MANUFACTURING INDUSTRIES 2030
Perspectives on Manufacturing Industries Vol.15
Dear Reader,

It is an undeniable fact that the entire world has been weighted down under the burden of COVID-19. The virus continues to challenge industries, workforces, governments, and societies across the globe. That said, it may turn out that the disruption we are currently experiencing will have less lasting long-term impact than other trends and disruptions that have been obscured by the pandemic.

Against the backdrop of the pandemic, the 15th edition of Perspectives on Manufacturing Industries is projecting the future of the sector, assessing what it will look like in 2030. We developed 12 hypotheses on changes that have the potential to impact the industry significantly over the next decade. These hypotheses were put to the test, and then we discussed them with more than 20 CEOs and other management board members of manufacturing companies. Our discussions and findings have resulted in the focus of this journal: The global supply chain dilemma, the true value of digital, and the war for talent are all trends that rank very high on CEOs’ agendas. But the impact of decarbonization on the industry should not be underestimated either, as it will play a major role in creating material opportunities in the coming decade.

We also address the issue of managing costs in a pandemic as well as examining quality management 4.0. Additionally, we discuss how the truck industry can meet European emission standards and how digital services will revolutionize the defense industry.

The manufacturing industry is experiencing disruptive and volatile times. With the right strategies and responses, though, the industry not only will survive, but will also thrive in the post-pandemic future.

Yours sincerely,

Wolfgang Krenz
Head of Global Manufacturing Industries Sector
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This is an interactive file
Click to navigate
Open a business newspaper or webpage of your choice and you will find ample reflections on what the new normal after COVID-19 will look like. And it is undeniably true: The novel coronavirus will have lasting effects on societies and businesses — much like 9/11 brought us new and enduring levels of airport security and the financial crisis of 2008 led to new and continuing financial regulation. But an excessive focus on COVID-19 when contemplating what the future may bring, in our view, is shortsighted. In fact, other trends may have a more fundamental impact. During our “Manufacturing Industries 2030” initiative that we conducted throughout 2020, we interviewed the chief executive officers (CEOs) of leading manufacturing firms. Emphasizing the need for a broader view, one CEO said: “COVID-19 is not the world — it is the lens through which we currently look at the world.” And another one put it this way: “COVID-19 itself is not the change, but it is the catalyst for other changes that had already been ongoing.”

**DO NOT LOOK BACK IN ANGER**

The past decade turned out to be a good one for the manufacturing industry with annual global growth of more than four percent, beating GDP by one percent. (See Exhibit 1.) But it did not start out that way at first. The shock from the 2008/2009 financial crisis led to an overall cautious approach to business in the first half of the decade, and ensuring resilience and flexibility was top of mind for company leaders — an experience and mindset that has benefitted the industry as we entered the COVID-19 crisis. “Digital” and the “rise of Chinese players” were the most prominent trends of strategic relevance. Otherwise, many companies focused more on optimization and operational excellence as well as incremental expansion of their portfolios.
While some sectors, such as wind turbine manufacturing or material handling equipment, underwent industry consolidation, it was not a period of industry-shaping mergers and acquisitions (M&A), although the unbundling of several industrial conglomerates toward the end of the decade could be seen as an exception or as the start of a new cycle of M&A activity (also see our hypothesis 8).

Exhibit 1: Past and future growth of industrial goods sector
Global Industrial Goods Output (Sales)\(^1\) in $US BN

We asked ourselves, what will the manufacturing industry look like in 2030 — not simply in terms of volume forecasts (as shown in Exhibit 1), but in terms of key structural trends manufacturing firms need to look at. We started the same-named initiative where we established 12 hypotheses on developments that we think have the potential to significantly impact the sector in the next decade. These hypotheses were subsequently tested through a broad survey among executives and discussed in depth with more than 20 CEOs and other management board members of manufacturing companies during the summer of 2020.

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1. Engineering & Metal Goods (NACE: 25, 27, 28): Fabricated metal products, electrical equipment, machinery and equipment n.e.c.

Source: Oxford Economics
12 THEMES THAT WILL DOMINATE THE STRATEGIC AGENDAS OF MANUFACTURING FIRMS IN THE 2020'S

1. The greening of industry

Achieving carbon-neutrality will be necessary yet little differentiating for manufacturers of industrial products — but helping others becoming carbon neutral presents a trillion dollar opportunity.

2. The world is watching

Social media pressure and public opinion hits industrial firms. A rising number of CEOs will find themselves named and shamed for poor corporate environmental and social behavior.

3. The global supply chain dilemma

An ever-increasing array of contradictory and dynamic parameters (such as trade barriers, political instability, epidemics, and natural disasters) will force companies to square the circle, to actively manage the risks — and to stay flexible.

4. The fading importance of production

The traditional OEMs’ focus of CAPEX and management attention on production is no longer warranted by its relevance for differentiation — a shift of resource focus and divestments will not only “change the face” of an industrial OEM but also create new tier-n suppliers.

5. The redefinition of the B2B customer relationship

The B2B customer experience will be “consumerized” and customer relationships will move from transactional to permanent (“customer integration”), both trends strongly leveraging digital technologies.

6. The true value of digital

Additional value from data-driven business models will turn out to be marginal for most manufacturing firms, but the true value of applying digital technologies to reinvent internal processes will finally be unlocked, if if they think big, bold, and take an end-to-end approach.
Crisis like COVID-19 will change behavior and further accelerate trends towards software solutions and data platforms. The global market value share of tech players and digital disruptors has soared in the past and will grow even more — at the (relative) expense of traditional business models like manufacturing.

After the current wave of corporate divestments, a "consolidation end game" will happen in many sectors — followed by a comeback of diversification in search of new growth opportunities.

Four types of investors (Chinese, private equity, activist, and special situation) will raise their stakes and change the corporate dynamics of manufacturing firms — each in their unique way.

As companies increasingly face high-impact cyberattacks (such as production shutdowns and IP theft), cybersecurity will assume a greater importance on corporate agendas, driving up costs and slowing the deployment of innovative data-driven business models.

Never before has the workforce had to change as drastically and in as many dimensions in the span of just 10 years. The capability of industrial firms to build and retain the workforce of the future will be a major factor in separating winners from losers.

Evolving mindsets and the need for agility will drive major changes to manufacturing firms’ organization. Culture, more dynamic organizational structures, and management models around autonomy, self-fulfillment, and virtualization will lead the change.
While our approach was global in nature, it has to be noted that the responses were heavily skewed towards Western Europe. Three results are noteworthy: First, on average, 88 percent of survey respondents agreed or partly agreed with our hypotheses. The admittedly provocative hypothesis “The Fading Importance of Production” related to competitive differentiation and future distribution of capital expenditures fell off a bit. Second, many top themes are “known quantities” but have taken on new qualities, either as a result of COVID-19 or through the experience over the past years. And, third, “The Greening of Industry” is the “new kid on the block,” with high relevance and representing a substantial opportunity for the sector.

Exhibit 2: Hypotheses 2030 by relative consent

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Average consent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The global supply chain dilemma</td>
<td>88%</td>
</tr>
<tr>
<td>The war for talent 2.0</td>
<td></td>
</tr>
<tr>
<td>The reinvention of corporate organizations</td>
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<tr>
<td>The greening of industry</td>
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<tr>
<td>Redefinition of the B2B customer relationship</td>
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<tr>
<td>The world is watching</td>
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<td>The proliferation of cyber risk</td>
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<td>The loss of value share</td>
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<td>The true value of digital</td>
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<tr>
<td>The changing nature of M&amp;A</td>
<td></td>
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<tr>
<td>Growing influence of non-traditional investors</td>
<td></td>
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<tr>
<td>The fading importance of production</td>
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</table>

Source: Oliver Wyman analysis

On the last point, as our separate article ("Ride the Green Wave") points out, this is not about do-goodership or compliance. According to our estimates, it is a trillion-dollar business opportunity for providers of industrial equipment. Depending on how carbon pricing regulation plays out it can be a massive value pool for equipment suppliers who can provide equipment or upgrades to current equipment, which reduces the carbon footprint of equipment operators (for example power generation, steel, cement, and chemicals).
What will the manufacturing industry look like in 2030 — not simply in terms of volume forecasts, but in terms of key structural trends?
New breakthrough technologies (for instance around hydrogen solutions) and hence new types of industrial equipment that will need to be brought to industrial scale offer the opportunity for manufacturing firms to diversify and get a share of the pie. The fact that richer countries, especially in Europe, will likely drive the climate agenda earlier and harder, gives Western manufacturers the opportunity to be first movers, positioning themselves early for subsequent global rollouts.

**VIEWS FROM THE TOP**

The following three themes have come out as the leading topics in our “impact vs. need for action” ranking. (See Exhibit 2.) We are sharing some of the perspectives that our interview partners shared with us.

**Spotlight 1: The war for talent 2.0**

This theme came out at the top of the ranking. There was wide agreement among the company leaders that the industry faces a substantial shift in skill portfolio and general upskilling ahead. Many traditional skills will become redundant, but company leaders were confident that the shift will happen gradually and be managed organically, without having to resort of greater restructuring efforts. The most commonly raised theme was insufficient access to certain skills, especially but not only those related to digital (for example, data scientists, AI, or cybersecurity experts). Unattractive company locations and the image of “old economy” were quoted as reasons. Another observation that was shared widely was the reluctance of upcoming junior management talent to take on expat positions abroad, as was previously the norm, leading to a lack of international experience. This phenomenon was typically associated with the broader theme of changing attitudes toward work vs. life. On the positive side, company leaders felt they have powerful weapons in the war for talent, such as solidity and value orientation (points that came up repeatedly in interviews with family-owned firms), investment in people and the willingness to leverage new work models, and setting up shop in trendier locations to accommodate new workforce requirements. Some specifically see it as an opportunity to leverage the more down-to-earth attitudes of family businesses to attract top-notch talent (as a counterweight to the large corporations in major urban areas).
Exhibit 3: Hypotheses 2030 ranked by impact and need for action for the manufacturing industry

1. The greening of industry
2. The world is watching
3. The global supply chain dilemma
4. The fading importance of production
5. The redefinition of the B2B customer relationship
6. The true value of digital
7. The loss of value share
8. The changing value of M&A
9. The growing influence of non-traditional investors
10. The proliferation of cyber risk
11. The war for talent 2.0
12. The reinvention of corporate organizations

Source: Oliver Wyman analysis
Spotlight 2: The global supply chain dilemma
The recent COVID-19-related supply chain disruptions certainly played a role in bringing this topic so far up in our ranking. Our Manufacturing Industry Strategy Club Pulse Survey, for instance, showed that supply-chain disruptions in more than 50 percent of the responding firms were a key driver for revenue losses, especially at the beginning of the crisis. And this despite the fact that the supply chains of B2B manufacturing firms are typically less global and less complex than those of automotive OEMs for example. Consequently, few of the companies we interviewed had severe breaks in the supply chain that would have halted production completely. “The frequently denounced shopping around the church spire has its advantages,” one managing director of a leading machinery player cheered. While no disruptive shifts in supply chain strategies were anticipated, it was clear that companies will rate security of supply — and more flexibility as a means to this end — higher going forward (see our article “Making Supply Chains More Resilient”). Depending on the business model, that can mean either more “local-for-local” (for instance in the case of component manufacturers) or more “centralization,” including near-shoring of low-cost sourcing from Asia to Eastern Europe (in the case of complex machine OEMs). And it will lead, wherever economically feasible, to a move from single to at a minimum dual sourcing strategies. But there was broad consensus that the new focus on resilience must not come at any cost, as “customers will likely not be willing to pay more.”

One aspect that came up loud and clear in our discussions was the issue of rising political tensions and trade conflicts, with their implications not only on supply chains but on the very business model of many manufacturing firms that are highly dependent on exporting globally. While not the focus of this round of discussions we are planning to make this a topic for future industry dialogue.

Spotlight 3: The true value of digital
There was broad agreement regarding the continued high potential of “digital” for manufacturing companies and around the fact that only a fraction of this potential has been realized thus far. The two elements of our hypothesis (the huge unexploited potential for internal efficiency gains and the limited external revenue potential) can best be illustrated by two supporting quotes. The CEO of a leading provider of intralogistics systems who currently invests heavily in digitally enabled end-to-end processes stated: “We still see 20 percent to 30 percent internal efficiency gains through digital. It takes some time to get there, but I am sure whoever does not invest in this now will be dead in 2030.” On digital business models, the chief technology officer (CTO) of a large manufacturer of mechanical components said, “We are not and we won’t be making much money by selling digital products like software or apps. But digital will allow us to make money with our traditional products in a new way.” However, the digital trend is clearly hampered by “The Proliferation of Cyber Risks” (hypothesis 10) which also has been rated very high, and one CEO noted that the adoption of digital/Industrial Internet of Things (IIoT) offerings has slowed due to customer concerns on system attacks or data theft.
Despite the unanimous view that digital continues to be a top topic, our concrete hypothesis was one of the more hotly contested ones. (See Exhibit 3.) But that contentiousness may have been driven by objections against our somewhat brusque denouncement of “data-driven business models.”

ONWARDS AND UPWARDS

As the manufacturing industry sets out for a new decade, the immediate future looks bleak. COVID-19 is a reality, and recovery of the economy to precrisis levels will take a few years, as we saw in previous recessions. But long-term growth projections remain intact. The decade will bring old and new challenges for manufacturing firms — and new opportunities, as our 12 themes illustrate. As always, the future will belong to the visionaries, to the adaptive, and to the prepared. Now is a good time for company leaders to take stock, to set the strategic direction, and to prepare for the 2020s. While the future of the industry may be uncertain, there is one thing that is certain: It won't be boring.
Chapter 1

MANUFACTURING 2030

Ride The Green Wave
Daniel Kronenwett

Making Supply Chains More Resilient
Jochen Graff, David Kaufmann, Tushar Narsana, Rohit Singh

The New Shareholders
Thomas Kautzsch, Xavier Ruaux, Tarik Ouahmed

Consumerization and Partnerships
David Kaufmann, Daniel Kronenwett, Xavier Ruaux
Decarbonization will be a colossal topic for industrial equipment manufacturers in the coming decade, irrespective of the current COVID-19 turmoil. That, however, will not be due to the impact machinery manufacturers have on reducing their own CO₂ emissions. This represents just a small piece of the pie and will become more of a “hygiene factor” (although much work remains to be done). Instead, manufacturers of industrial equipment will have a giant impact on other sectors using their solutions.

By leveraging innovation, equipment manufacturers will become the key enabler for CO₂ reduction: a €1 trillion business opportunity fueled by regulation as well as public and private money. To take advantage of this opportunity and to belong to the winners in the next decade, equipment manufacturers need to develop a clear strategy now.

The COVID-19 pandemic has displaced the decarbonization debate over the past few months. Nonetheless, reducing global warming remains a critical objective, and the goal will soon find itself high on the agendas of decision-makers in every economic sector.

Currently, industrial machinery and equipment manufacturers account for approximately 1 percent of total global emissions. (See Exhibit 4.) As a result, achieving internal carbon neutrality at equipment manufacturers will have little impact on the big picture.

Industrial machinery firms are typically the ones who deliver equipment into numerous sectors that produce energy, materials and goods — emitting or consuming huge amounts of CO₂ themselves when using that equipment. Those sectors, in total, are responsible for almost 70 percent of the emissions that could be affected through decarbonization technology. This reflects a huge lever — and business opportunity — for equipment manufacturers.
Exhibit 4: Industrial machinery and equipment sector with small lever for itself, but with big lever for other sectors

Worldwide CO₂-emissions by sector 2017

Total: 33 GT CO₂

1) Other includes commercial and public services, agriculture/forestry, fishing and non-specified other

Note: Industrial electricity and heat allocation on industry sectors based on 2016 figures

Source: IEA, Oliver Wyman analysis
BIG FUNDING

Paving the way toward this opportunity is unprecedented funding: The European Union Commission has announced €1 trillion in public spending and financing support across all sectors as part of the “Green Deal”, which was presented in December 2019. In addition, many global investment funds stated — and reiterated during the COVID-19 crisis — their intention to funnel private money into the winning business models of the decarbonization era.

The money will be well received: According to a recent CDP/Oliver Wyman study of firms representing about 75 percent of European market capitalization, vast amounts of capital are needed to achieve climate goals — especially in power generation and production of materials like steel and cement. In 2019, the European firms covered by the study reported €60 billion of low-carbon capital investments. But for Europe to achieve CO2 neutrality by 2050, this investment at least needs to be doubled, to €120 billion annually — which is quite a stretch.

Now more than ever, it is important that European countries invest in renewable energy and other low-carbon technologies to build back better after the COVID-19 pandemic, creating new jobs and rebooting their economies. Embracing renewable energies and energy efficiency policies will not just protect our planet, but will also create a healthier and resilient world for all. Already today we offer leading-edge solutions to combat climate change. Moreover, our parent company was the first global industrial company to commit towards carbon neutrality by 2030.

Miguel Ángel López, Chairman, Siemens Gamesa Renewable Energy

MACHINERY MAKERS:
INTERNAL CARBON NEUTRALITY AS “HYGIENE FACTOR”

The EU Commission set the target to reach carbon neutrality by 2050. Until then, tighter regulations and significantly higher CO2 prices can be expected. European firms are obliged to minimize their own internal emissions. For equipment manufacturers, achieving internal or “scope 1-2” carbon neutrality by the 2050 goal will be more a matter of a “hygiene factor” driven by public pressure rather than a strategic differentiator. A more ambitious strategy of reaching carbon emission goals would accrue some benefits to machinery manufacturers like greater appreciation in capital markets and among employees. Those gains for the most part would, however, be reputational and bring only minimal economic advantages to manufacturers.
Regardless, European machinery firms still have much work to do. Driven by a relatively low price of CO₂, firms on average have reduced their emissions only by around 2 percent annually in the last three years. Looking ahead, only 43 percent of examined European industrial equipment makers have announced any CO₂ goals. Their declared objectives are only “halfway” (that is, they represent a reduction of about 50 percent of today’s emissions) or follow the 2050 timeline of carbon neutrality. US firms have been even more conservative: Only 19 percent have made announcements, with an average reduction target of 25 percent.

THREE PATHS FOR SEIZING A €1 TRILLION OPPORTUNITY

Assuming that capital investments of €120 billion annually are needed to achieve carbon neutrality in Europe by 2050, more than €1 trillion will have to be spent on green solutions relevant to equipment manufacturers over the coming decades. That is a huge value pool waiting to be drawn on by companies investing in low-carbon technology and by industrial equipment manufacturers developing that innovation.

How do industrial equipment makers go about seizing the opportunities?
There are three distinct paths:

Path 1
involves incremental hardware improvements via regular research and development (R&D) cycles, for instance a much more powerful wind turbine. Additional improvements could be realized by offerings based on software and, for instance, Industrial Internet of Things solutions that allow for more efficient energy use of existing hardware through data analytics.

Path 2
includes groundbreaking solutions and reinventions of entire production processes, with substantially lower emissions than baseline “legacy” solutions. The decarbonization impact — as well as necessary R&D investments and risks — will be much greater than in Path 1. Examples of innovative solutions are the use of hydrogen technologies in steel or cement production or decentralized, integrated power generation systems fully based on renewables that are deployed in production factories.

Path 3
incorporates carbon capture, utilization, and storage (CCUS) technologies that allow for the capture of existing CO₂ and its use for new purposes Those technologies can focus on storing CO₂ in underground reservoirs via compression/injection or converting CO₂ from the atmosphere or production processes into raw material for new products such as chemicals. Equipment manufacturers must decide on what role they want to play, what their ambition is, and how to position themselves to succeed in accessing the available funds.
We are a global engineering company. Therefore, we want to deliver meaningful impact not only by reducing our own CO₂ footprint but especially by supporting our customers to significantly reduce their emissions. To achieve this, our goal is to further boost and expand our corporate portfolio of energy efficient, low-carbon production technologies.

*Dr. Jochen Weyrauch, Deputy CEO, Dürr AG*
A DECARBONIZATION STRATEGY TO CATCH THE OPPORTUNITY

Top management at machinery manufacturers can start this process by providing a clear vision and guiding themes around decarbonization. The strategy should be comprised of two interlinked pieces:

**Internal decarbonization:** Firstly, create transparency around the areas for taking action: Map out the stakeholder landscape, and assess the risks of delaying or going slow. Secondly, develop a target picture on internal de-carbonization that includes a decision on whether to be proactive or reactive regarding the CO₂ ambition. Thirdly, quantify targets and define an action plan.

**Harnessing opportunities from low-carbon products:** Firstly, quantify potential decarbonization “value pools” in customers’ industries. Maturity and pre-conditions of future technologies need to be understood along with in-house competencies and the competitive situation. Secondly, develop a low-carbon business portfolio, including assessment of business cases and funding opportunities. Thirdly, inorganic moves are likely to be required: Along internal actions, M&A strategies will need to be developed in this last step.

It is hard to drive the strategy single-handedly. To succeed, corporates will need an effective ecosystem of partners, including customers, suppliers, rating agencies, startups, and advisers. Equipment manufacturers should start crafting their decarbonization strategy now — the COVID-19-induced downturn could be a good time for a green reinvention.

At INDUS Group, we have set clear CO₂ reduction targets and pursue an ambitious emissions reduction path in order to maintain an above-average speed on our way to CO₂ neutrality. As a holding we support our portfolio companies in further developing the current strategy as well as financially, by means of our internal sustainability development bank, which helps to facilitate required investments and adjustments in production processes.

*Dr. Jörn Großmann, Board Member Indus Holding AG*
MAKING SUPPLY CHAINS MORE RESILIENT

How manufacturers can solve the supply chain dilemma — while remaining flexible and competitive

Jochen Graff, David Kaufmann, Tushar Narsana, Rohit Singh

Even in the world that existed long before COVID-19, supply chain management revolved around tradeoffs between the competing goals of cost, service level and cash. Now, however, a dizzying array of factors — including rapid-changing customer demands, unpredictable trade barriers, political instability, natural disasters, as well as the pandemic — has made optimization of the supply chain more challenging than ever before. Achieving a supple and secure supply chain for manufacturers in this new normal will require resilience and flexibility, but cost pressure will remain. The most broadly applicable lever to achieve this is risk diversification which can take two main forms: supplier diversification and supply chain regionalization.

To solve the global supply chain dilemma, companies need to approach future supply chain (and manufacturing) strategy decisions along two dimensions: market requirements, such as product value, complexity, and lead time, and the differentiator value (of having one’s own production capability). That said, there is no “one size fits all” solution: Supply chain strategies will develop in differentiated ways based on the decisions a company makes along the two dimensions.

MARKET REQUIREMENTS

The key decision for manufacturers in terms of supply chain setup centers on the issue of local versus global production. Factors driving this decision include security of supply for critical products, trade barriers, political landscape, factor costs and skill requirements. While simple and low-value products, such as consumer electronics, will continue to be mass-produced in global low-cost locations, complex and high-value products with shorter lead times, such as medical equipment, will likely be re-localized to increase resilience and flexibility.

Indeed, 10 out of 12 industries, with a combined market capitalization of $22 trillion, have already implemented or announced plans to shift back at least a portion of their production from current low-cost locations, according to a recent Bank of America survey.
To solve the global supply chain dilemma, companies need to approach future supply chain (and manufacturing) strategy decisions along two dimensions: market requirements, and lead time, and the differentiator value.
DIFFERENTIATOR VALUE (OF HAVING PRODUCTION CAPABILITY)

Here, the key decision is whether to make or to buy. The factors driving this decision include manufacturing capability, intellectual property, brand, and scale advantages. For certain products, such as engines and powertrains, where perceived customer value and differentiation are strongly driven by production capability, companies have selectively insourced production to build on this capability and ensure independence. For products where the perceived customer value and differentiation are no longer the result of a company’s production capability but rather its engineering or supply chain management excellence, original equipment manufacturers (OEMs) could move toward an outsourced production model to ensure flexibility. However, in such cases, the company should work with multiple suppliers in each sourcing category to avoid the risks of “single sourcing.”

Exhibit 5: Future supply chain archetypes

Source: Oliver Wyman analysis
Based on our research and interviews with industry and supply chain experts, we see four manufacturing OEM supply chain archetypes emerging. (See Exhibit 5.) And, depending on the company’s product portfolio complexity, several archetypes could co-exist within one company.

- **Outsourced production, with global supply chain**
  Manufacturing companies with commoditized production processes could lean towards a model that outsources production, so as to focus more on value-added activities. If product value and complexity, as well as lead-time requirements, are relatively low, then companies are likely to leverage a global supply chain to optimize cost. This model requires careful consideration of engineering processes, a strong brand, and intellectual property protection to deter suppliers from turning into competitors. For example, consumer electronics is a segment that has begun to adopt this archetype by leveraging Asian-based contract manufacturers that produce their products for the global market.

- **Outsourced production, with local/regional supply chains**
  Manufacturing companies with commoditized production processes that need to manage higher-value products and more demanding lead-time requirements, will likely move to regional or even local supply chains to ensure flexibility. Generic pharmaceuticals manufacturers and safety equipment makers are among the sectors that have moved in this direction by managing several supplier networks, each focused on a specific region.

- **Centralized mass production**
  Companies with unique production capabilities are bound to keep these in-house to differentiate themselves from the competition. The only way they can offset low product value and complexity is by having global-scale production, maximizing equipment utilization, and implementing cutting-edge automation. By building flexible and highly automated factories, the medical device and high-end electronics industries have started to adopt this archetype.

- **Globally/digitally interconnected production network**
  Companies with unique production capabilities that need to manage highly complex products with short lead times are often not able to have their own production facility for each main region, as this would explode their cost base. These companies are likely to adopt a globally and/or digitally interconnected production network to obtain the optimal balance. Automotive original equipment manufacturers (OEMs) and mechanical-engineering companies are among the industries moving in this direction, orchestrating their supply chain via a global network of suppliers and production sites.
Multiple archetypes may co-exist within the same company depending on the characteristics of their products. As discussed, many factors will influence a company's decision along the two axes and consequently define the relevant archetypes. As a reaction to the COVID-19 pandemic, we expect to see a shift towards the upper quadrants of the framework, leading to more localized supply chains. Supplier diversification and active supplier risk management are levers that apply equally to the left and right quadrants.

Of course, all these archetypes are related to a specific type of operating model. While there will be differences between the archetypes, all of them share one common denominator: Each supply chain model must ensure rapid responses and flexibility to cope with an increasingly volatile environment, and each must strike a balance between cost, service, and cash. Pro-active supply chain risk management will enable companies to detect potential risks along the supply chain early on to define and initiate the necessary countermeasures.
THE NEW SHAREHOLDERS

Who will be buying Europe’s industrial equipment manufacturers?

Thomas Kautzsch, Xavier Ruaux, Tarik Ouahmed

Conglomerates are becoming more focused, and sector consolidation is underway in the industrial equipment sector. Merger-and-acquisition (M&A) activities, which slowed down due to COVID-19, are expected to resume. The investor mix however might change going forward.

M&A activity in the European industrial equipment sector has been relatively stable over the past decade, with around 350 transactions each year and a total deal value of roughly $20 billion. (See Exhibit 6.)

Exhibit 6: Development of transaction in European industrial machinery sector
Acquiror Nationality of corporate parent as relevant criterium

<table>
<thead>
<tr>
<th>Acquiror Nationality of corporate parent</th>
<th>Deal Value in $BN¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese acquisitions</td>
<td>2010: 300</td>
</tr>
<tr>
<td>US acquisitions</td>
<td>2011: 400</td>
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<td>ROW acquisitions</td>
<td>2012: 100</td>
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<td>Deal Value</td>
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<td>2017: 200</td>
</tr>
<tr>
<td></td>
<td>2018: 300</td>
</tr>
<tr>
<td></td>
<td>2019: 200</td>
</tr>
<tr>
<td></td>
<td>2020: 500</td>
</tr>
</tbody>
</table>

¹. Only disclosed deal values are included in the analysis; 2020 contains announced deals until end of September
Source: Dealogic M&A Database, Oliver Wyman analysis
BUYERS, HOWEVER, ARE CHANGING QUITE SIGNIFICANTLY

Strategic buyers from China seeking market and technology access have acquired significant European firms from 2010 onwards. The peak was reached in 2016. Since then, political pressure in the US and Europe has limited Chinese acquisitions of larger technology firms (including industrial machinery in Europe). However, it is expected that Chinese buying will resume if industrial and trade policy restrictions are removed — as the underlying strategic logic from these transactions remains intact.

PE investors
Industrial conglomerates such as ThyssenKrupp, ABB, Siemens, and Bosch have become more focused in recent years, creating a wave of opportunities for large-scale buyouts. While this wave will eventually come to an end, the industrial equipment sector will remain a significant source of opportunities for private equity. Going forward, this could also involve more divestments of smaller industrial players and companies being taken private.

As both these groups tend to pay higher multiples than traditional industrial players, valuations will rise, and most industrial players are not willing to compete at those valuation levels.

Activist investors
Campaigns by activist investors have increased in recent years, the most prominent example being Cevian’s investments in ThyssenKrupp and ABB, where it had a strong influence on the portfolio restructuring at both companies. It is likely that activist investors will become even more prominent and drive strategic agendas.

Debt funds/restructuring funds
There has been limited investment by restructuring funds in recent years, given the strong performance of the sector. Now, however, COVID-19 has hit the sector hard. At the same time, some subsectors are facing structural shifts in technology and customer industries (for example, the shift from internal combustion engine to alternative drive trains). So, the number of restructuring cases will increase, as banks are cautious in providing additional capital to a cyclical sector, thus providing more opportunities for debt funds.

Governments
With the exception of Russia, no European government has taken equity stakes in the sector. We believe this is likely to continue: Governments will probably prioritize those sectors regarded as strategic (such as defense), large firms with more jobs at risk in (like automotive and travel), or sectors closely related to the pandemic (such as healthcare and pharmaceutical) in the years to come. This could change, however, if governments conclude that their national industrial base is at risk.

Executive teams and boards should be ready to meet the challenges represented by these trends. To do that will require more active portfolio management, a clear value-creation agenda, and sound financing.
The time when Business-to-Business (B2B) sales marched to their own drum — focused around the product and disconnected from the “customer-centric DNA” of Business-to-Consumer (B2C) — is gone forever: Customers have grown accustomed to a different experience, with constant information and integration as well as enhanced and rapid services throughout the journey. But the carryover of the consumerization experience is only one part of the story. The other change is the one B2B is undergoing in a fundamental yet complementary way: from transaction-based relationships, to partnerships. B2B is no longer simply about doing a “one-time” sale; instead, it is about building trust in the long run. This is increasingly becoming the case with the arrival of the Internet of Things (IoT), where the connection between suppliers and clients can only be strengthened and cemented. Strong market trends are reshaping the B2B environment, and companies need to adapt rapidly if they are to thrive.

“CUSTOMER CENTRICITY” IS RESHAPING B2B

While the product itself may previously have been the glue holding together the B2B relationship, it is now — and will continue to be the case over the next decade — all about the customer and his journey from initial identification to aftersales.

The initial customer contact starts more and more online: It is becoming increasingly easy to investigate, look for alternatives, spot suppliers and partners, and price products and services without ever having to leave the computer workstation. The prospective B2B customer, therefore, needs to be “captured” earlier through new channels such as online marketing, social media, or specific blogs. Furthermore, initial questions have to be answered fast to avoid losing the customer to the competition, given the pressure of ever-escalating market speed. Take the example of an industrial company in Germany that developed an “instant quoting” application for engineered parts, increasing its capacity to answer client requests rapidly and efficiently and maintain contact while making sales.
The B2B client increasingly is looking for an integrated experience, after the initial contact, with personalized and tailored offers. Customers expect immediate information about the status of their orders, systematic tracking, speed, reliability, and adaptability of deliveries, as well as options to tailor various services to their specific needs. Furthermore, administrative and burdensome elements of the transaction are to be smoothed out, creative payment options are to be proposed to the client, and, more generally, 24/7 rapid and efficient service is the new normal. In the B2B world of tomorrow, the client is more than ever the central figure. And while the product remains essential, refined strategic customer segmentations and tailored services will be reinforced as key differentiators.

Eventually, aftersales and retention will become an essential component of the story: while it is good to have made a sale to a client, it is even better to retain that client for the future in a recurring model. Empowered by an open and competitive world — along with easy to use “plug and play” systems — customers will be able to make even more rapid changes. In the same way, we also foresee customer loyalty being up for grabs, raising the importance of retention. Industrial players setting up “relays” at client sites is one example of sustained service, as it is and will be more and more about the permanence of the “customer-centric” interaction. (See Exhibit 7.)

Exhibit 7: B2B client relationship drivers

<table>
<thead>
<tr>
<th>FROM TRANSACTIONS TO PARTNERSHIPS</th>
<th>Co-innovation</th>
<th>“Trust based” RFPs</th>
<th>Responsibility for products’ performance during operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial contact</td>
<td>Co-development</td>
<td>B2B2C thinking</td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Tailored pricing</td>
<td>win/win solutions</td>
<td>24/7 Availability</td>
</tr>
<tr>
<td></td>
<td>Creative payment options</td>
<td>On-site presence</td>
<td>On-site presence</td>
</tr>
<tr>
<td></td>
<td>Easy admin</td>
<td>Immediate reactivity</td>
<td>Immediate reactivity</td>
</tr>
<tr>
<td></td>
<td>Constant collaborative improvement</td>
<td>Constant collaborative improvement</td>
<td>Constant collaborative improvement</td>
</tr>
<tr>
<td></td>
<td>Offer design and sales</td>
<td>Integrated planning</td>
<td>end-to-end</td>
</tr>
<tr>
<td></td>
<td>Adaptability, Flexibility, Speed and tailored operations</td>
<td>Track &amp; Trace</td>
<td>Adaptability, Flexibility, Speed and tailored operations</td>
</tr>
</tbody>
</table>

Source: Oliver Wyman analysis
Business-to-Business is increasingly about co-innovation and co-development: together shaping the product best adapted to the client’s needs.
FROM “TRANSACTIONS” TO “PARTNERSHIPS”

Pushing the expected evolution one step further, it appears that B2B clients are more and more looking for long-term “partnerships,” rather than “one-shot transactions”.

B2B is increasingly about co-innovation and co-development: together shaping the product best adapted to the client's needs. This evolution is triggering win-win adaptations that reduce costs as well as lead-times while supporting growth. Going one step further, B2B clients increasingly expect suppliers to take into account the expectations of the final customer in a new B2B2C mode of thinking — hence standing ready to fine-tune the components of their offer.

In terms of co-innovation and co-development, a leading apparel manufacturer teamed up with his machinery and chemicals suppliers, triggering optimizations that benefited the suppliers as well as the final client. Another more broad example is the Hydrogen Council, a global initiative that promotes collaboration between stakeholders in creating innovative sustainable energy solutions.

Second, the request for proposal (RFP) process will continue to evolve from “price triggered” to “trust-based.” New features such as transparency, tailored interactions, or preparatory investments will become increasingly key, demonstrating the will of a supplier to build something strong and sustainable. While the aspect of price will of course remain crucial, new differentiators will weigh more heavily in the balance. Take the example of a forklift producer that adopted a winning partnering posture during a large-scale RFP, offering innovative, tailored transparency on features, services, and prices combined with high-level adaptability and counsel. In this win-win deal, the supplier won a much larger and more sustainable market than it initially expected, even if it had to concede a slight decrease on its margin.

Finally, suppliers will be asked to take greater responsibility for their products' performance during operations and have to put themselves into the shoes of their clients even after delivery and installation. This evolving trend is driven both by a new client mindset that is seeking “real understanding” of their needs and by Internet of Things technologies that trigger greater performance transparency and new maintenance models.

While it is true that customers have more possibilities and initiative to switch suppliers based on opportunities, the emerging partnership model would seem to be a means of stabilizing relationships and countering the volatility trend.
CUSTOMER RELATIONSHIP OF THE FUTURE

In rapidly changing markets that offer a wide range of affordable new technologies, the key to B2B supplier success lies in shifting from price to service and partnership. Of course, the price must be in line with the market, but more importantly, the supplier must be able to offer B2C-like information, transparency, speed, reliability, adaptability, and availability — while simultaneously investing in a long-term partnership. Of course, B2B companies will need to adapt: Sales and marketing will need to work together more than ever leaving behind the former silo mindset, while operations will need to gear up so as to handle the rapidly increasing and constantly changing client demands. Data will be at the center of the strategy. Shared internally and partly externally data will become a key to unlocking end-to-end performance. The transformation of B2B, one that is based on trust and confidence and aimed at creating value for the entire ecosystem, has begun and will only accelerate.
Chapter 2

BY FUNCTION: NEW SOURCES OF VALUE

Demand and Supply Chain
Management in Uncertain Times
Tushar Narsana, Rohit Singh, Jochen Graff, David Kaufmann

Quality Management 4.0
Hannes Engelstädter, Richard Hell

Managing Costs in Times of COVID-19
Romed Kelp, Hendrik Becker
As business leaders grapple with managing the fallout from the COVID-19 crisis, it is useful to look at lessons learned from prior global financial crises. Our research on the 2009 recession shows that public manufacturing companies that chose to transform their businesses during a time of crisis emerged almost five percent stronger in EBITDA (earnings before interest, taxes, depreciation, and amortization) margin compared to their peers. Conversely, companies that took no action lost EBITDA (and potential market share) to their peers.

As we emerge from the lockdown period, businesses need to make the most of their knowledge and assets to navigate their way ahead. Here efficiency and agility will be key. One way to achieve this is through transforming Sales and Operations Planning (S&OP), a core cross-functional process. We estimate that near-term improvements to S&OP could start delivering results within a quarter and would make the change self-funding.

S&OP’S STRATEGIC POTENTIAL

In an ever-increasing competitive environment, it is crucial to deliver results on multiple dimensions: enhancing flexibility, setting the fundamentals for service differentiation, and reducing cost and inventories. Over the last two decades, most companies have recognized the importance of S&OP as a critical process to balance supply and demand, but many organizations are merely using S&OP as a tactical tool; few have realized the full benefits of its strategic potential (see Recession-Proof Your Supply Chain).
As businesses start to understand today’s new normal, many questions remain about how to leverage and adapt S&OP in these difficult times. How will demand be affected both short and long term? How will firms cope with interruptions on the supply side? And how will they deal with constraints to capacities? Some firms may even choose to implement a “crisis S&OP” for the next twelve months, or at least until there is a greater feeling of confidence and stability.

**Exhibit 8: Five levers for Sales and Operations Planning transformation**
THE FIVE ELEMENTS OF S&OP TRANSFORMATION

Despite the current uncertainty caused by COVID-19, in our experience, there are five fundamental elements of S&OP transformation companies can consider as they apply to both, crisis and normal times:

1. **Strategic supply chain segmentation**: Segmenting customers and products based on their profitability and supply chain needs will enable companies to meet customer requirements and manage their cost to serve. In conjunction with customer segmentation, the products should be segmented, such as Make-To-Order (MTO) versus Assemble to Order (ATO) versus Make-To-Stock (MTS). Service policies, such as delivery lead time and minimum order quantity, should be aligned end to end in the supply chain as well.

For example, a high-growth industrial products manufacturer serving the building construction industry was struggling to improve order on-time delivery, threatening their market-leading product position and reputation in an industry driven by delivering projects on-time and on-budget. A detailed evaluation revealed a one-size-fits-all supply chain that was not optimized for short order lead times. Using an approach based on product demand and variability, this company segmented its product lines into three supply chains, customized the fulfillment process based on the supply chains, and improved its order on-time delivery by more than 30 percent.

**Exhibit 9: Product segmentation for improved service and supply chain performance**

![Diagram](image-url)
2. **Improved demand planning:** It is vital to optimize the planning methodology to set clean and well adapted S&OP fundamentals: horizon, granularity, and frequency of each step as well as shared and connected data streams. Here firms can potentially use the power of digital to improve the demand forecast and leverage multi-view demand planning process to help with forecasting with input from the commercial organization that provide inputs such as market trends, new product launches, promotions, and competitive considerations.

3. **Disciplined production scheduling:** Firms should develop capabilities to optimize production throughput and cost while achieving the desired service levels. Ensure that the production plans are refreshed at the right frequency, the time fences are honored, and production schedules are followed. Here firms should also implement performance management and continuous improvement processes to improve production to plan and asset productivity.

4. **Agile supply management:** This area can be improved by securing supply sources, optimizing lead times, and managing multi-sourcing strategies to mitigate risks. While costs remain key, new indicators should see their importance raise (for example, related to risks, co-innovation, co-development, or sustainability) to build a stronger, more agile relationship with suppliers.

5. **Streamlined manufacturing:** It is also important to set up lines for efficiency versus agility. In one example we have seen, a commercial vehicle industry supplier realized over time that their product had become so complex that they had more than 1,500 final product options for a simple assembly of forged components. Their engineers accepted all specification requests from customers, causing frequent line changes and stoppages, without realizing that 95 percent could be standardized into less than 24 total options. After simplifying its product offering, this company assigned high-volume lines to few MTS products (about 60 percent of volume) to achieve cost efficiencies — versus lower volume lines with high stock-keeping unit (SKUs) complexity to ensure higher agility. In other words, align manufacturing strategy with the product segmentation (such as MTO versus MTS). This led to EBITDA doubling in six months and plant utilization increasing from the low 40s to higher than 70 percent.

Setting performance targets based on this design, for example, target OEE (Overall Equipment Effectiveness), should be based on considerations like product mix on the line, demand volume, and the number of changeovers driven by customer service considerations.
The key enablers to achieving this transformation are setting up disciplined policies and governance, more robust performance management, and one single data baseline. Also, the potential of leveraging digital techniques should be evaluated. For example, in almost every situation, an AI-enabled, statistical, forecasting engine is a simple technique that can be deployed quickly for MTS products.

**THE ROAD AHEAD**

Even before the COVID-19 pandemic, organizations experienced many benefits from optimizing the performance of the S&OP process. As we move out of the lockdown period, the current environment demands even greater resilience and adaptability. In turn, it is even more essential to finetune S&OP to prepare for an uncertain future.

Companies must take this time to run data-driven scenarios to help prioritize S&OP improvement levers based on complexity and impact on the business. Ultimately, manufacturing companies should emerge 20-30 percent leaner, at a minimum. This has a direct impact on EBITDA, plus affords higher On-Time Delivery (OTD) and more efficient working capital. When done well, this could give organizations a tactical advantage over their competition.
Manufacturing is being challenged at its core by multiple crises, but new technologies can speed its recovery — and increase resilience and flexibility — starting with quality management.

The COVID-19 pandemic has disrupted manufacturing and the supply chain deeply, impacting sourcing, logistics, production, and quality along the entire chain. The crisis has created new quality challenges, revealing weaknesses in existing quality-management (QM) approaches and bringing manufacturing resilience into sharp focus. In this context, digital approaches to QM are becoming even more relevant: By leveraging advanced analytics and automation technology, digitization can achieve greater efficiency, resilience and will provide a fast and lasting impact.

THREE DIGITAL DIMENSIONS OF QUALITY MANAGEMENT

Most companies have yet to achieve full digital transformation, but with challenges for manufacturers and the need for resilience on the rise, QM can be a successful driver on the road toward technological evolution. Industry 4.0 comprises various digital technologies — from connectivity, to advanced analytics, robotics, and automation — all of which are on the way to revolutionizing QM in the next five to 10 years. Some of these digital solutions are already being successfully deployed and have been shown individually to lower the cost of non-quality from 10 to 20 percent. And a specific menu of digital quality management solutions can lead up to a 50 percent reduction, creating enormous opportunities for change. To become more digitized, automated, and distributed, manufacturing firms must incorporate and leverage three dimensions in their operations: digitally enabled production and quality feedback loop; AI-based quality testing and vision control; and automated, real-time production and quality control tower.
DIGITALLY ENABLED PRODUCTION-AND-QUALITY FEEDBACK LOOP

Production is often disrupted in labor-intensive processes and related manufacturing industries, affecting overall performance. Fluctuations may be driven by labor shortages, lack of training, increased rework rate, and scrap rate, all of which directly impact the overall throughput and the total cost of non-quality.

Traditionally, manufacturers have tried to reduce those impacts by establishing quality gates on key production steps — a reactive process that is time consuming, not fully reliable, and triggers problem solving only in severe cases. Their efforts have been challenged by the lack of a data infrastructure to provide necessary transparency on real-time performance, as well as a missing data integration, thus leading to limited views — and potentially a misunderstanding — of actual production performance.

Digitally enabled production-and-quality feedback loops use advanced analytics and process verification in real time to track trends, prevent deviations or out-of-specification production, optimize rework, and remove bottlenecks faster. Employing digital tools that are easy to use and understand by operators and supervisors, the feedback loop translates work procedures into visual guidance and quality checks. The feedback loop also predicts negative quality trends before they turn into increased rework and bottlenecks.

One global component supplier implemented a tablet-based quality feedback loop at its lead plant in the Americas. In less than six months, the rework rate had fallen from more than 25 percent to less than 10 percent, removing production bottlenecks and achieving $35 million annual savings.

This innovative solution does not require a holistic Industrial Internet of Things (IIoT) platform or large investments. Instead, it leverages existing operations’ data in two aspects: first, by complex analytics and AI based algorithms providing the essential information needed to apply just-in-time corrections sequentially so as not to disrupt production workflow; and second, aiming targeted information and operational advice to line workers in an easy, convenient format.

It is about not disrupting the optimized workflow of the workforce built up over many decades, and in providing real-time, contextual instructions to ensure that the operation meets specifications and targets.

AI-BASED QUALITY TESTING AND VISION CONTROL

Another challenge to quality processes is manual inspections, which typically require a large number of inspectors and take time. While quality checks are critical for ensuring the excellence of the product, they can give a false sense of security due to inspector variation, unknown defects, and human error.
Specific set of digital quality management solutions implementation impact in terms of non-quality cost reduction

up to 50%
Implementing a testing-and-vision control system along with a machine learning (ML)-based process and quality control on the production line can identify operator errors, quality deviations, and process variations in real time. The system processes inputs via multiple cameras, applies deep learning models for detecting defects and anomalies, and acts as digital assistant by alerting the operator to issues and providing instructions for fixing the problems. Additionally, the AI-based vision control system feeds into a digital twin, providing real-time insights to industrial engineering, production planning, and quality management.

Several assembly-based industries, with multiple manual operations and procedures, have employed in-station automated production and quality control systems that have had the impact of cutting rework rates dramatically by providing direct, real-time feedback to operators, preventing many problems downstream. Other benefits include cutting cycle time due to automated defect detection (up to 20 percent defect detection rate improvement) and reducing reliance on downstream end-of-line manual inspection. These systems can also provide visibility into lean improvement measures and productivity improvements and the efficacy of implemented corrective actions for quality issues.

**AUTOMATED, REAL-TIME PRODUCTION AND QUALITY-CONTROL TOWER**

Even production and quality leaders have only limited real-time data and transparency into operations and quality performance in a single plant or across multiple plants. The challenges of managing a production ramp-up while contending with quality issues after delays, increases systemic stress and jeopardizes achievement of throughput targets. And, if there is no sharing of data between functions or production stations, then you are limited to hot spot improvements rather than end-to-end optimization.

A production and quality-control tower can tackle those challenges and enable preventive quality assurance. (See Exhibit 10.) The interconnected quality-management system comprises three crucial elements:

- Real-time operations monitoring, from single production-station level to multi-plant level to allow quick deviations identification, problem solving and decision-making
- Advanced analytics-based alerts, prediction of performance trends, and actionable improvement insights to prevent larger quality issues landing further upstream
- End-to-end process performance for quality management and dependent functions by use of centralized data and cross-functional KPIs to provide a consolidated view on operations performance

For example, a global leading component supplier implemented the production and quality-control tower to make product and process quality accessible from product development through to delivery of the finished product. The implementation brought about a 17 percent reduction in manufacturing rework and 15 percent reduction in non-quality cost, as well as indirect production improvements of 8 percent in overall equipment efficiency (OEE).
Exhibit 10: Quality control tower application interfaces (browser-based)

1. Inline camera/vision control system paired with manual operation => direct feedback to operator

2. Digital Quality Cockpit allows real-time preventive steering of quality, tackling severe challenges that our customers have to cope with

3. Quality feedback loop for tablet-based quality checks on manual operation

Level 1
Quality project overview
Real-time quality management overview for:
- all quality projects are ranked by importance and impact
- current gate performance by function
- consolidated gate status for gate review execution
- QTC impact information to support the Go/No-Go decision making

Level 2
Project deep dive
KPI cockpit for early deviation recognition through:
- weighted KPIs driving the completion rate for the functional Go decision
- TOP 5 most significant KPIs tracking per function between the gates comparison with best practice KPI benchmark

Level 3
KPI analytics
Advanced analytics for efficient roadblocks elimination:
- AI-based KPI tracking with gate achievement prediction and alerts across quality projects interdependencies (on building blocks, components and suppliers)
- automated analytics-driven issue escalation and resolution process

Source: Oliver Wyman analysis
OUTLOOK

Manufacturing industries are likely to see continued uncertainty in demand as well as disruptions to the supply chain in the coming years. It is of the essence that manufacturers begin using digital solutions to build resilience. The technologies needed to attain the three digital dimensions of quality management already existing and are readily available. Implementing them will benefit manufacturing performance and improve quality in the near term. In the long term, it will result in greater operational resilience and fewer supplier-driven disruptions by preventing quality-related issues and reducing volatility when ramping up production.
MANAGING COSTS IN TIMES OF COVID-19

Short-term actions will not suffice to ensure profitability for manufacturing firms

Romed Kelp, Hendrik Becker

It is likely that the COVID-19 crisis will have a grave impact on manufacturing firms. Depending on the severity, 60 to 90 percent of them could experience significant losses. Taking short-term reactive measures are inevitable. But, as the financial crisis 2008/2009 has shown, companies that deployed sustainable cost reduction programs significantly outperformed the competition. In fact, they emerged as strong and profitable winners.

Currently nobody can predict with confidence how the COVID-19 crisis will unfold. Forecasts from renowned institutions and governments change from week to week and provide little certainty. But there are various fundamental scenarios that differ in depth and length worth looking at. How will these scenarios affect manufacturing firms in particular?

With its global interconnectedness and export focus, the German manufacturing sector serves as a good proxy to illustrate the two archetypes of economic crises: Economic shocks like the Severe Acute Respiratory Syndrome (SARS) epidemic in 2002 or the terror attacks of 9/11 were both regionally contained and relatively short. German manufacturing companies saw less than a five percent downturn in production and had fully recovered after less than two years. Broader recessions like the global financial crisis in 2008/09 or the German recession in 1992/93 led to a decline in production by up to 30 percent and it took more than three years to recover. (See Exhibit 11.)
Using the crisis as a catalyst for change, strong and forward-looking firms should additionally consider transformation programs to adjust business fundamentals through portfolio optimization, merger and acquisition activities, and re-organization.
Exhibit 11: Broad crises take more than three years to recover
Monthly Production Index in Germany (normalized to 100 = average of 12 months prior to crisis)

Source: Destatis, Oliver Wyman analysis

COVID-19 RECESSION: NEITHER SHORT NOR SHALLOW

As of late March 2020, billions of people all over the globe have been affected by some form of a lockdown. Stock markets are in sharp decline and unemployment is on the rise: In the United States alone, unemployment rates rose by 25 percent compared to previous months. Thus, COVID-19 will likely follow the pattern of a broad crisis, resulting in a rather deep decline and a lengthy recovery. The main scenarios on the course of the pandemic itself can be translated to scenarios for manufacturing firms: a one-quarter recession (“V-shape”), a two-quarter recession (“U-shape”), and a four-quarter recession (“L-shape”). (See box on p. 48 for details.)

Before COVID-19 broke out, European manufacturing firms yielded 7 percent EBIT in average. The impact on bottom-line results will be significant but depending on the exact shape of the crisis. Oliver Wyman recently surveyed chief strategists of Germany-based manufacturing firms and found that most expect a “U-shape” scenario. In this case, almost 60 percent of European manufacturing firms would experience a negative EBIT in 2020 despite a successful first quarter. In the “L-shape” scenario, this would be significantly worse with more than 90 percent of firms in the red and causing carry-over effects well into 2021. (See Exhibit 12.)
Exhibit 12: Almost 60 percent of European manufacturing firms would experience a negative EBIT in 2020
Percent of firms, per EBIT range

<table>
<thead>
<tr>
<th>EBIT margin</th>
<th>Status prior to COVID-19</th>
<th>V-Shape: One-quarter recession</th>
<th>U-Shape: Two-quarter recession</th>
<th>L-Shape: Financial crisis +</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;7%</td>
<td>-</td>
<td>24%</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>0 to 7%</td>
<td>44%</td>
<td>56%</td>
<td>30%</td>
<td>4%</td>
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<tr>
<td>0 to -7%</td>
<td>5%</td>
<td>16%</td>
<td>47%</td>
<td>22%</td>
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<tr>
<td>&lt;-10%</td>
<td>1%</td>
<td>3%</td>
<td>11%</td>
<td>71%</td>
</tr>
<tr>
<td>Average of all firms</td>
<td>7%</td>
<td>4%</td>
<td>-2%</td>
<td>-19%</td>
</tr>
</tbody>
</table>

Source: Amadeus, Destatis, Oliver Wyman analysis

Oliver Wyman’s research shows that the crisis will impact OEM-type businesses more than component businesses, as OEMs delivering production systems and off-highway equipment have a higher degree of company-internal value-add. The higher personnel and fixed costs result in an increased exposure to declining revenues. Cost structures of component businesses typically feature a higher material costs share. These are more variable and can be scaled with revenues more easily.

The shape of the crisis

Oliver Wyman has modeled three different COVID-19 scenarios for manufacturing firms: In the “V-shape” scenario, public health measures contain individual outbreaks and COVID-19 lasts for three to four months. The revenue decline mainly shows in Q2 and the economy recovers quickly in Q3 and Q4. In the “U-shape” scenario, the pandemic will break due to seasonality of the virus or virus mutation and COVID-19 will last for 6–12 months. This would lead to a revenue decline in Q2 and an even more severe decline in Q3 before revenues recover in Q4. In the most severe “L-shape” or “financial crisis +” scenario, COVID-19 will last more than 12 months and not be affected by seasonality or hard to fight due to mutation. In the result, the revenue decline would persist throughout four quarters starting in Q2 2020.
SHORT-TERM ACTIONS ARE INSUFFICIENT

Most manufacturing firms have reacted remarkably quickly after the potential magnitude of the pandemic became visible and governments have taken strong countermeasures. Firms initiated short-term measures like discretionary spend cuts, temporary, and/or permanent workforce reductions. Similarly, cash management and forecasting have, rightly so, moved into the focus. But all these measures will only stop the bleeding but not start the healing. Leaders should assume that these short-term measures will be not enough. Instead, they should focus on addressing structural and sustainable measures now.

Oliver Wyman's analysis shows that manufacturing firms which responded to the financial crisis with structural performance improvement or even transformation programs significantly outperformed those which only focused on short-term cost cutting. Focusing on the longer-term efforts paid off far more: Many returned to pre-crisis EBIT levels in less than two years and even exceeded them shortly thereafter. To overcome the recent COVID-19 crisis quickly and respond to the 'new normal' of lower revenues in the mid-term, most firms will need to deploy structural performance improvement programs. For these programs, leaders will first have to develop a clear target picture for the firm in three to five years. This should include the future core business model and operating model, but also define profitability targets and profit and loss goals.

Based on this target picture, the performance program will deploy levers such as value sourcing, production footprint optimization, and overhead cost reduction, but also top-line levers like introducing new pricing mechanisms or similar. An integrated governance model will ensure laser-focused delivery of such a holistic program.

Using the crisis as a catalyst for change, strong and forward-looking firms should additionally consider transformation programs to adjust business fundamentals through portfolio optimization, merger and acquisition activities, and re-organization. These transformational activities should be in close sync with the structural performance improvement program and also be focused towards the target picture.

NO TIME TO BE LOST

Short-term COVID-19 responses like supply chain continuity, liquidity assurance, furlough programs and first cost containment have been implemented. They should be continuously monitored and adjusted where needed.

Company leaders who want to emerge from the crisis more profitably need to start working on structural performance improvement or even transformational programs now. To avoid that the urgent constantly overrules the important, this will require dedicated teams for the short-term cure and the structural, sustainable solution. This way firms will start to experience the positive effects more quickly and gain a tactical advantage over their competition.
Chapter 3

BY SECTOR: NEW CHALLENGES

Adapt or Perish
Romed Kelp, Joachim Deinlein, Srinath Rengarajan

Defense Industry
Eric Ciampi, Archag Touloumian
Europe’s tougher CO\textsubscript{2} truck emissions standards will shape the sector in the next decade as truck manufacturers comply with new targets to avoid hefty penalties. This effort not only requires that manufacturers overcome technical barriers and balance investments, but also calls for the industry to adapt and modify the go-to-market approach.

The European trucking industry is responsible for the equivalent of around 50 million tons of CO\textsubscript{2} emission every year — more than 5 percent of European greenhouse gas emissions. The European Commission acted by introducing regulations to curb these emissions. Against an industry baseline ultimately to be confirmed in April 2021, European truck original equipment manufacturers (OEMs) must now reduce their average fleet CO\textsubscript{2} emissions by 15 percent by 2025 and 30 percent by 2030.

For European truck makers, non-compliance is not an option. With penalties set at €6,800 per gCO\textsubscript{2}/km in 2030, the cost to truck makers could be more than €100,000 per truck sold if CO\textsubscript{2} profiles remain at 2019 levels, equal on average to the revenue generated selling a truck. Failure to meet emission targets would not only result in reputational damage but would also devastate margins. Simultaneously, customers are seeking greener transportation options to support their own carbon-neutrality goals.

**MEETING EMISSIONS TARGETS**

Satisfying societal green expectations presents a huge challenge for truck OEMs. While existing technologies can help reach 2025 targets, a sizable share of zero emission vehicles (ZEVs) in the sales mix is necessary to ensure compliance with the 2030 targets and avoid penalties. Consequently, startups, automotive suppliers, and established truck OEMs are shifting gears to hasten the market readiness and commercialization of battery and fuel-cell electric trucks.
Money at stake: Estimated fines in case of fully non-compliance in 2030 for the European truck industry

more than €10 BN
Incremental improvements in aerodynamics and engine generations, along with sales of trucks with natural-gas engines, will help reduce truck-makers’ emissions. But even with progress in those improvement levers, OEMs would still have to ramp up ZEVs to 10 to 15 percent of their total sales to hit the 2030 target. This goes beyond test fleets and calls on OEMs to develop and industrialize a reliable solution.

In addition to technical development and cost competitiveness of ZEVs, market success requires OEMs to address business model challenges. Two of the most fundamental changes relate to infrastructure and the associated go-to-market model. (See Exhibit 13.)

**Exhibit 13: Zero emission agenda for truck OEMs**

**TECHNOLOGY**
- Assess technology portfolio (e.g. H₂ fuel cell, battery electric) by use case
- Apply watch-tower approach constantly to monitor as-is CO₂ footprint and compare to should-be/target value

**GO-TO-MARKET/BUSINESS MODEL**
- Overcome the “sticker-price” challenge with an even stronger TCO emphasis
- Design product and services bundles beyond the current offering; e.g. develop the required ecosystem through partnerships

**INFRASTRUCTURE**
- Understand infrastructure challenges for H₂ and battery electric trucks by geography
- Engage in multilateral collaborations/consortia to build ecosystems

Source: Oliver Wyman analysis

**INFRASTRUCTURE CHALLENGE**

Truck drivers are used to a dense, ubiquitous network of gas stations that allows fast refueling. In contrast, hydrogen stations and fast electric charging stations for trucks on highways are still in their infancy in Europe. Even if a pan-continental density of recharging or refueling infrastructure akin to gas stations is not replicated, recent European Automobile Manufacturers’ Association (ACEA) estimates suggest a need for more than 40,000 direct current (DC) fast chargers, 250,000 DC slow chargers (including at depots), and over 500 hydrogen stations for trucks by 2030. Meeting those needs is critical to ensuring that the zero-emission trucks are not limited to specific niche applications.
Consequently, OEMs must decide whether to rely on governmental plans or third-party players (such as energy or oil companies) to build this infrastructure or whether to take a more proactive role, potentially through multilateral cooperations. In case OEMs decide to play an active role to drive the build-out of crucial infrastructure, consortia with infrastructure players will become of increased importance, where the offer will be a complete ecosystem centered around the customer requirements. To make this a success, OEMs will have to develop the necessary partnering, selling, servicing, and operating capabilities.

**GO-TO-MARKET CHALLENGE**

The second challenge for OEMs concerns the go-to-market model for alternative powertrains. Battery and fuel-cell electric powertrains may be less costly to run than conventional trucks, but the up-front investment is much higher, compared to conventional trucks. Thus, truck manufacturers will have to decide on what and how to sell to customers, be it in terms of pricing, bundling sales together with services, or offering the infrastructure elements described above.

Given the higher initial purchase price of zero-emission trucks, the need is even greater for leveraging and communicating a total cost of ownership (TCO) logic to end customers, including residual value guarantees to mitigate technology uncertainties. This requires OEMs to move toward a comprehensive asset lifecycle approach, taking greater ownership over a vehicle’s value over its lifetime. This could entail potentially combining the vehicle and fuels offers and providing an integrated price per kilometer to the end customers. In addition, OEMs need to enable their salesforce and partners to sell these combined offers effectively. In the new, zero-emission world, salespersons not only need to be able to sell a more expensive, difficult-to-explain technology and sophisticated offer bundle, but they also be able to consult the customer regarding specific use cases and required infrastructure.

**GOING GREEN — MORE THAN A TECHNICAL CHALLENGE**

The challenge for OEMs is multifaceted. On the technical side, they need to assess their technology portfolio and roadmap in terms of readiness and of meeting time, cost, and quality targets. Based on this, they need to monitor their exposure and the countermeasures in place to ensure compliance. A watchtower approach that looks at the current status, but also forecasts the future state, can help govern the process.

On the commercial front, truck OEMs need to reinvent their business model and go-to-market approach to profit from their zero-emission offering. Given the order of magnitude of change, manufacturers must begin developing the necessary skills now.

By managing the technical and the commercial challenges in parallel, OEMs can raise their odds of adapting to and thriving in the transition to zero-emission trucks.
DEFENSE INDUSTRY

Who will win the digital services war?

Eric Ciampi, Archag Touloumian

Several major trends are reshaping the traditional battlefield. Collaborative combat, multi-army and multi-platform collaboration, a new generation of technologies such as artificial intelligence (AI) and autonomy, and geopolitical collaboration have fostered an increasing exchange of data between equipment, weapons platforms, and armies. This flow of data represents a new area of investigation and paves the way, amongst other digital opportunities, to an increasingly important role for digital services.

These digital services will contribute toward improving aftermarket activities, such as performing maintenance and overhaul on defense systems, and address the current challenges for support activities. However, digital services will also reshape the future competitive landscape of the global defense industry.

NEW CHALLENGES FOR SUPPORT SERVICES

Concern over the availability and reliability of military equipment is growing: The lengths of military engagements are becoming more protracted (as evidenced in ongoing US conflicts in Afghanistan and Iraq), and the conditions of mountainous terrain and desert under which forces operate are getting placing greater burdens on A-country militaries (such as the US, China, Russia, France, and the UK).

In addition, greater constraints on defense budgets have led to tensions over demand and offer. The number of defense platforms in most armies has decreased, equipment upgrades are being delayed, and support teams have been reduced due to budget constraints. For instance, the defense support workforce in France declined by one-third in the past decade. Such conditions have resulted in intensified usage of military equipment and accelerated its deterioration. As a result, the mission readiness of equipment has dropped in most armies: for instance, the mission capable rate of the US Air Force F16-C fell from 73 percent in 2015 to 70 percent in 2018. This has placed greater pressure and requirements on support services to maintain the reliability, availability, and turnaround time for servicing the military equipment.
Digital services will impact all aspects of the aftermarket activities and could represent global revenues by 2030

up to $20 BN
In parallel, the digitalization of equipment is rising, with the software content in weaponry expanding. Consequently, the pace of maintenance cycles is evolving, due to more frequent software upgrades. This trend underlines as well the cybersecurity constraints and changes the required skillset to support the new generation of weaponry.

Finally, the trend in most countries is to outsource support activities and rationalize the panel of suppliers: For example, there was only one contract in 2019 for Cougar and Caracal helicopters maintenance, versus 20-plus suppliers in previous years. Maintenance outsourcing contracts are also changing from traditional support accords (based on time and material or a more general agreement) towards performance-based logistics contracts, generating a new risk-sharing scheme and adding to the pressure on industrial players.

**ACCELERATION OF DIGITAL SERVICES**

These challenges are reshaping the support services activities in the defense industry, and opening doors to digital-services providers. (See Exhibit 14.)

Digital services will help improve current maintenance activities and increase maintenance providers’ competitiveness and quality. The consolidation and analysis of data from different sources (equipment, mission, external factors, and more) will help anticipate failures and better address them when they occur. It will improve transparency and predictability of failures and give ministries of defense longer-term visibility on maintenance budgets. In parallel, digitalizing maintenance activities will foster the evolution towards condition-based maintenance, structured around the service-level agreement (SLA), giving the whole industry an opportunity to better manage costs. Air forces tend to be a bit further along in their journey toward adopting these services due to the experience from civilian aerospace industry, but land and naval forces are rapidly catching up.

Looking ahead, the consolidation of data from different stakeholders on the value chain (equipment, platforms, military bases, and operators) will create new value spaces, at the interface between the various players, such as armed forces, OEMs, suppliers, and maintenance providers. New services will emerge to optimize assets and deliver better performance to the whole defense ecosystem. Some examples of the new services include digital training of operational forces for maintenance on the ground, remote assistance for maintenance operations, better traceability of spare parts to optimize availability on the ground, optimization of military base operations by anticipating maintenance needs, or support to mission preparation thanks to 360-degree visibility on the fleet and configurations.
### Exhibit 14: Example of a defense services value chain (non-exhaustive)

#### SUPPORT/CORE SERVICES

<table>
<thead>
<tr>
<th>Service Category</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product development and production</strong></td>
<td>Design, supply, production, assembly and conformity, sales, digital continuity</td>
</tr>
<tr>
<td><strong>Basic support</strong></td>
<td>Customer support, warranty, online technical support, AI-based trouble-shooting</td>
</tr>
<tr>
<td><strong>Maintain the product</strong></td>
<td>Provide parts, sales, distribution, inventory management, 3D printing, 360(^\circ) visibility on supply chain</td>
</tr>
<tr>
<td><strong>Perform repair</strong></td>
<td>Shop repair, scheduled maintenance, remote support to operators, digital coordination of mx works</td>
</tr>
<tr>
<td><strong>Manage the asset lifecycle</strong></td>
<td>Design and redesign, engineering continuous improvement, upgrades, obsolescence mgmt., cybersecurity engineering</td>
</tr>
<tr>
<td><strong>Manage lifecycle</strong></td>
<td>Subscription based MRO, tailored support/fleet mgmt, asset performance management, end-to-end platform management</td>
</tr>
<tr>
<td><strong>Track and monitor</strong></td>
<td>Health monitoring, global fleet management, vehicle passport, predictive mx</td>
</tr>
<tr>
<td><strong>Train</strong></td>
<td>Training, mobile, A/R and V/R training, collective training, evidence based training</td>
</tr>
<tr>
<td><strong>Deliver performance to the ecosystem</strong></td>
<td>Fleet/flight planning, traffic management, situational awareness, collaborative decision making</td>
</tr>
<tr>
<td><strong>Optimize</strong></td>
<td>Network optimization, real-time fleet management, support to bases operations, single sky/sea management</td>
</tr>
<tr>
<td><strong>Protect and manage information</strong></td>
<td>Cybersecurity advisory, cyber risk assessment, cyber attack response simulation, cloud application/saas</td>
</tr>
</tbody>
</table>

**Digital Enabled Services**
- Physical activities: traditional activities not necessarily involving digital
- Digital activities: disruptive services leveraging full power of digital

Source: Oliver Wyman analysis
Digital services will impact all aspects of the aftermarket activities and could represent revenues of up to $20 billion globally by 2030.

Three factors need to be set up to unlock these new services: first, developing robust digital platforms that are connected to the different sources of data to collect and analyze them, with the right level of cybersecurity protection; second, defining data governance amongst public and private stakeholders, with clear rules on data ownership and location; and third, creating business models generating value, to convince industrial players to invest in new technologies.

**FIRST-MOVER ADVANTAGE: INDUSTRIAL PLAYERS MUST AVOID INTERMEDIATION**

Defense players are moving to capture these new streams of value, but are also seeking to avoid intermediation and loss of value: aftermarket services represent up to 50 percent of most industrial players revenues and generate strong margins.

Platform OEMs are leveraging their prime position to capture maintenance verticalization contracts and extend the scope of their support activities at the expense of other suppliers. As a result of such contracts, Tier-1 players find themselves caught in the middle, losing a valuable part of the contract to OEMs. To avoid that outcome — and to compete with platform OEMs — they are enlarging their scope of data via partnerships to achieve critical mass and offer maintenance verticalization services. In this context, being a first mover is vital.

Incumbent industrial players are also challenged by the entry of new competitors into the sector: Information system/information/information technology (IS/IT) providers are building on their software expertise in the civilian realm and army IS/IT expertise to collaborate with defense players and develop/integrate digital platforms and operational services. Service providers are leveraging their presence on the battlefield with end clients to digitalize their offerings and are in a strong position to mobilize technical maintenance operations on military ground. Plus, startups are entering the market through data, niche services and software-as-a-service offering, exploiting the slower digitalization of incumbents.

In this complex and evolving environment, the status quo on the competitive landscape is up for grabs, and value can shift rapidly. To survive and thrive, industrial players must define their digital strategy, developing a win-win business model to attract partners and positioning themselves as the architects of future defense ecosystems.
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