Successfully Navigating Supply Chain Disruptions

Center for Automotive Research (CAR) Webinar

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Here with us today

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Supply chain agility is the #1 business priority for companies over the next 1-2 years

Survey of Automotive and Industrial Manufacturing Clients\(^1\)

(n=607)

<table>
<thead>
<tr>
<th>Area</th>
<th>Priority</th>
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</thead>
<tbody>
<tr>
<td>Supply Chain Agility</td>
<td>63%</td>
</tr>
<tr>
<td>Cybersecurity</td>
<td>61%</td>
</tr>
<tr>
<td>Digital Sales and Marketing</td>
<td>59%</td>
</tr>
<tr>
<td>Smart Factories</td>
<td>58%</td>
</tr>
<tr>
<td>Managing the Tax Impact of Changing Production Locations and Suppliers</td>
<td>56%</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>54%</td>
</tr>
<tr>
<td>Digitizing Products and Services</td>
<td>52%</td>
</tr>
<tr>
<td>Customization (Made to Order)</td>
<td>50%</td>
</tr>
<tr>
<td>Digital Upskilling</td>
<td>49%</td>
</tr>
<tr>
<td>Sustainability (Net Zero)</td>
<td>44%</td>
</tr>
</tbody>
</table>

\(^{1}\) Question: “What level of priority is your company giving to the following business areas over the next 1-2 years?” Survey Size: 607 respondents

Source: PwC Global Manufacturing COO Pulse Survey 2021
Supply chain disruptions are occurring with increased frequency

Supply chain survival of disruptive events is considered a new norm for global business operations

Global automotive production has declined ~16% due to COVID and the global chip shortage, and a recovery is not expected until late 2022.

**Global Light Vehicle Production Historical and Forecast**

(in M units)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>94</td>
</tr>
<tr>
<td>2019</td>
<td>89</td>
</tr>
<tr>
<td>2020</td>
<td>75</td>
</tr>
<tr>
<td>2021F</td>
<td>75</td>
</tr>
<tr>
<td>2022F</td>
<td>83</td>
</tr>
<tr>
<td>2023F</td>
<td>92</td>
</tr>
</tbody>
</table>

Based on industry forecasts, the global chip shortage and supply chain disruptions will result in ~$260B - $300B\(^1\) lost revenue for automotive OEMs globally in 2021 and will likely persist through the end of 2022.

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1. Assumes weighted average global retail price of $30K/vehicle and average dealership new vehicle gross margins of 8-10%.

Sources: Automotive News, Moody's, IHS Markit; J.D. Power, MarketWatch, Statista, MercerCapital, and PwC Autofacts analysis
The global microchip shortage was driven by massive demand shifts during COVID and long lead times for new orders and new capacity.

### Chip Shortage Root Causes

1. Covid-19 related demand shock and drastic reduction in automotive orders
2. Rising demand in consumer electronics and other industries during Covid-19
3. Investment reluctance in old technology among chip producers
4. Export curbs on US equipment to Asian foundries manufacturing for Huawei
5. Downtime of a large-scale production facility causing additional bottlenecks

### Semiconductor 2020 revenue by Customer Industry

- **Automotive**: 7%
- **Consumer**: 8%
- **Computer**: 28%
- **Industrial/Medical**: 5%
- **Wireless Com**: 5%
- **Storage**: 5%

**Automotive industry has low purchasing power accounting for only 8% of total sales.**

*Sources: SIA “Strengthening the global semiconductor supply chain in an uncertain era”; IDC “PC Demand Remained Strong in the Second Quarter Amid Early Signs that Market Conditions may be Cooling”; PwC Analysis*
Beyond microchips, there are several other critical automotive materials that may be at risk of future disruptions.

**Critical EV Battery Materials at Risk**

- Cobalt
- Lithium
- Graphite

**Other Critical Automotive Materials at Risk**

- Al
- Rubber
- Silicon

**Other Materials at Risk Due to**

- Limited Supply
- Expected automotive demand growth
- Expected demand growth from other industries

**Important that OEMs and Suppliers Identify the Materials within their systems and sub-systems that are Critical**

In addition to the examples above, other critical materials such as resin, neodymium, and copper pose a supply chain risk.

Sources:
- Automotive World: “Survey Reveals Aluminum Remains Fastest Growing Material”
- BBC: “Why the world is running out of sand”
- BusinessWire: “Global Construction Market Expected to Reach $16.6 Trillion by 2025, Growing at a CAGR of 7%”
- Reuters: “Shortages flagged for EV materials lithium and cobalt”
- NS Energy: “Profiling the world’s largest cobalt-producing countries”
- NS Energy: “Lithium prices could triple by 2030 as demand outpaces supply”
- PR Newswire: “Graphite Market to hit $36,889.1 Mn Revenue by 2030”
- The Car Guide: “Is Rubber the Next Shortage Threatening the Auto Industry?”
- PwC Analysis
Industry leaders are employing advanced supply chain risk management methods to create supply chain resilience

Supply Chain Risk Management - Maturity Model

Level 1: Basic Visibility

Ad-hoc & Reactive leveraging SC portals

- Basic visibility to tier-1 SC risks using drill-down dashboards
- Ad-hoc and reactive supply chain risk management methods
- No logistics contingency or risk mitigation plans

Level 2: Enterprise Visibility

Harmonized Enterprise Supply Chain Visibility

- Single consolidated view into enterprise supply chain risks
- Integrated forecasting beyond tier-1 suppliers
- Ad-hoc management of logistics disruptions based upon current conditions

Level 3: Agility

Smart Control Tower to sense & respond based on real time data

- Real time demand sensing and risk scenario planning
- Automated decision rules and algorithms for re-allocating inventory and production scheduling
- Integrated forecasting through Tier-N suppliers
- Logistics plans and operations include multiple routings, carriers

Level 4: Resilience

Predictive Analytics and Decision Support based on leading indicators

- Predictive supply chain risk management capabilities
- Proactive risk management of all critical supply chains
- New sources of supply for critical materials and technologies
- Integrated risk simulation and SIOP processes for Tier-N suppliers
- Proactive and dynamic logistics rerouting based upon real-time data inputs

Sources: PwC Analysis
Creating E2E visibility, agility, and resilience are critical to mitigate the risk of future disruptions.
How mature is your organization in managing supply chain risks?

Supply Chain Risk Management - Maturity Model

- **Level 1: Basic Visibility**
  - Ad-hoc & Reactive
  - leveraging supply chain portals

- **Level 2: Enterprise Visibility**
  - Harmonized Enterprise Supply Chain Visibility

- **Level 3: Agility**
  - Smart Control Tower to Sense & Respond based on real time data

- **Level 4: Resilience**
  - Predictive Analytics and Decision Support based on leading indicators
Questions?

Please submit questions using the Q&A function on your toolbar