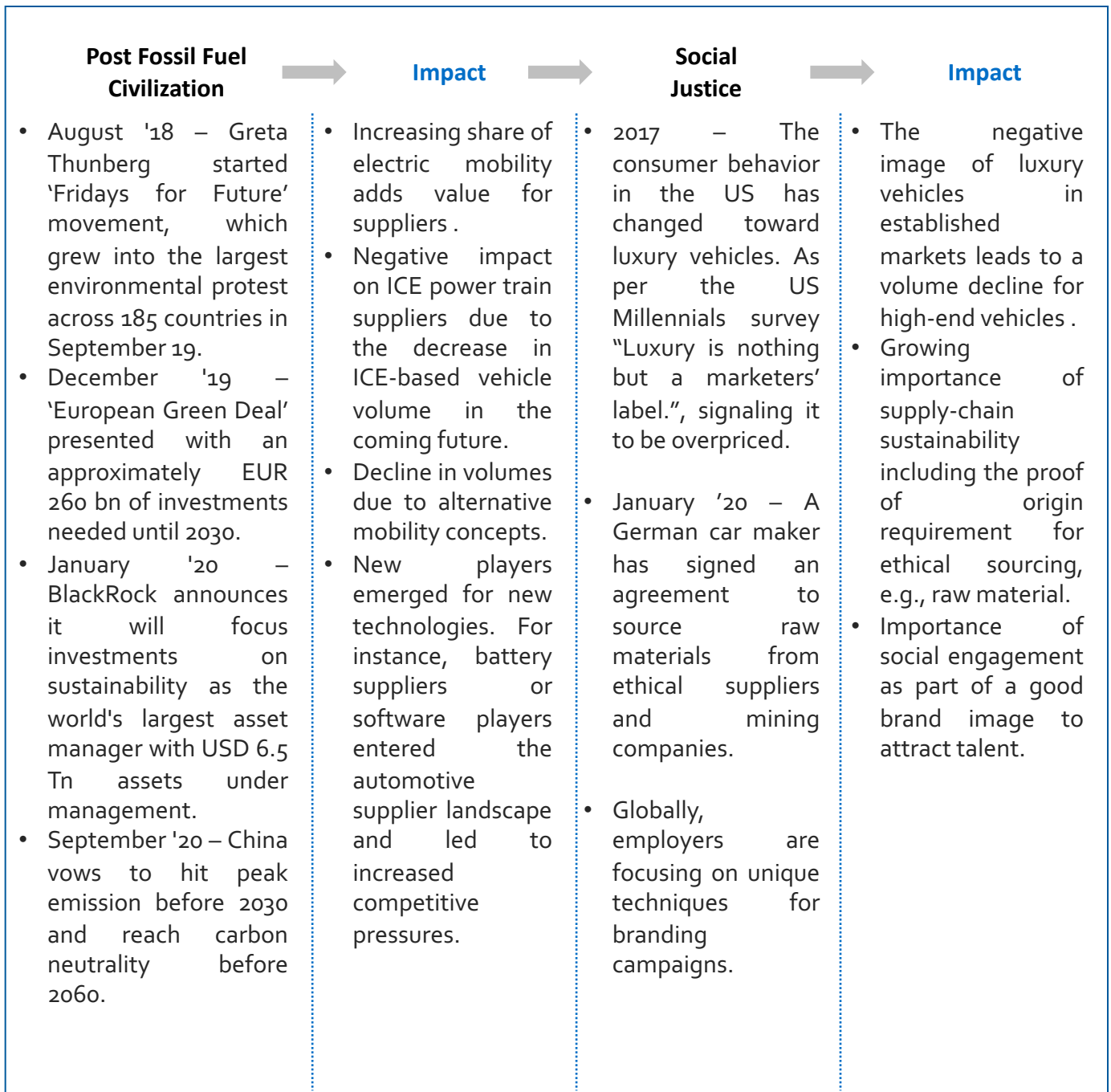
Source(s): USAFACTS

The above diagram depicts the hybrid vehicle and EV sales from 2011 to 2019. In 2019, the hybrid vehicle sales increased by 17% in 2019 due to the focus on reduced carbon emission from vehicles in the US.

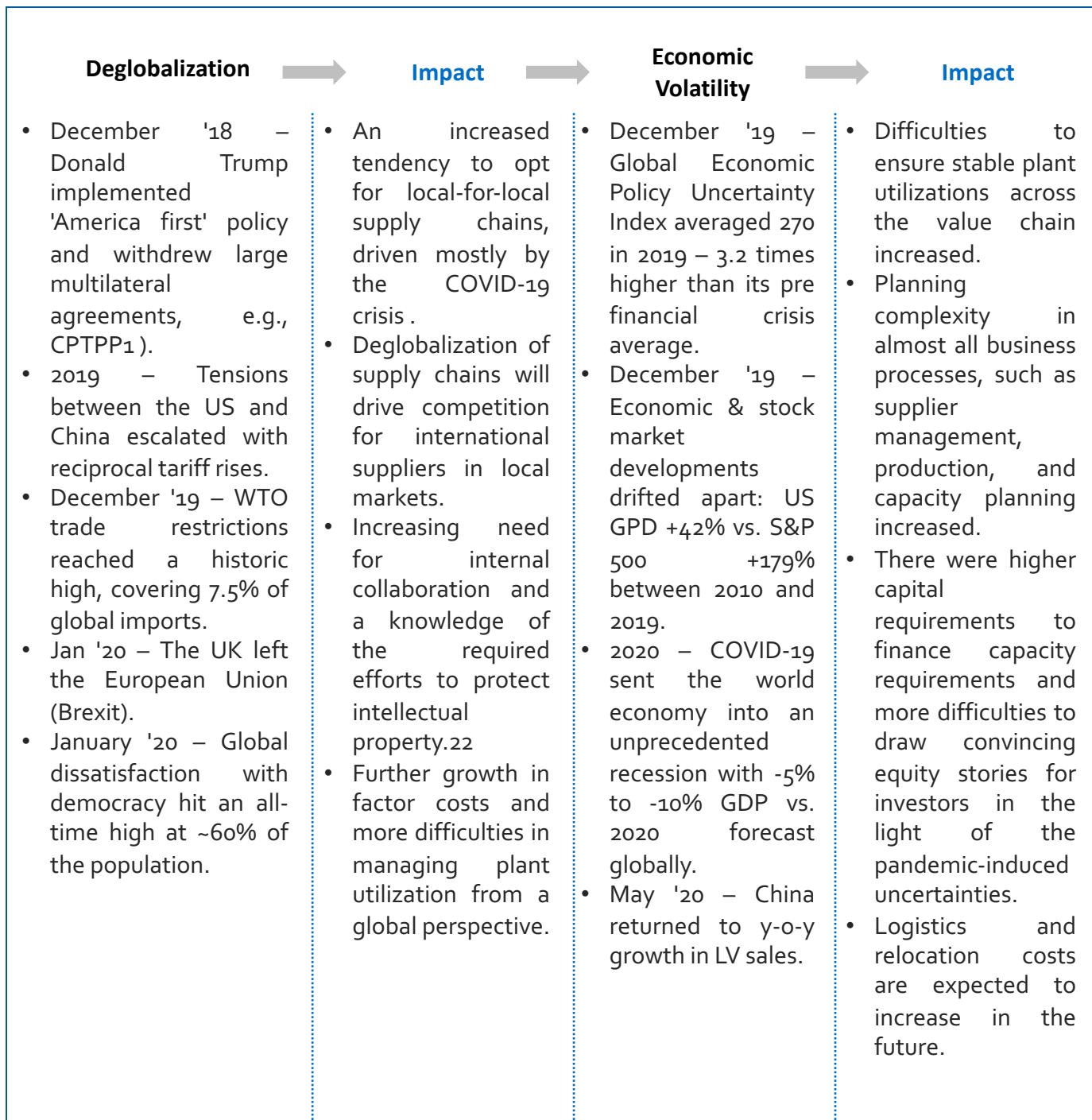
5. Disruptive Trends & Challenges

Socio-Economic Megatrend Impacting Suppliers

In addition to the many business challenges highlighted in the prior pages, there are several socio-economic factors that are impacting the industry and the supply chain.

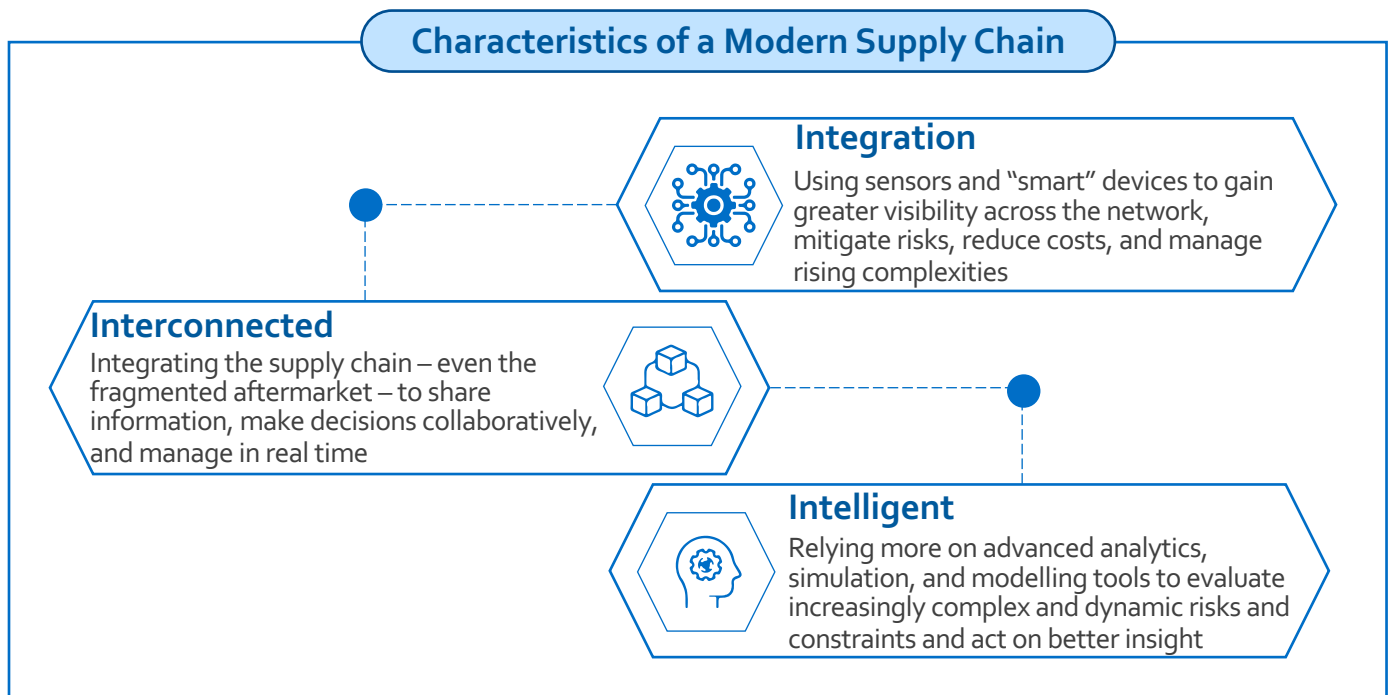


5. Disruptive Trends & Challenges



Goals of Modern Supply Chain

To effectively address the challenges posed by the modern world and the ever-changing business ecosystems, automotive companies not only need simple and more efficient supply chains, but also a smarter supply chain. The below figure depicts the characteristics of a modern supply chain.



Difference between Traditional and Modern Supply Chain

The difference between modern and traditional supply chains in the automotive sector can be better understood by looking at how they address the industry challenges.

Visibility

Visibility is one of the top challenges in the automotive supply chain. Analyzing across the different visibility practices, automotive companies trail top supply chains by some considerable margins. The most significant barriers to visibility and collaboration are organizational, rather than technological.

The modern supply chain sees visibility as the basic building block for responding to a majority of the

To obtain more visibility, the modern supply chain uses RFID tags, sensors, and intelligent devices to track and optimize the movement of materials from suppliers to receiving docks and throughout the assembly line.

6. Modern Supply Chain's Response to Challenges

challenges faced. However, it takes instrumentation even further, using it to improve visibility downstream. Modern supply chains also have the intelligence needed to optimize operations based on increasing visibility. Sourcing quantities, safety stock levels, and replenishment thresholds are calculated using accurate information and sophisticated analytics while event actuators automate action based on predetermined rules.

Cost Containment

Within the automotive industry, more supply chain executives rank cost containment as a top challenge. Outsourcing is one of the potential areas of opportunity to alter the costs with transportation being the most outsourced supply chain function. However, there is room to improve outsourcing effectiveness.

Top 3/4th of the automotive companies are focusing on cost containment to meet business challenges.

The modern automotive supply chain takes full advantage of increased instrumentation, interconnectivity, and intelligence to reduce cost. Using these capabilities, it maintains the optimum inventory of incoming materials, finished products, spare parts, and accessories spread across distribution centers and thousands of dealer repair shops.

In a smart supply chain, spare parts forecasting and planning are carried out at a lower level of detail. Even with hundreds and thousands of parts and millions of part-location combinations, it can simulate different scenarios and tailor replenishment strategies for each individual part. Sophisticated procedures help in better prediction of periodic demand fluctuations. The entire chain saves money by carrying less inventory and reducing uncertainty through better utilization of parts. Furthermore, modern automotive supply chains use analytics to optimize distribution networks, which reduces warehousing and transportation costs, while maintaining high service levels.

Purchasing

As the global supply chain is expanding widely all over the world, the flow of materials is being controlled quite seriously by each company. Cost, quality, and time issues are always considered when manufacturers outsource the materials. Procurement is a very important part of the automotive industry. Automotive companies are trying to reduce costs and improve efficiency at all stages, posing another challenge to the already competitive supplier industry. Automotive companies conduct risk analysis, financial analysis, and market analysis on different products. Such analysis helps them in production, demand prediction, and materials purchasing.



- Toyota outsources 70% of car component production but it tightly controls design and engineering, engaging suppliers with proven ability to deliver on time, maintain quality, control cost, and continue innovation.

6. Modern Supply Chain's Response to Challenges

Risk Management

Across different industries, one-third of all supply chains fail to manage risk on a formal basis. Several automotive companies have fallen behind in implementing risk management practices in supply chain. However, more than 60% of automotive companies have integrated risk mitigation into their supply chain processes; in the future, the integration rate will reach 75%. However, fewer automotive supply chain executives believe risk mitigation would enhance forecast accuracy. Similarly, automotive supply chains do not see a strong link between risk mitigation and increased responsiveness.

Risk management is a major challenge for 57% of the automotive supply chains.

- With sophisticated analytics-based demand forecast, variable cost structures, and better integration with suppliers, the modern automotive supply chain is more capable of adjusting supply as per demand. Furthermore, stronger make-to-order capabilities reduce the risk of having dealers with unwanted inventories.
- Issues such as counterfeit and gray market products can be tackled in a modern supply chain by using smart tags that allow parts to be authenticated and traced throughout the supply chain.

Customer Demand & Collaboration

Across the industries, demand planning with customers is the least frequently implemented process for synchronizing supply and demand. In terms of customer collaboration on product innovation, automotive supply chains fare much better. Compared with top supply chains, a substantially high number of automotive supply chains supports customer product configuration and specifications. Similarly, twice as many auto companies collaborate extensively with customers on product design.

Only 26% of sales and operations executives collaborate with customers to a significant level, as compared to 77% who use internal sales and operations planning processes.

The modern automotive supply chain uses greater instrumentation and interconnectivity to improve products and supply chain operations and gain consumer insight. With online communities, embedded systems, connected automotive, and online vehicle configuration and ordering, the smart supply chain has more information about consumers and how they use their vehicles than before. More importantly, it has intelligent analytics to synthesize and use this wealth of information. Furthermore, the smart automotive supply chain addresses the rising demand for configurable products.

6. Modern Supply Chain's Response to Challenges

Globalization

Automotive is one of the largest industries and has been at the forefront of establishing global infrastructure. As other industries begin to catch up, they are struggling with some of the same operational issues automotive supply chain executives have faced for some time – quality and delivery reliability.

Only 1/3rd of the automotive supply chains report improved performance as a result of globalization.

Traditional supply chains have to keep up with more advanced business issues, such as the regulatory and legal challenges of an international supply network and the organizational and cultural obstacles posed by increasing virtual relationships.

A modern automotive supply chain is focused on integrating supply chains globally. This involves integrating product lifecycle management with enterprise resource planning systems to all the partners. In addition, collaboration, knowledge sharing, and social networking tools help close distance gaps and build networks across the extended value chain.

Future Trends

In the years to come, the automotive industry will have to focus on building flexible and resilient supply chains that allow rapid refocusing when responding to severe disruptions. There is a series of trends that automotive manufacturers are implementing.

Procurement Model that Looks Beyond the Lowest-cost Supplier

Pricing and cost are usually the driving factors in sourcing decisions. Automotive companies are beginning to lessen their focus on sole sourcing and Just-In-Time (JIT) delivery from the lowest-cost supplier. Many automotive companies are taking additional steps to improve the stability and resilience of their supply chain through strategic changes to their procurement model and contracts. Wherever possible, many of them are considering dual-sourcing and on-site and off-site warehousing options to ensure that they have a bank of parts available. They have also diversified their selection of third-party logistics providers.

Right-shoring Considerations

For some components, automotive companies are considering options to move away from sourcing in China to other countries and analyzing the cost versus risk mitigation benefits of shifting their supply chains. The term “right-shoring” refers to locating the manufacturing operations of a business in localities and countries that provide the best combination of cost and efficiency.

Some automotive manufacturers will consider moving away from China, which is a major manufacturing hub and will be looking at other options in parts of Southeast Asia, India, or Latin America. When weighing the pros and cons of locations, companies will consider the cost of materials, property prices, labor costs and regulations, IP protections, and logistics. Notably, China continues to be the main manufacturing hub and sourcing location for certain key electronic components. Automotive supply chains will continue to be sourced from China and will become increasingly important with the industry’s movement to electrification.

Transparency in the Supply Chain

Automotive companies are taking short- and long-term actions to create more visibility within their supply chains. They are increasing transparency throughout their supply chains in order to mitigate future risks. Manufacturers that were able to successfully navigate through the pandemic noted the importance of having transparency in all aspects of their supply side including material providers, facility locations, and logistics. Companies that have not already done so, are looking at options to digitize their supply chain in order to have real-time visibility into any potential or existing disruptive factors.

Traditionally, certain aspects of an automotive supplier’s supply base and logistics have been considered proprietary and confidential. However, there will be pressure by OEMs on Tier 1 suppliers to provide more information regarding their sub-suppliers, sourcing locations, and even pricing. Obtaining this level of detail into their suppliers’ operations may be useful for navigating future issues and mitigating supply chain disruptions. However, we expect that automotive suppliers will resist providing certain pricing and cost details that would allow an OEM to gain unwelcome insight into a supplier’s pricing model or even present antitrust issues in the automotive industry.

7. Future of Automotive Supply Chain

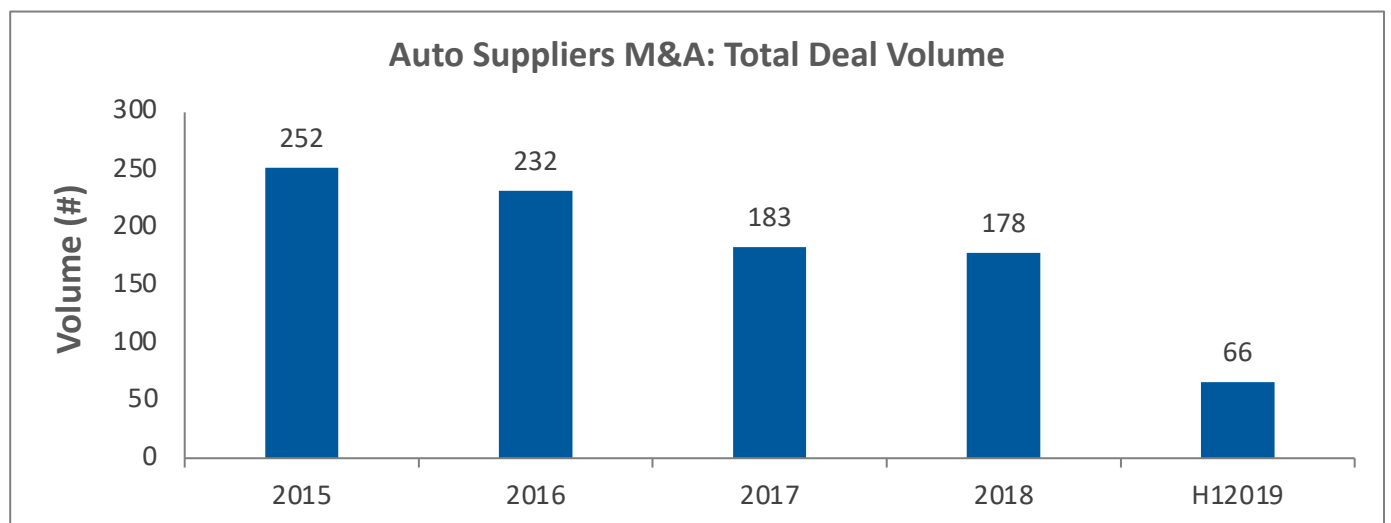
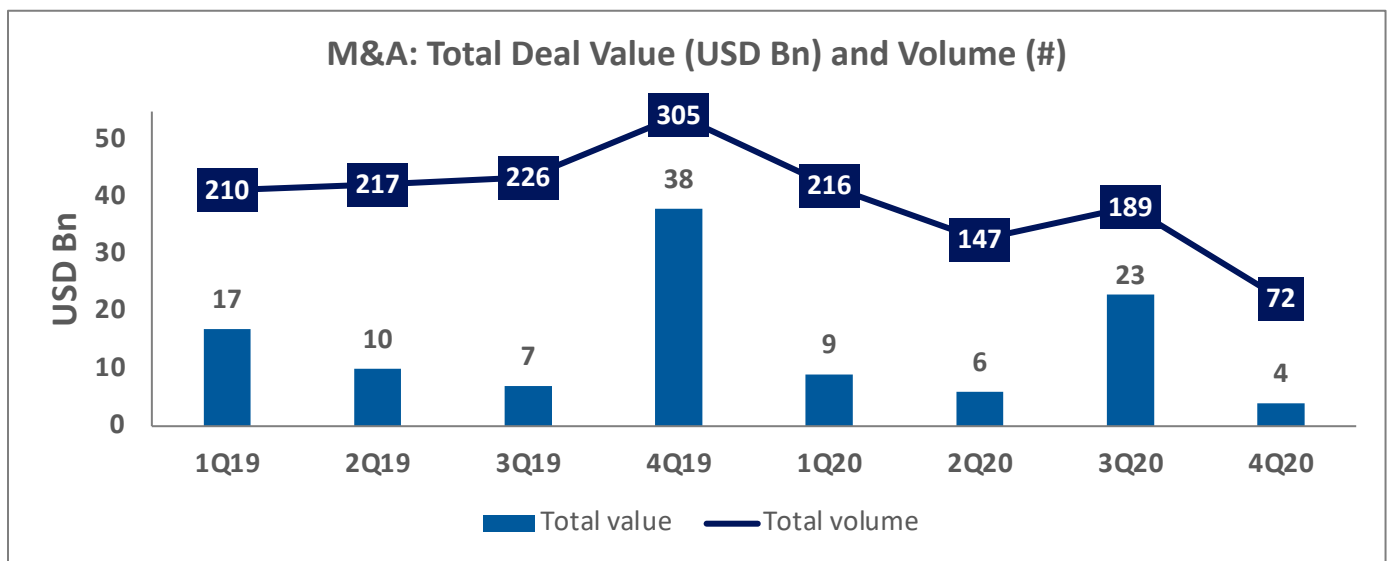
Working Together for an Efficient Future

- The Catena-X Automotive Network is an open, scalable network that is being developed to enable secure, inter-enterprise exchange of data in the automotive industry.
- Automotive manufacturers and suppliers, dealer associations, and equipment suppliers such as BMW AG, Deutsche Telekom AG, Robert Bosch GmbH, SAP SE, Siemens AG, ZF Friedrichshafen AG, and Mercedes-Benz AG are a part of this collaboration, which was announced at the beginning of December 2020.
- Catena-X Automotive Network uses the GAIA-X platform to bring more digitalization, more sustainability, and fewer breakdowns. This kind of collaboration can enable OEMs to strengthen their capabilities and become the orchestrators of a more intelligent supply ecosystem.
- The platform is currently being developed and its first aim is to demonstrate the feasibility and benefits of inter-enterprise data exchange in the supply chain.

8. M&A as a Solution to Supply Chain Challenges

M&A Value and Volume

During the pandemic, automotive M&A strategies are focused on production and supply chains, while staying on the pulse of CASE technologies. As the market is seeing a recovery and restrictions are being lifted globally, M&A will be necessary for automotive companies to continue to upgrade their business models in order to be more responsive to their customers, stay ahead of the technology curve, and be competitive. As a result of the existing global challenges magnified by the global pandemic, we anticipate increased interest in vertical integration, addition of regional supply sources, and decreased supply chain complexity by consolidation.



8. M&A as a Solution to Supply Chain Challenges

In 2020, the total M&A deal value and volume declined by 32% and 18% respectively. Amid the COVID-19 pandemic, the second quarter of 2020 witnessed a slump in M&A activity. However, the activity recovered in the third quarter, mainly due to the need for addressing supply chain disruptions and the emergence of new capital in the form of Special Purpose Acquisition Company (SPACs) in connected, autonomous, shared, and electrified (CASE) technologies. As the investors are reluctant to fund capital intensive automotive suppliers, the suppliers are expected to divest their non-core assets and divisions to generate the funding needed to support CASE investments.

Disruptions on Supply Side:

- M&A transactions are expected to rise in 2021 with an objective of expanding technological competencies, enhancing talent base, and strengthening R&D capabilities. In a bid to free up capital, the OEMs and suppliers are expected to divest their non-core assets and reinvest into high growth areas. The growing number of SPACS in the auto-tech space is expected to continue.
- Investments in EV production and supply are growing, which leads to anticipation for an imminent acceleration in EV sales. Amid the increasing market share of EVs, auto suppliers focusing on ICE could lead to distressed M&A activity.
- A shortage in the supply of chip-sets required for infotainment systems, power steering, and other systems is expected in 2021 as the chip-set makers are focusing on meeting the growing demand from consumer electronics. The short supply of chip-sets usually forces OEMs to halt manufacturing of certain models.

Major Activities in 2020:

- PSA Group and Stellantis Automobiles (Stellantis) merged to create Stellantis, bringing together 14 vehicle brands across the globe. With the completion of the merger, Stellantis became the fourth-biggest automaker in the world by volume and the third-biggest by revenue.
- Volkswagen truck unit Traton finalized the USD 3.7 Bn Navistar-acquisition deal in late 2020. The deal extends Volkswagen's reach in North America and brings Navistar together with the MAN, Scania and Volkswagen truck brands.
- The deal is also in line with the latest trends of the truck industry which has been seeking ways to share the costs of developing low emissions technology.

STELLANTIS



9. Trading and Transaction Comparables

Trading Comparables

(in USD Mn)	Market Cap	Enterprise Value	EV/Sales			EV/EBITDA			P/E		
Company			2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Automotive Suppliers											
DENSO CORPORATION	USD51,427	USD52,598	1.1x	1.1x	1.0x	12.5x	8.4x	7.1x	76.0x	20.9x	14.8x
TE Connectivity	43,821	46,708	3.6x	3.1x	3.0x	17.5x	13.9x	12.9x	27.7x	20.9x	19.1x
Aptiv	37,032	38,747	3.0x	2.5x	2.2x	23.9x	15.9x	13.6x	70.5x	34.8x	25.9x
Bridgestone Corporation	31,174	33,328	1.2x	1.1x	1.1x	8.3x	5.6x	6.0x	NM	11.9x	14.2x
Continental AG	27,710	32,738	0.7x	0.7x	0.6x	6.3x	5.3x	4.5x	NM	15.6x	10.0x
Magna International	28,847	31,686	1.0x	0.8x	0.7x	10.4x	7.0x	6.3x	24.3x	12.8x	10.8x
Compagnie Generale des Etablissements	26,621	31,129	1.3x	1.1x	1.1x	7.1x	5.9x	5.3x	27.6x	13.8x	11.3x
AISIN CORPORATION	10,584	16,243	0.5x	0.5x	0.4x	4.9x	4.0x	3.7x	15.7x	10.6x	8.9x
Hyundai Mobis	22,698	15,439	0.5x	0.4x	0.4x	6.6x	5.3x	4.5x	16.6x	9.4x	8.1x
BorgWarner Inc.	11,997	14,513	1.4x	1.0x	0.9x	9.4x	6.5x	5.7x	20.3x	12.9x	10.1x
Lear Corporation	11,043	12,720	0.7x	0.6x	0.6x	11.0x	7.0x	5.9x	34.3x	13.0x	10.2x
Valeo SE	7,447	12,315	0.6x	0.5x	0.5x	7.4x	4.4x	3.7x	NM	18.4x	9.3x
Faurecia SA	7,279	11,512	0.6x	0.6x	0.5x	5.8x	4.0x	3.5x	NM	11.1x	7.4x
Goodyear Tire & Rubber Company	4,426	10,292	0.8x	0.7x	0.6x	13.7x	6.6x	5.7x	NM	21.0x	9.9x
Autoliv	8,775	10,003	1.3x	1.1x	1.0x	11.9x	7.4x	6.4x	32.0x	14.5x	11.7x
Schaeffler	5,959	8,979	0.6x	0.5x	0.5x	3.8x	3.5x	3.2x	15.2x	6.9x	6.0x
Adient	4,454	7,881	0.6x	0.5x	0.5x	10.1x	6.9x	5.9x	51.5x	11.2x	8.2x
Koito Manufacturing	9,979	7,705	1.1x	1.1x	1.0x	7.2x	5.8x	5.0x	25.3x	18.5x	14.2x
HELLA GmbH	6,914	6,904	0.9x	0.9x	0.8x	8.2x	6.8x	5.9x	NM	16.4x	13.8x
Gestamp Automocion	3,178	6,746	0.8x	0.6x	0.6x	7.6x	5.3x	4.5x	NM	15.1x	9.5x
Dana Incorporated	3,820	6,214	0.9x	0.7x	0.6x	10.5x	6.5x	5.5x	67.0x	10.7x	8.0x
Tenneco	1,178	6,174	0.4x	0.3x	0.3x	5.9x	4.3x	4.1x	NM	3.9x	3.0x
CIE Automotive	3,647	6,159	1.7x	1.5x	1.4x	11.7x	8.6x	7.7x	16.0x	11.1x	9.5x
Plastic Omnium	4,885	5,997	0.7x	0.6x	0.6x	6.7x	5.3x	4.8x	NM	13.6x	10.8x
Sumitomo Rubber Industries	3,476	4,897	0.6x	0.6x	0.6x	5.8x	5.6x	5.3x	16.1x	14.1x	12.7x
Linamar Corporation	3,964	4,241	0.9x	0.7x	0.7x	5.7x	4.4x	4.1x	15.8x	9.7x	9.0x
American Axle & Manufacturing	1,225	4,119	0.8x	0.8x	0.7x	5.7x	4.4x	4.1x	74.2x	7.2x	5.1x
Hyundai Wia Corporation	1,893	3,358	0.6x	0.5x	0.5x	10.9x	7.7x	6.7x	34.7x	17.8x	13.3x
Toyota Boshoku	3,498	3,192	0.3x	0.3x	0.2x	3.9x	3.4x	3.1x	12.8x	10.9x	10.3x
Meritor	1,842	2,760	0.9x	0.7x	0.6x	9.0x	6.4x	5.0x	17.4x	9.6x	6.5x
Nexteer Automotive Group	2,772	2,563	0.8x	0.7x	0.6x	7.2x	4.7x	4.3x	23.7x	11.2x	9.4x
Garrett Motion	403	2,015	0.7x	NA	NA	5.4x	NA	NA	NA	NA	NA
NHK Spring	1,741	1,871	0.3x	0.3x	0.3x	5.5x	4.6x	3.9x	33.4x	15.9x	10.9x
Sumitomo Riko Company	656	1,447	0.4x	0.4x	0.3x	NA	NA	NA	NM	24.4x	10.2x
Cooper-Standard Holdings	498	1,245	0.5x	0.5x	0.4x	34.9x	6.6x	4.4x	NM	NM	14.0x
JTEKT India	288	293	1.8x	1.4x	NA	27.1x	NA	NA	NA	NA	NA
High			3.6x	3.1x	3.0x	34.9x	15.9x	13.6x	76.0x	34.8x	25.9x
Average			1.0x	0.8x	0.8x	10.0x	6.3x	5.5x	32.5x	14.2x	10.8x
Median			0.8x	0.7x	0.6x	7.6x	5.8x	5.0x	25.3x	13.0x	10.1x
Low			0.3x	0.3x	0.2x	3.8x	3.4x	3.1x	12.8x	3.9x	3.0x

9. Trading and Transaction Comparables

(in USD Mn)	Market Cap	Enterprise Value	EV/Sales			EV/EBITDA			P/E		
Company			2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Automotive Aftermarket											
DENSO CORPORATION	USD51,427	USD52,598	1.1x	1.1x	1.0x	12.5x	8.4x	7.1x	76.0x	20.9x	14.8x
Genuine Parts Company	18,729	21,030	1.3x	1.2x	1.2x	15.4x	14.0x	13.1x	24.5x	21.5x	20.4x
LKQ Corporation	15,032	18,614	1.6x	1.5x	1.4x	13.7x	11.5x	10.9x	19.3x	16.0x	15.0x
Hyundai Mobis	22,698	15,439	0.5x	0.4x	0.4x	6.6x	5.3x	4.5x	16.6x	9.4x	8.1x
HELLA GmbH	6,914	6,904	0.9x	0.9x	0.8x	8.2x	6.8x	5.9x	NM	16.4x	13.8x
CIE Automotive	3,647	6,159	1.7x	1.5x	1.4x	11.7x	8.6x	7.7x	16.0x	11.1x	9.5x
Bosch Limited	5,963	5,636	4.3x	3.6x	3.1x	37.4x	26.5x	20.5x	43.7x	33.5x	26.7x
Bharat Forge	4,323	4,701	5.3x	4.5x	3.6x	40.7x	27.7x	17.7x	137.5x	54.3x	30.7x
Dorman Products	3,176	3,046	2.8x	2.5x	2.4x	17.4x	14.6x	13.7x	28.5x	22.0x	20.3x
Cooper Tire & Rubber Company	2,970	2,936	1.2x	1.0x	1.0x	7.5x	6.4x	6.3x	19.7x	14.6x	15.0x
XPEL	2,092	2,068	13.0x	8.9x	7.6x	81.8x	52.4x	40.9x	114.4x	70.3x	55.8x
CWB Automotive Electronics	1,149	1,136	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shanghai Baolong Automotive	899	1,104	NA	NA	NA	NA	NA	NA	31.9x	23.1x	19.9x
Standard Motor Products	1,007	1,065	0.9x	1.0x	1.0x	7.7x	8.1x	7.6x	12.2x	15.0x	14.1x
Uni-Select	546	1,009	0.7x	0.6x	0.6x	11.4x	8.8x	7.8x	NM	44.9x	19.5x
Superior Industries International	166	840	0.8x	0.6x	0.6x	6.5x	4.7x	4.2x	NM	NM	33.2x
Ichikoh Industries	651	704	0.7x	0.6x	0.5x	7.5x	5.0x	4.3x	24.0x	14.6x	10.2x
Cayman Engley Industrial	373	684	0.9x	0.8x	0.8x	7.1x	5.8x	5.0x	21.5x	11.7x	8.9x
Fuxin Dare Automotive Parts	380	576	NA	NA	NA	NA	NA	NA	NA	NA	NA
Motorcar Parts of America	413	564	1.1x	1.0x	0.9x	7.7x	6.9x	5.6x	12.5x	10.3x	7.5x
Horizon Global Corp.	224	487	0.7x	NA	NA	NA	NA	NA	NM	NA	NA
PT Selamat Sempurna	484	476	NA	NA	NA	NA	NA	NA	NA	NA	NA
GSP Automotive Group Wenzhou	424	317	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rane Holdings	114	221	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shriram Pistons & Rings	238	216	NA	NA	NA	NA	NA	NA	NA	NA	NA
Optima Automobile Group	181	184	NA	NA	NA	NA	NA	NA	NA	NA	NA
AD Plastik	127	179	0.9x	0.8x	0.8x	6.7x	7.2x	6.0x	14.9x	12.2x	8.5x
Lumax Auto Technologies	129	136	0.9x	0.8x	0.7x	11.5x	9.1x	7.6x	21.1x	16.4x	13.2x
Daewoo Electronic Components	101	129	NA	NA	NA	NA	NA	NA	NA	NA	NA
High			13.0x	8.9x	7.6x	81.8x	52.4x	40.9x	137.5x	70.3x	55.8x
Average			2.1x	1.8x	1.6x	16.8x	12.5x	10.3x	37.3x	23.1x	18.3x
Median			1.0x	1.0x	1.0x	11.4x	8.4x	7.6x	21.5x	16.4x	14.9x
Low			0.5x	0.4x	0.4x	6.5x	4.7x	4.2x	12.2x	9.4x	7.5x

9. Trading and Transaction Comparables

(in USD Mn)			<u>EV/Sales</u>			<u>EV/EBITDA</u>			<u>P/E</u>		
Company	Market Cap	Enterprise Value	2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Automotive Supply Chain											
China MeiDong Auto	6,443	6,325	2.0x	1.5x	1.2x	30.1x	18.4x	11.7x	54.7x	36.2x	26.7x
Guizhou Guihang Automotive Components	898	831	NA	NA	NA	NA	NA	NA	NA	NA	NA
Seojin Automotive	47	367	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bulten	265	319	0.8x	0.6x	0.6x	9.6x	5.6x	5.1x	55.2x	10.7x	9.4x
Shanghai Lianming Machinery	286	293	NA	NA	NA	NA	NA	NA	NA	NA	NA
High			2.0x	1.5x	1.2x	30.1x	18.4x	11.7x	55.2x	36.2x	26.7x
Average			1.4x	1.1x	0.9x	19.8x	12.0x	8.4x	54.9x	23.5x	18.1x
Median			1.4x	1.1x	0.9x	19.8x	12.0x	8.4x	54.9x	23.5x	18.1x
Low			0.8x	0.6x	0.6x	9.6x	5.6x	5.1x	54.7x	10.7x	9.4x
Overall High			13.0x	8.9x	7.6x	81.8x	52.4x	40.9x	137.5x	70.3x	55.8x
Overall Average			1.4x	1.2x	1.0x	12.6x	8.7x	7.3x	35.5x	17.7x	13.7x
Overall Median			0.9x	0.8x	0.7x	8.2x	6.5x	5.7x	24.4x	14.5x	10.8x
Overall Low			0.3x	0.3x	0.2x	3.8x	3.4x	3.1x	12.2x	3.9x	3.0x

9. Trading and Transaction Comparables

Key M&A Transactions

S. No.	Announced Date	Target Company	Target Country	Bidder Company	Deal Value (USD Mn)	EV (USD Mn)	EV/Rev (x)	EV/EBITDA (x)
1	22-Feb-21	Cooper Tire & Rubber Company	United States	The Goodyear Tire & Rubber Company (NasdaqGS:GT)	3,236.8	2,611.1	1.04x	6.29x
2	3-Feb-21	Mando-Hella Electronics	South Korea	Mando Corporation (KOSE:A204320)	147.8	147.8	0.26x	-
3	28-Dec-20	Tecnova	Ecuador	iQ International AG (DB:IQL)	39.4	39.4	0.62x	4.53x
4	18-Dec-20	Tiffin Motorhomes and Companies	United States	Thor Industries (NYSE:THO)	300.0	300.0	0.38x	-
5	14-Dec-20	Strands Group	Sweden	Relais Group Oyj (HLSE:RELAIS)	24.6	24.6	1.43x	10.74x
6	7-Dec-20	Jeco Co	Japan	DENSO Corporation (TSE:6902)	24.8	21.3	0.09x	2.15x
7	17-Nov-20	SBS Friction	Denmark	Brembo S.p.A. (BIT:BRE)	47.8	47.8	2.24x	-
8	11-Nov-20	Hongdong Faltec Auto Accessories	China	Guangdong Tokiwa Automobile Business	3.9	5.6	1.53x	-
9	30-Sep-20	Hebei Hongxing Automobile Manufacturing	China	Xingtai Longgang Investment	30.9	34.3	125.90x	-
10	28-Aug-20	Metalart Friction	India	Rico Auto Industries Limited (BSE:520008)	0.0	0.0	0.01x	-
11	11-Jul-20	Ningbo Bird Yilian Electronics	China	Ningbo Bird (SHSE:600130)	0.5	1.0	0.08x	-
12	9-Jul-20	Chengdu Gaoyuan Automobile Industries	China	Chengbao Automobile International.; Geely Automobile Group	115.3	115.3	0.13x	-
13	1-Jul-20	Ilseung Ind	South Korea	Chin Yang Industry (KOSE:A003780)	3.3	3.3	0.31x	-
14	30-Jun-20	Sichuan Ganghong XinYue Auto Services	China	Guanghui International Auto Trading Ltd	0.5	0.5	2.37x	-
15	12-May-20	Hyosung Quang Nam	Vietnam	Hyosung Advanced Materials Corporation (KOSE:A298050)	10.0	10.0	5.98x	-
16	15-Apr-20	Endurance Adler	Italy	Endurance Technologies Limited (BSE:540153)	3.8	3.9	0.55x	-
17	14-Apr-20	Hubei Tri-Ring Forging	China	Xiangyang Automobile Bearing (SZSE:000678)	99.3	99.3	0.73x	-
18	31-Mar-20	Jiangmen Qingqi Huanan Motorcycle	China	Undisclosed	6.4	6.4	0.31x	-
19	27-Mar-20	Jiangsu Zhihang New Energy	China	Jiangsu Ruihong Lithium Industry	66.9	102.9	10.84x	-
20	6-Feb-20	Tunga Delar Sverige	Sweden	Relais Group Oyj (HLSE:RELAIS)	14.8	15.6	1.51x	7.54x
21	28-Jan-20	Delphi Technologies	United Kingdom	BorgWarner Inc. (NYSE:BWA)	3,948.2	3,337.2	0.80x	7.05x
22	27-Dec-19	TRANSTECNO	Italy	Interpump Group S.p.A. (BIT:IP)	40.3	67.2	1.34x	6.92x
23	25-Dec-19	Liaoning Jinxing Automotive Interior	China	Zhejiang Dongshun Automotive Trim	23.6	23.6	0.24x	-
24	23-Dec-19	Meizhou Xinyu Automobile Sales and Service	China	Shenzhen Shenye Industrial	10.8	10.8	0.31x	-
25	18-Dec-19	Stellantis Automobiles	United Kingdom	Stellantis N.V. (BIT:STLA)	45,042.8	26,885.6	0.22x	2.27x

9. Trading and Transaction Comparables

S. No.	Announced Date	Target Company	Target Country	Bidder Company	Deal Value (USD Mn)	EV (USD Mn)	EV/Rev (x)	EV/EBITDA (x)
26	18-Dec-19	PSA Peugeot-Citroen	France	Stellantis Automobiles N.V	16,408.0	16,408.4	0.20x	1.99x
27	6-Dec-19	Jiangsu Joylong Automobile	China	Yangzhou Jiangdu District Xiannv Infrastructure Construction	72.9	72.9	0.54x	-
28	2-Dec-19	BAIC Automobile	China	Beijing WeLion New Energy Technology LTD	44.5	87.2	0.38x	-
29	2-Dec-19	Opus Group	Sweden	Searchlight-Geilen consortium	490.0	490.5	1.79x	8.93x
30	26-Nov-19	Jinan Geely Automobile	China	Zhejiang Geely Automobile Industry Company Limited	165.9	165.9	1.29x	-
31	30-Oct-19	Veoneer Nissin Brake Systems	Japan	Honda Motor (TSE:7267); Nissin Kogyo	106.0	207.8	0.73x	-
32	30-Oct-19	Nissin Kogyo	Japan	Honda Motor	505.0	974.1	0.56x	4.09x
33	30-Oct-19	Showa Corp	Japan	Honda Motor	700.0	1,238.6	0.47x	3.46x
34	30-Oct-19	Keihin Corp	Japan	Honda Motor	1,467.0	1,466.8	2.80x	3.67x
35	17-Oct-19	Vetierre Riunite	Italy	Sun European Partners, LLP	122.0	122.1	1.01x	6.71x
36	14-Oct-19	Shandong Jiatai Transport Equipment	China	Guangdong Huatie Tongda High-speed Railway Equipment Corporation	136.0	267.3	8.54x	30.94x
37	27-Sep-19	Hankuk Glass Industries	South Korea	Glenwood Private Equity	245.0	244.6	0.58x	5.55x
38	17-Sep-19	Dongfeng Xiaokang Motor	China	Chongqing Sokon Industry Group	543.0	754.5	0.31x	4.66x
39	16-Sep-19	Newmar Corp	United States	Winnebago Industries	344.0	343.5	0.52x	6.61x
40	2-Sep-19	Mobase Electronics	South Korea	MOBASE (KOSDAQ:A101330)	266.2	265.6	0.44x	10.41x
41	12-Aug-19	Jason Industries (Fiber Solutions)	United States	Motus	85.0	85.0	0.59x	-
42	25-Jul-19	Cobham	United Kingdom	Advent International Corporation	5,171.0	5,171.3	2.23x	21.67x
43	16-Jul-19	Kirchhoff GmbH	Germany	Mutares SE & Co. KGaA (XTRA:MUX)	1.1	1.1	0.01x	-
44	12-Jul-19	Top Injection	Mexico	Pride International (Hongkong) Limited	1.2	1.2	0.62x	-
45	12-Jul-19	Tower International	United States	Autokiniton US Holdings	1,206.1	1,050.3	0.70x	6.70x
46	10-Jul-19	YUTAKA SEIMITSU KOGYO	Japan	JTEKT Corporation (TSE:6473)	92.2	92.2	0.21x	-
47	26-Jun-19	BCA Marketplace	United Kingdom	TDR Capital LLP	2,645.0	2,645.5	0.69x	12.13x
48	24-Jun-19	Altran Technologies	France	Capgemini SA	5,590.0	5,589.7	1.63x	11.94x
49	19-Jun-19	Chassis Brakes International	Netherlands	Hitachi Automotive Systems,	659.0	659.1	0.63x	11.76x
50	18-Apr-19	Prime Car Management	Poland	PKO Leasing S.A.	479.0	479.4	2.92x	9.19x
51	3-Apr-19	Setrab	Sweden	Shanghai Yinlun Investment	7.6	7.6	0.71x	-
52	1-Apr-19	Ningbo Jiye Investment	China	Ningbo Jifeng Auto Parts	1,072.0	1,072.2	0.44x	5.95x

9. Trading and Transaction Comparables

S. No.	Announced Date	Target Company	Target Country	Bidder Company	Deal Value (USD Mn)	EV (USD Mn)	EV/Rev (x)	EV/EBITDA (x)
53	29-Mar-19	Magna Powertrain Campiglione	Italy	Hanon System EFP Corporation	95.8	95.8	0.44x	-
54	28-Mar-19	WABCO	Switzerland	ZF Friedrichshafen AG	7,243.0	7,584.0	1.98x	13.17x
55	12-Mar-19	Aurangabad Electricals	India	Mahindra CIE Automotive Limited (BSE:532756)	119.2	119.2	1.27x	-
56	20-Feb-19	Prime Car Management	Poland	Pollen Street Capital	509.0	509.1	3.08x	9.69x
57	22-Jan-19	PT Multistrada Arah Sarana	Indonesia	Compagnie Générale des Établissements Michelin Société en commandite par actions (ENXTPA:ML)	685.3	742.9	2.46x	33.33x
58	21-Jan-19	UQM Technologies	United States	Danfoss Power Solutions (US) Company	102.9	100.9	7.12x	-
59	17-Jan-19	All Assets of F&S Distributors	United States	Sterling Seal & Supply Inc.	0.9	0.9	0.34x	-
60	16-Jan-19	Belanger	United States	OPW Fueling Components Inc	175.1	175.1	3.18x	-
61	15-Jan-19	National Electric Vehicle	Sweden	China Evergrande New Energy Vehicle Group Limited (SEHK:708)	925.6	1,336.8	162.65x	-
62	28-Dec-18	Beijing Borgward Automobile	China	Changsheng Industrial (Xiamen) Enterprise Management Consulting	577.7	862.2	1.16x	-
63	28-Dec-18	Prime Car Management	Poland	Hitachi Capital Polska	510.0	509.9	3.56x	9.03x
64	19-Dec-18	Anhui Tatfook Heavy Industry Technology	China	Bengbu High-Tech Zone Investment Group	8.4	8.4	1.29x	-
65	18-Dec-18	SL Lighting Company	South Korea	SL Corporation (KOSE:A005850)	249.3	374.6	0.47x	-
66	18-Dec-18	Viza Geca	Spain	Magna International Inc. (TSX:MG)	105.3	95.3	0.67x	-
67	22-Nov-18	ADM21	South Korea	SM Chemical Corp.	39.6	39.0	2.65x	-
68	22-Nov-18	Xingmin Intelligent Transportation Systems	China	Sichuan Shengbang Chuangheng Enterprise Management	202.0	800.5	2.97x	19.32x
69	20-Nov-18	TA Holdings Europe	Belgium	Financiere SNOP Dunois S.A.	290.6	290.6	0.43x	5.40x
70	15-Nov-18	Spectrum Brands	United States	Energizer Holdings	1,250.0	1,250.0	2.69x	10.68x
71	13-Nov-18	Clarios	United States	Caisse de Depot et Placement du Quebec; Brookfield Business Partners	13,244.0	13,244.0	1.66x	7.88x
72	8-Nov-18	Agility Fuel Solutions	United States	Hexagon Composites ASA (OB:HEX)	124.2	248.4	1.58x	16.90x
73	7-Nov-18	Prime Car Management	Poland	PKO Leasing S.A.	514.0	513.7	3.58x	9.09x
74	7-Nov-18	U-Shin	Japan	MinebeaMitsumi Inc.	466.0	465.7	0.31x	4.15x
75	2-Nov-18	Sewon	South Korea	Central Insight.Ltd (KOSE:A012600)	15.3	18.1	0.75x	-
76	31-Oct-18	Rassini, S.A.B.	Mexico	GGI Inv SPV SAPI De CV	349.4	808.3	0.88x	5.22x
77	26-Oct-18	Clarion	Japan	Faurecia S.A.	1,361.0	1,361.3	0.84x	9.52x
78	25-Oct-18	RENK Aktiengesellschaft	Germany	Volkswagen AG	411.0	597.3	1.12x	6.64x
79	16-Oct-18	Junjin Heavy Industry	South Korea	Well to Sea Investment ; Motrex	224.0	223.5	1.17x	7.48x

9. Trading and Transaction Comparables

S. No.	Announced Date	Target Company	Target Country	Bidder Company	Deal Value (USD Mn)	EV (USD Mn)	EV/Rev (x)	EV/EBITDA (x)
80	9-Oct-18	Dill Air Controls Products	United States	Shanghai Baolong Automotive Corporation (SHSE:603197)	91.2	227.9	2.86x	-
81	9-Oct-18	Sonic Automotive	United States	Sonic Financial Corporation	20.9	3,303.8	0.33x	10.43x
82	1-Oct-18	Garrett Motion	Switzerland	Honeywell International Inc. (Shareholders)	1,304.0	2,712.2	0.88x	6.58x
83	18-Sep-18	Erwin Hymer Group	Germany	Thor Industries	2,340.0	2,340.4	0.88x	18.67x
84	13-Sep-18	Hebei Xin'ou Auto Parts Technology	China	Tianjin Pengling Group	167.0	166.6	2.53x	18.68x
85	8-Sep-18	Jonjee Hi-tech Industrial and Commercial Holding	China	Zhongshan Runtian Investment	834.0	3,292.0	6.24x	28.30x
86	20-Aug-18	Grakon Parent	United States	Methode Electronics (NYSE:MEI)	501.5	496.6	3.19x	13.14x
87	2-Aug-18	Ovako	Sweden	Sanyo Special Steel	914.0	912.3	0.85x	8.13x
88	31-Jul-18	Nexus Vehicle Management	United Kingdom	Phoenix Equity Partners Limited	186.0	186.5	2.42x	26.56x
89	30-Jul-18	Oerlikon	Switzerland	Dana Incorporated	605.0	605.1	0.82x	7.69x
90	19-Jul-18	Sage Automotive Interiors	United States	Asahi Kasei Corporation (TSE:3407)	1,060.0	1,060.0	2.23x	-
91	12-Jul-18	Camso	Canada	Compagnie Générale des Établissements Michelin (ENXTPA:ML)	1,611.0	1,611.0	1.65x	11.85x
92	9-Jul-18	Anhui GVB Renewable Energy Technology	China	GuoChuang Software (SZSE:300520)	115.0	115.0	7.68x	-
93	6-Jul-18	FTZ Autodele & Vaerktoej; Inter-Team	Denmark	Mekonomen AB	463.0	463.0	0.78x	9.63x
94	2-Jul-18	Ningbo Fuerda Smartech/Shanghai Fuyulong Car Technology	China	Sanhua Holding Group	305.8	305.8	1.20x	-
95	21-Jun-18	Motus Corp	South Africa	Imperial Holdings Limited (Shareholders)	1,372.0	1,806.8	0.32x	5.00x
96	11-Jun-18	Jiangsu Hengyi Automobile Fittings	China	Huada Automotive Technology Corp., Ltd (SHSE:603358)	38.6	75.8	1.64x	-
97	9-Jun-18	Zhongzhi Yike Chengdu Automobile	China	Zhe Jiang Kangsheng (SZSE:002418)	87.7	87.7	0.35x	-
98	5-Jun-18	Xuchang Qianchao Yuandong Auto Parts	China	Xuchang Yuandong Drive Shaft (SZSE:002406)	2.3	4.2	43.88x	-
99	4-Jun-18	Sunbeam Auto	India	Kedaara Capital Investment Managers Limited	132.0	131.6	0.64x	7.91x
100	29-May-18	Grammer	Germany	Ningbo Jifeng Auto Parts (SHSE:603997)	777.1	1,012.1	0.48x	7.05x
101	24-May-18	Veoneer	Sweden	Autoliv (Shareholders)	3,638.0	3,699.8	1.59x	52.63x
102	22-May-18	Toledo Molding & Die	United States	Grammer AG (XTRA:GMM)	271.0	271.0	0.90x	-
103	22-May-18	Valves Business of Sensata Technologies	United Kingdom	Pacific Industrial (TSE:7250)	173.0	173.0	1.48x	-
104	26-Apr-18	RAPRO Kimya Turizm Bilisim San. ve Tic.	Turkey	Gates Industrial Corporation plc (NYSE:GTES)	50.9	50.9	2.04x	-
105	13-Apr-18	AMA Group	Australia	Blackstone Group	366.0	365.6	1.23x	12.64x
106	10-Apr-18	Federal-Mogul	United States	Tenneco Inc. (NYSE:TEN)	5,400.0	5,400.0	0.68x	7.19x

9. Trading and Transaction Comparables

S. No.	Announced Date	Target Company	Target Country	Bidder Company	Deal Value (USD Mn)	EV (USD Mn)	EV/Rev (x)	EV/EBITDA (x)
107	10-Apr-18	Wheel Pros	United States	Clearlake Capital Group	405.0	405.0	-	8.10x
108	10-Apr-18	Zhejiang Xinlong Industrial	China	Zhejiang XCC Group	104.0	104.1	1.30x	11.82x
109	6-Apr-18	eHi Car Services	China	A consortium led by MBK Partners and Ray Zhang	1,114.0	1,522.7	3.62x	8.07x
110	2-Apr-18	Reydel Automotive	France	Samvardhana Motherson Automotive Systems Group B.V.	105.0	105.0	0.10x	1.54x
111	7-Mar-18	Thomson Industries; Kollmorgen; Portescap; Jacobs Vehicle Systems	United States	Altra Industrial Motion Corp	2,961.0	2,961.0	3.26x	13.46x
112	1-Mar-18	Laird	United Kingdom	Advent International Corporation	1,599.0	1,599.4	1.24x	11.57x
113	28-Feb-18	Fenix Parts	United States	Stellex Capital Management	38.4	37.3	0.28x	-
114	19-Feb-18	Faster	Italy	Helios Technologies	605.0	604.5	5.24x	20.20x
115	22-Jan-18	Wuxi Micro Research Precision Press-Parts	China	Wuxi Longsheng Technology (SZSE:300680)	75.6	73.7	3.00x	17.25x
116	17-Jan-18	GKN	United Kingdom	Melrose Plc	12,101.0	12,101.1	0.91x	8.12x
117	12-Jan-18	Lance Camper Manufacturing	United States	REV Group (NYSE:REVG)	77.3	77.3	0.77x	-
118	1-Jan-18	Comstar Automotive Tech	India	Blackstone Group	121.0	120.7	1.36x	4.52x

Average

4.38x

10.85x

Median

0.91x

8.13x

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10. Team and Experience

Selected Global M&A Partners Transactions




Merger

Lordstown Motors is an Ohio-based OEM that designs and manufactures all-electric, light duty fleet vehicles.



Brown Gibbons Lang & Company

Advisor





Gaupen Henger, leading Norwegian trailer manufacturer, was sold to French listed group Trigano.

France
Norway



Saga Corporate Finance & Financière de Courcelles



Advisor to the seller





Sale of a manufacturer of kinematic plastic trim parts for the automotive industry

Japan
Germany



RECOF

Advisor to the seller





Acquisition of a leading Finnish vehicle inspection company from MB funds

United Kingdom
Finland



Aventum Partners

Advisor to the buver





Michelin has acquired Meyer Lissendorf, a car tire wholesale specialist in Germany

France
Germany



Financière de Courcelles

Advisor to the buver





H2 Equity Partners enters into partnership to acquire TB&C, global supplier of hybrid components for automotive sunroofs

Netherlands
China
Mexico and Central



JBR

Advisor to the seller



Financial and economic valuation of Valbormida's Brazilian subsidiary specializing in casting of automotive parts



Condere

Advisor





Sale of Lumitec LLC (Lumitec) to Truck-Lite Co., LLC



Brown Gibbons Lang & Company

Advisor to the seller



Ditecar

Fenix Partners S.A. acted as financial advisor to Ditecar S.A.



Fenix Partners

Advisor to the seller





About Us

Established in 1999, Global M&A Partners is a leading international partnership of investment bankers specializing in mid-market transactions. We provide sector expertise, international scope, and deep local market knowledge and execution capabilities for our clients. We operate with local offices across 4 continents and have completed over 1,500 transactions during the last ten years, typically ranging from €50 to €500 million.

Our Automotive team maintains coverage of the broad automotive sector, including automotive supply chain, automotive aftermarket, and the on- and off-highway commercial vehicle sectors.

We have executed numerous transactions for private, public, or institutionally backed companies, including mergers & acquisitions, restructurings, and capital raising.

The team brings a unique perspective, having spent time as operators and advisors to the sector, leading to deep and entrenched sector relationships. Given our sector experience, transaction expertise, and unparalleled access to local decision makers, we can work together to offer customized M&A solutions and premium valuations for our clients.

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