



Global Manufacturing Outlook

**Transforming for a digitally
connected future**



KPMG International

kpmg.com

Lead authors



Doug Gates

Global Sector Chair, Industrial Manufacturing

KPMG International

T: + 1 678 472 0137

E: dkgates@kpmg.com

Doug is the Global Chair of KPMG's Industrial Manufacturing Industry Sector, which includes Aerospace & Defense, Engineering & Industrial Products, Metals and Conglomerates. In this role he is responsible for the development of industry-leading services, thought leadership and go-to-market strategies to support the world's largest industrial manufacturers.



Erich L. Gampenrieder

Global Head of Operations Advisory and Global Head of Operations Center of Excellence

KPMG International

T: + 49 89 9282 1700

E: egampenrieder@kpmg.com

Erich leads KPMG's Global Operations Advisory Practice and the Operations Center of Excellence. During his almost 20 years of experience, he has been responsible for high-profile cross-border programs for a number of Fortune 500 companies in the manufacturing, high tech, chemicals, healthcare and consumer industries.



Tom Mayor

Practice Leader, Industrial Manufacturing Strategy at KPMG Advisory

KPMG in the US

T: +1 216 875 8061

E: tmayor@kpmg.com

Tom is a Partner and Industrial Manufacturing Strategy Practice Leader in the US. Tom focuses on supporting automotive, aerospace and industrial manufacturers with technology-driven growth strategies, operating strategy, and large-scale business performance transformation. In addition to his practice and client leadership roles, Tom coordinates KPMG's Internet of Things, Mobility and Autonomy teams in the US.



Charlie Simpson

Partner, Global Strategy Group

KPMG in the UK

T: +44 7500 857 332

E: charlie.simpson@kpmg.co.uk

Charlie is a Partner in KPMG's Global Strategy Group in the UK and is Head of the Mobility2030 service, which is helping clients across the transport ecosystem understand and plan for strategic changes driven by new technology, financial, regulatory and consumer trends. He specializes in growth strategies for major global clients, with a focus on customers and innovation.

Contents

04 **Foreword**

06 **Key findings**

08 **The promise of transformation**

11 **The need for speed**

13 **Machines augment workers**

17 **Deeper business relationships**

19 **Global risks**

22 **Conclusion: Alive with possibilities**

24 **How KPMG can help and related thought leadership**

26 **About the survey**

27 **Our thanks**



Methodology

The 2018 Global Manufacturing Outlook report is based on data from 300 manufacturing industry CEOs. This data was part of the 2018 CEO Outlook, a survey of 1,300 CEOs in 11 countries, conducted in early 2018 by Forbes Insights on behalf of KPMG International. To support the data, KPMG International conducted a series of interviews with executives at manufacturers around the world. Their experience, combined with the views of KPMG professionals and sector leaders, provide valuable insights for today's manufacturers.

Foreword

A significant finding of our latest global survey of manufacturing CEOs is that data scientists are expected to be the most important capability in supporting future growth plans. This may not be a surprise, since they are a crucial component in digital transformation. But what gives me pause is that every other industry thinks so, too. How are manufacturers going to compete for talent against the likes of Google and Amazon? Where is the 'cool' factor in machine shops and assembly lines?

The answer is not to try to 'out-cool' Silicon Valley, especially if it would lead to inauthenticity or the denial of what is great about your company's culture. Having spent more than 20 years at a large aerospace manufacturer, I can attest to the fact that the vast majority of factories are not, and never will be, hip. But the products, creativity and vision behind them definitely are.

Instead, I would urge manufacturers to embrace the new and transform themselves using the latest technology at hand, whether it be robotics, 3D printing, advanced analytics, the Internet of Things, the cloud or blockchain. It will be a long journey, travelled at high speed with mileposts of success and speed bumps, but the exciting part is envisioning what your organization may look like at the end. Consider the changes taking place in the transportation industry, to name but one. Charlie Simpson, in our Global Strategy Group, says that in 3 to 5 years, people will be able to buy monthly mobility contracts, enabling people to rent a car, take a train, or fly on a plane, all with data stored on one's mobile phone.

This all may seem a scary prospect for manufacturing CEOs, but the alternative of doing nothing — or not enough — is likely to be scarier. As companies merge, disruptors compete and industries blend together, it will be hard to know what manufacturing in its many forms will look like in the next 5 to 10 years.

This does not mean that CEOs should begin the journey without a plan of how to get there. They need to build a digital transformation strategy that shows to their internal and external stakeholders, not least the workforce, they have a vision of the future and the capability to carry it out. It must be practical. It must be comprehensive. It must demonstrate how the organization will implement it, carefully balancing short-term wins against long-term goals.

Please take a look at our thoughts on the implications of digital transformation for manufacturing, which is based on a survey of manufacturing company CEOs, interviews with corporate leaders, research on the changing supply chain, and the insights of our subject matter experts at KPMG. We hope you will find some useful takeaways to help your organization grow better and fend off competitors old and new. For my money, there's nothing cooler than seeing our industry adapt and thrive, both today and in the future.

Doug Gates

Global Sector Chair,
Industrial Manufacturing
KPMG International





Key findings



The promise of transformation

Manufacturing CEOs confident in their leadership, but concerned about execution

— **Ready to lead**

Two-thirds say, "I'm prepared to lead a radical transformation of my organization's operating model."

— **Slow to see results**

Seven in ten say the lead times on digital transformation often seem overwhelming.

— **Directors want quick results**

More than half say that "the board of directors has an unreasonable expectation for an ROI on digital transformation."



The need for speed

Manufacturing CEOs anxious about ability to cope

— **Don't delay**

Nearly two-thirds say acting with agility is "the new currency of business; if we're too slow, we will be bankrupt"

— **Falling behind?**

One in three agree their organization is struggling to keep pace with technological innovation.

Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International
Excerpt from *GEODIS 2017 Supply Chain Worldwide survey



Machines augment workers

Many internal challenges in transforming organizations

- **Artificial intelligence (AI) optimism**

Two-thirds say, "AI will create more jobs than it will eliminate."

- **Workforce capabilities**

Two-thirds say data scientists will be the most-needed type of worker for future growth.



Deeper business relationships

Stronger partnerships needed in the rapidly expanding ecosystem

- **Supply chain visibility**

Only 6 percent have achieved full supply chain visibility, despite acknowledging its growing importance.*

- **Corporate partnerships**

More than one-third say that strategic alliances are their most favored strategy for achieving growth objectives over the next 3 years.



Global risks

Nationalism and cyber threats

- **Rivalries**

A return to territorialism seen as the greatest threat to growth, while emerging markets are the highest priority for geographical expansion.

- **Cyber risk**

Only half feel well-prepared to identify new cyber threats, 14 percentage points fewer than CEOs in other industries.



The promise of transformation

Digital technologies create tremendous opportunities for growth and transformation at manufacturers, but few have taken full advantage of them.



of the CEOs say that **technological disruption is an opportunity** and not a threat.

In this 8th edition of the Global Manufacturing Outlook report, our findings from the survey and interviews with manufacturing industry executives and KPMG member firm partners show there is no time to waste in building a comprehensive digital transformation strategy. Global manufacturing is being disrupted to its foundations and industrial demarcation lines are blurring. The fourth industrial revolution is dramatically changing the barriers to entry and is expected to lead to the reshaping of many companies — and even entire industries. But this is an “opportunity and not a threat” says 95 percent of the CEO respondents to our survey. And this is also how we see it at KPMG.

The game-changing tools around data analytics, artificial intelligence (AI), advanced robotics, augmented reality and others promise great benefits when they are combined with the connective power of the Internet of Things (IoT). But the 300 manufacturing CEOs surveyed in our latest poll (as part of a wider survey of a total of 1,300 CEOs) do not expect to realize them quickly, even though

they are under pressure from investors for rapid results. Digital transformation is clearly a long-term commitment, and one of the many tasks CEOs must undertake is to persuade stakeholders to be patient, while they lead their organizations on the exciting and challenging journey. It is a journey that can drive growth to levels not achievable under current business models and strategies.

“Digital transformation has been mixed in terms of the speed of deployment across manufacturers,” says Doug Gates, Global Chair of KPMG’s Industrial Manufacturing Sector. “Some have organized well and jumped on it. Some have gone on a technology splurge, but ROI has been elusive. And many are still struggling to decide what to do and where to start. The right first step is to lay out a long-term strategy and roadmap. Start the journey with steps that will achieve near-term value, while laying the foundation for new business opportunities that will come from interconnectivity and a broad access to data and information.”

Indeed, some say that the future of manufacturing will depend on



interconnectivity and having broad access to data. “The continued maturing of new technologies, including IoT, AI and Mixed Reality is bringing digital transformation into reach for all manufacturers,” says Chris Harries, Business Development Director, Manufacturing Industry at Microsoft. “By connecting equipment and by monitoring end-to-end operations at a much more granular level, it becomes possible to gain a new level of insight relating to a company’s products, their operations and their customers. This creates the potential for a new set of services that are more predictive, more proactive, and that are redefining the agile manufacturer.”

In our survey, CEOs have responded in remarkably high numbers that they are prepared to take charge of the process of reshaping the corporation and to set out a vision of what the organization should be aiming for. Almost two-thirds say they are “personally prepared to lead [their] organization through a radical transformation of its operating model to maintain competitiveness.”

But does this represent a genuine vote of confidence in the ability of CEOs

and their organizations to weather potential shocks, as the company undergoes profound changes? Or is it merely a show of strength designed for the benefit of internal and external stakeholders? It is apparent that CEOs feel under pressure from stakeholders to demonstrate the value of the investment quickly with more than half saying the board of directors has an unreasonable expectation for a return on the investment in digital transformation. It is no wonder that so many struggle to maintain the course, often moving from strategic plans to tactical and limited execution, as nearly three-quarters of all CEOs say that lead times on significant digital transformation projects often seem “overwhelming.”

“These pressures underpin why it is critical to build in quick wins and key milestones into any digital transformation program. Being a great visionary is important, but you want to have some achievements to point to when the board or the market starts turning up the heat,” says Brian Heckler, National Sector Leader for Industrial Manufacturing at KPMG in the US.

“
These pressures underpin why it is critical to build in quick wins and key milestones into any digital transformation program.”

Brian Heckler
National Sector Leader for
Industrial Manufacturing
KPMG in the US

“The key to planning the digital transformation journey is to identify and follow the value,” says Tom Mayor, Industrial Manufacturing Strategy Practice Leader at KPMG Advisory in the US. “How can it be applied to unlock new markets or drive step-function changes in product or service performance? The biggest winners will be those that strategically use digitalization to create more valuable products or services, rather than those that merely pick it up tactically as their next cost-reduction tool.”

Indeed, digital transformation could not be more strategic because in many companies it will represent a rethink of their entire business and operating model. Executives must strike a difficult balance between traditional cost-efficiency measures to enable short-term profitability improvements and bold actions to change business models and drive long-term, revenue growth.



Taking action

- Leaders must satisfy short-term expectations without losing sight of the long-term prize. Focus on hitting incremental milestones that fit in with the ultimate goals.
- The roadmap needs to be broad and far-reaching, focused on pathways to new opportunities.
- Digital transformation must be seen as a way to unlock value in places that were never considered before.



In their words:

The “digital transformation officer”

Fernando Gonzalez
CEO, CEMEX

CEMEX, a global building materials company based in Mexico, is determined to seize a digital future. In a sector where customers expect service at digital speeds, collaborative innovation is essential to solve critical challenges. As part of this strategy, the company has developed a customer-facing platform called CEMEX Go. This platform, which can be accessed on a number of devices, allows customers to execute tasks such as placing orders or tracking shipments.

For CEO Fernando Gonzalez, this transforms the customer experience. “If you can do almost everything in an app, that means digital, real-time speed,” he says. “Customers can change requirements and receive a very fast response.”

CEMEX Go not only enhances the customer experience, it also provides a rich trove of highly useful data that can be shared. “Now, we have tons of information on commercial transactions. There is huge potential to transform our sector by being able to provide our customers with very valuable data on top of our traditional products and services,” he says.

Gonzalez notes that CEMEX now employs some 400 people with digital expertise, in areas such as design thinking and the user experience. They see a company where digital transformation is led from the top-down. “I’m playing the role of digital transformation officer myself,” says Gonzalez.

In 2017, he set up CEMEX Ventures, an open innovation and venture capital unit. The objective is to engage startups, entrepreneurs, universities and other stakeholders in developing new technologies that solve the construction industry’s key challenges.

Gonzalez believes the innovation unit structure may avoid the cultural and communication challenges that often hamper the relationship between startups and major corporations. “It’s one of the main reasons we developed this kind of independent or autonomous unit,” he notes. “A startup doesn’t need to deal with 40,000 people in the company. That would be a nightmare. CEMEX Ventures is a small group of people and so it simplifies how startups deal with us.”

He wants CEMEX Ventures to focus on those areas that are mutually valuable to CEMEX and its innovation partners. “I think the main challenge is to find the innovations that accommodate our organization, but which also accommodate the startup itself,” he says. “Whenever there is a match, it works extremely well.”



The need for speed

Even though a large majority of manufacturing CEOs concede that it will take up to 3 years to begin to realize the benefits of digital transformation, they readily accept that they need to plan and move fast.

Nearly two-thirds of manufacturing CEOs agree that acting with agility is “the new currency of business; if we’re too slow, we will be bankrupt.”

But it is easier said than done. More than a third of CEOs admit their organizations are struggling to keep pace with the rate of technological innovation in manufacturing and almost half say that most of their technology investments are tactical. But if they choose the wrong technology, it can be costly from the perspective of both time and money.

Some of the technologies are essential components of modernization. “IoT and augmented reality are among the top forces driving the digital transformation of manufacturing,” says Jim Heppelmann, President and CEO of PTC, a US-headquartered software company. “Investing in these digital technologies is required for organizations on the digital journey that want to better manage operations and increase competitive advantage, especially those that have complex manufacturing and operational processes.”

It is certainly true that avoiding new investments is as risky as betting on the wrong technology. Executives in the automotive and aerospace & defense (A&D) industries only need look as far as Elon Musk’s efforts with Tesla and SpaceX to see the impact disruptive companies can have on their businesses and how the demarcations between traditional industry sectors are blurring. Charlie Simpson, a Partner in the Global Strategy Group at KPMG in the UK, spends a lot of time these days working with clients around this convergence of sector boundaries. He says that in 3 to 5 years, people will be able to buy monthly mobility contracts that will be stored on one’s mobile phone¹. “You will dock your digital environment in your phone in the vehicle you step into, whether it’s a rental or a car-sharing service. And this could be integrated with buses, trains and airplanes as a digital travel experience. The best aggregators of such a transport service may not be the traditional players, but instead, technology companies, banks, telecommunication businesses, or even unknown new entrants,” Simpson says.

“
You will dock your digital environment in your phone in the vehicle you step into, whether it’s a rental or a car-sharing service.”

Charlie Simpson
Partner, KPMG Global Strategy Group
KPMG in the UK

¹ <https://home.kpmg.com/uk/en/home/insights/2017/04/mobility-2030.html>

One way to prepare for disruption is to understand how current competitors are likely to behave and which technologies they may invest in. It is also important to track startups across the globe that are reimagining the way business will be conducted. Yet only two out of five manufacturing CEOs think they will need to improve the way that they monitor market disruption over the next 3 years and only about half plan to increase investment in processes to detect disruption and promote innovation. With the incredible pace that business disruption is moving, to be caught unaware could be a death sentence.



Taking action

- Digital transformation is complex and executives must plan well and move fast.
- Technology is underpinning digital transformation, but be careful not to jump too soon; without a plan, you can spend a lot and gain little.
- Don't just focus on current competitors, since digital transformation is lowering barriers; threats are often coming from non-traditional players.
- Be vigilant about monitoring disruption; even if you are a market leader, complacency and arrogance are your two biggest blind spots.



In their words:

Looking for deeper, long-term relationships

Miles Roberts
Group Chief Executive, DS Smith

Miles Roberts is the Group Chief Executive of DS Smith, one of the world's largest corrugated packaging companies. It is a beneficiary of changes in consumer lifestyles and the rapid growth in e-commerce around the world.

The leading edge

Online commerce has taken us by surprise. We knew it was going to be big, but we didn't realize it would be absolutely enormous. We continue to project forwards as to where it can go. If you were to go to the Far East, such as China, you'll see where the UK will be in 5 years' time. Today in Europe, about 10 percent of the goods sold to consumers are bought on the Internet. How far will it go? Is it going to be 20, 30, 40, 50 percent? Some think that certain categories in China, particularly among men, could reach 70 percent. This is going to have an enormous effect on our business, in terms of the quality and type of packaging needed to get into areas that we hadn't considered before, just because of the way people live. Developers are building apartments with no kitchen for buyers who ask themselves, "What do I want a kitchen for? I have all my food brought in, and it's only half an hour from order to delivery." So I think it's a really exciting area and we want to be at the forefront.

Do the right thing

There will be more legislation; you can feel it in public opinion and it's something we have to be very mindful of. We want to do the right thing now, ahead of the legislation where necessary. We have to be a better company, not just a bigger company. This means better through the eyes of the customer, so they feel we are a more responsible company and have earned the right to be a larger company. That's what we're working on.

Stronger supply chain

We're after deeper, longer-term relationships. We want more value from our suppliers — value that isn't just the price of today. It's about innovation and how we can both improve. Our relationship with these parties has to change as well. There does have to be more trust. So when we look to our suppliers, we're not saying, "How much can you do for us?" We're saying, "How great can you be in the fields where we're asking you to be?" And I think this is going to be an increasing trend. For the right company that works in the right way, I think it's an opportunity.



Machines augment workers

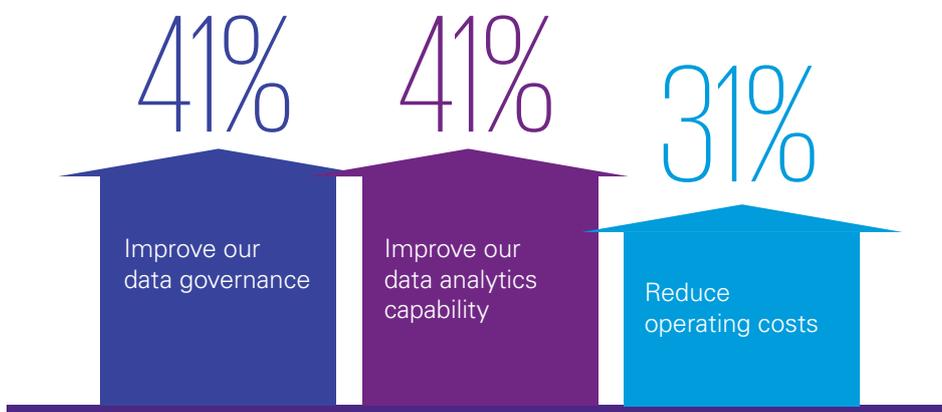
Advocates say that the use of advanced data analytics can help improve decision making, drive new perspectives for business services and open up new opportunities for revenue growth. But to do so, it will have to overcome some skepticism among CEOs.

Almost half of manufacturing CEOs surveyed say they won't be increasing their use of predictive models or analytics. They express skepticism about the ability of data analytics to forecast business trends, with one out of every two CEOs having a low regard for the accuracy of predictive analytics.

Moving beyond predictive analytics, AI, by common consent, is a crucial component in digital transformation. For all the expected advantages of AI, 41 percent of CEOs perceive the biggest benefits over the next 3 years will be enhancing data analytic capabilities and data governance (see chart below). This may ultimately improve revenue growth.

AI and the bottom line

What are the biggest expected benefits of AI over the next 3 years?
Percentage of manufacturers



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

“The full benefits of digital transformation are unlikely to materialize unless the strategy encompasses the entire organization.”

Doug Gates
Global Sector Chair,
Industrial Manufacturing
KPMG International



“
Successful
transformation
is all about
people.”

Erich Gampenrieder
Global Head of Operations
Advisory
KPMG in Germany

Somewhat surprisingly, less than one in three CEOs felt that AI's focus should be in the reduction of operational costs. This is a dramatic and positive change from just a few years ago when CEOs were heavily focused on reducing costs. Clearly, CEOs are seeing the potential of unlocking data through AI as a growth engine rather than a cost saver.

It will take time for organizations to become comfortable with tools such as AI and predictive analytics, and even when they are, human judgement, experience and intuition will continue to play a crucial role. Indeed, “the full benefits of digital transformation are unlikely to materialize unless the strategy encompasses the entire organization. It entails embracing new technologies in the back office, across the shop floors and into the supply chains. Challenges arise from the breadth and complexity of this transformation,” says Doug Gates of KPMG.

Manufacturers are working out which parts of the value chain they can enhance

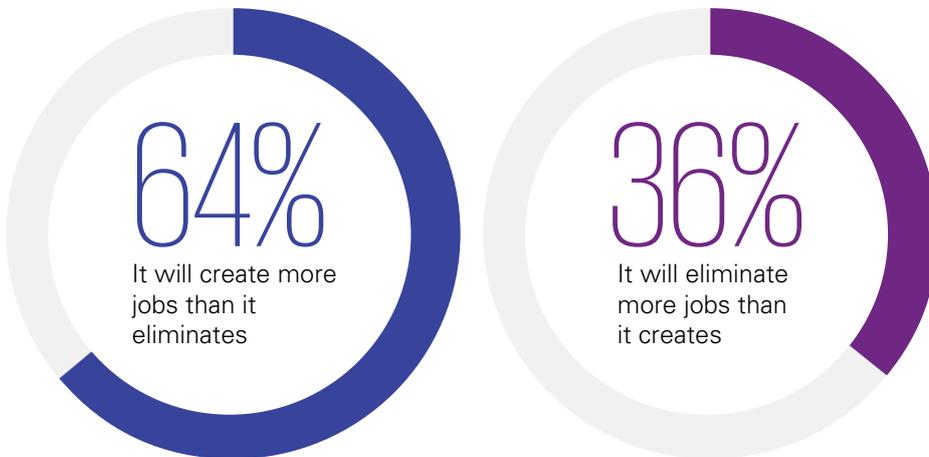
the fastest with digital technology, according to Osamu Matsushita, Leader of Industrial Manufacturing at KPMG in Japan. “They often start at the customer end because it is the simplest to digitalize, such as moving more customer services online. The problem, then, is that they often have not thought through how to align a digitalized front office with the rest of the business,” Matsushita says. “They need to think through the impact of digitalization at every step along the value chain.”

Mastering the digital transformation within the fourth industrial revolution requires fundamental shifts in attitudes from the top of the company to the bottom. “Successful transformation is all about people,” says Erich Gampenrieder, Global Head of Operations Advisory at KPMG in Germany. “You need to invest in people and create an innovative mindset, involving training and enablement. These elements are more important than implementing the technologies. If people don't get excited about transformation, it won't be successful.”

Robots won't replace humans

What is the most likely impact of artificial intelligence on your workforce?

Percentage of manufacturers



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

Successful manufacturers will be those that blend artificial and human intelligence most effectively. Elon Musk seems to have acknowledged this point when he tweeted in April 2018 that “excessive automation at [the] Tesla [factory] was a mistake...Humans are underrated.”² Despite fears frequently expressed in the media that AI and other digital technologies will lead to the loss of millions of jobs, manufacturing CEOs take a more sanguine view, at least in the medium term (see chart above).

Are CEOs being excessively optimistic? “Not at all,” says Tom Mayor of KPMG. “We have compelling evidence through the Industrial and Agricultural Revolutions, and, more recently, the

rise of the internet and e-commerce, that people and economies are infinitely creative. There is always fear of the unknown about technology-driven employment crises, but at the end of the day these types of new technologies drive growth and whole new industries arise.”

Workers will need extensive retraining, though, if they are to move into new jobs that robots cannot perform. Greg Corlis, Managing Director in the IoT Practice at KPMG in the US, says, “Organizations will have to retool the capabilities of their workers and educate them on new roles introduced through digital transformation. Many organizations are struggling with it.”

“

Manufacturers are going to struggle to attract the talent they need to accelerate their digitalization strategies.”

David Neely

Managing Director of KPMG’s Digital Enablement Practice in the US

² <https://twitter.com/elonmusk/status/984882630947753984>

To manage digital transformation, companies will need people with the skills to fully use the new technologies. CEOs were asked to select which capability from nine types of skills would be most important in supporting their organization's future growth plans. The result was that data scientists would be most in demand, a view shared by the other industries surveyed. "Manufacturers are going to struggle to attract the talent they need to accelerate their digitalization strategies," says David Neely, Managing Director of KPMG's Digital Enablement Practice in the US. "But by staying ahead of the curve, they will be better able to compete for the skilled people looking for an exciting career path."



Taking action

- Leaders of the organization need to get more comfortable with predictive models and analytical tools. They can augment human judgement, not replace it.
- Manufacturing companies will have to work hard to attract (and retain) the digital-age talent — data scientists are the hottest commodity across all industries.
- Digitalization will create more opportunities for the entire workforce, but company leaders must communicate to alleviate employee fears and define the benefits.



In their words:

No more over-engineering

Kunihiko Koshizuka
Chief Technology Officer
Konica Minolta

Kunihiko Koshizuka is the Chief Technology Officer of Konica Minolta, a global company producing imaging technology, based in Japan. Led by the CEO, the company has focused on fundamental changes to the way it does business.

A positive disruptor

We view digital transformation from two perspectives: our own digital transformation and the digital transformation of our customers. We are using digital technologies to transform our manufacturing operations in Malaysia, for example. Second, we are now providing digital manufacturing solutions to our customers to help them transform. We are also transforming our office services business by developing a platform where third-party developers can offer applications directly to our office services customers, which is a fundamental shift in our business model.

Strengthening customer relationships

We have been training a new generation of business developers with technology backgrounds to gain insights into customers' problems and develop solutions. For example, business developers in our Quality of Life business unit, which provides monitoring solutions for elderly care homes in Japan, have visited more than 50 elderly care homes and studied how caregivers work. We identified that reducing the excessive workload associated with monitoring the well-being of the elderly was a critical business problem. We designed our solution to transform the workflow of caregivers using digital technologies such as smartphones.

A product of digital transformation

One example of a digital transformation product is our high-sensitivity tissue-testing technology, which quantifies proteins associated with specific cancers. We apply image analysis and AI/deep learning on cancer patients' tissue specimens to differentiate between normal and cancer cells. We then apply molecular imaging and analytics to quantify specific proteins on cancer cells to accurately diagnose the type of cancer. This empowers pathologists to diagnose cancer types more accurately.

Optimizing the level of engineering

We used to over-engineer our products because we did not have accurate data on how they were used. Today, our products are instrumented to log how our customers use them and, with their permission, we can collect and analyze the data. This will enable us to make fact-based decisions about the features that really matter to our customers.



Deeper business relationships

The heightened connectivity that comes with digital transformation will redefine global enterprises. To help accomplish this, CEOs are looking to build on the opportunities that arise as connectivity brings suppliers, manufacturers and customers closer together.

Manufacturing executives understand that digital connectivity is an imperative to manage the ever-growing complexity of supply chains, as they extend from one part of the globe to the other. These digital supply chain networks will require complex strategic alliances which, more than one third of CEOs believe, are the most critical elements for achieving growth objectives over the next 3 years.

But partnering is not without challenges. CEOs in the survey say that the biggest barrier to extracting value from third parties is the difficulty of sharing data securely, so top-tier manufacturers are becoming more selective about which companies they partner with.

In the A&D industry, for example, prime contractors are demanding higher operational and compliance standards from their suppliers than ever before. "Historically, a business would approach a prime contractor and demonstrate its capabilities and there would be a period of relationship building before becoming a part of the ecosystem," says Mike Kalms, a Partner in Operations Advisory at KPMG Australia. "Now, you need to achieve a high level of industrial readiness before even having a conversation with a prime

contractor. They will be asked about their cyber readiness, ERP maturity and whether they have the systems in place to work in an integrated fashion. This level of maturity is not only required by the prime contractors, but is also being stipulated by governments," he says.

Supply chains, which are only as strong as the weakest link, are being replaced with potentially more resilient, multi-dimensional networks of suppliers, customers and business partners. An example of supply-chain innovation can be found in Europe. "Vodafone Procurement Company, a Luxembourg-based supply chain management company and a subsidiary of the telecoms provider, has built a fully digital procurement platform that is designed to automate strategic procurement using advanced cognitive tools," says Michael Pleuger, a Partner in Management Consulting at KPMG in Germany. "The company is delivering advanced services, significant cost savings and big efficiency gains for Vodafone's global ecosystem and business partners."

Greater transparency of supply chain operations is becoming more important, as manufacturing OEMs are demanding a more agile response

“
Now you need to achieve a high level of industrial readiness before even having a conversation with a prime contractor.”

Mike Kalms
Operations
Advisory
KPMG Australia

from their suppliers. Full supply chain visibility rose to become the third most important strategic priority in 2017, according to a global survey of supply chain professionals³. However, only 6 percent of respondents believe they have achieved this aim.

The demand for transparency is not coming from just the manufacturing OEMs, as regulatory bodies are getting in on the act. For example, Erich Gampenreider of KPMG points out that the European auto makers and their suppliers were pushed to harmonize the different assessment and certification systems in the automotive supply chain⁴ by publishing a new set of standards in October 2016. Gampenreider notes that “All EU car makers have agreed to ensure that every auto part can be monitored so that every company knows where the part comes from and how it was produced.”

These trends reinforce the fact that companies are becoming more interdependent. Digital connectivity enables organizations to rely more on each other and accelerates the development of ecosystems. The growth of global business networks, however, changes the risk landscape and makes companies more vulnerable to external shocks, as we shall see in the next section.



Taking action

- Building digital connectivity is a must to improve transparency and better manage the ever increasing complexity of global supply chains.
- Growth will be heavily reliant on strategic alliances, so determine which companies are important to work with.
- With connectivity comes risk. Building a trusted network of suppliers and partners will be critical.



In their words:

A truly visible supply chain

Kelly Bysouth
Vice President of Global Procurement and Supply Chain at Adient

US-headquartered Adient supplies seats and components for more than 25 million cars a year from 238 plants in 34 countries. It employs the just-in-time (JIT) system to minimize inventories, shipping to its customers within a two-hour window. Although JIT is the automotive industry norm, it is not perfect.

“Demand was getting pushed down the tiers, not only to our vertically integrated tiers, but to our suppliers and even down to the raw materials suppliers. To compound the issue, the entire process was not occurring at the same time, which caused lags in scheduling and timing, as well as a lot of bad data being shared across the board,” says Kelly Bysouth, Vice President of Global Procurement and Supply Chain at Adient.

To improve this model, the company has developed a process called integrated demand and supply planning to synchronize production and avoid waste. “It’s giving us much more visibility and linkage between our customer demand and the signals we are sending to all of our suppliers. We are creating an ecosystem and binding the whole supply chain together systematically and with much more accurate information,” says Bysouth.

For example, Adient would previously receive seat orders from a customer that could potentially extend beyond the contracted end of production. Those orders would automatically cascade through its ERP system to its suppliers without anybody noticing the mismatch.

“In the past, we would just push that through and wait for suppliers to come back and say, ‘I can’t do that,’” she says. In the new system, any such mismatch is flagged by the software program and steps can be taken to re-calibrate the demand and supply of seats. Before, managers could only see 12 weeks ahead based on our customers’ forecasts; now they are able to look out two years into the future.

Adient ran a pilot program for the new planning system at five of its North American plants and within 6–7 months was able to reduce premium freight costs, avoid obsolescence and make efficiency gains in its selling, general and administrative expenses.

Bysouth and her team did a lot of pre-selling of the concept, but once she was able to show the yield in dollars and cents, it was hard to disagree with the benefits of scaling the pilot across the enterprise. Now Adient is rolling out the system in Europe, where it has more than 80 plants. When the supply chain is more integrated and systematized, there is more visibility and efficiency. Even JIT can be improved.

³ GEODIS 2017 Supply Chain Worldwide survey, in which more than 600 supply chain professionals in 17 countries took part.

⁴ ISO/TS 16949 <http://www.aiag.org/quality/iatf16949/iatf-16949-2016>



Global risks

If the complexity of the digital transformation journey was not enough, manufacturers are facing new risks as they widen and deepen their global ecosystems. The most notable of these are geopolitical changes and cyber threats.

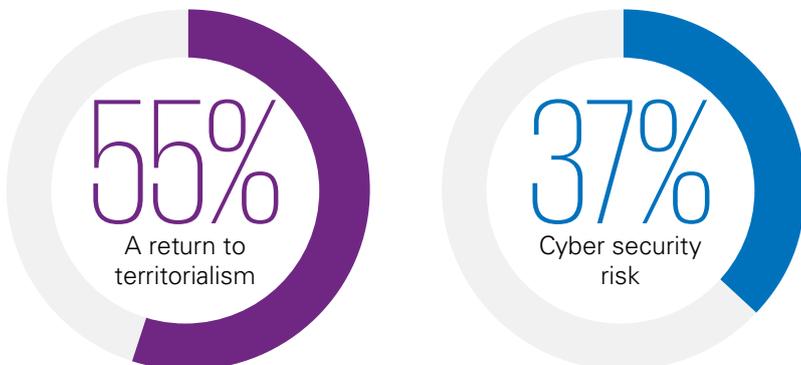
First, as manufacturers continue to globalize their operations, they face geopolitical headwinds. Governments in some parts of the world have become more stridently nationalistic and trade friction is one result. In the survey, CEOs were asked to choose the greatest risks to their organization's growth and more than half indicated that a return to territorialism was the greatest threat, far ahead of cyber security and disruptive technology. "The changing geopolitical landscape, while not necessarily stalling their

global expansion, is certainly making businesses consider very carefully their investment strategy," says Stephen Cooper, Head of Industrial Manufacturing at KPMG in the UK. "Expansion in those areas where they see growing demand, such as Asia, with a growing middle class, is in many cases front of mind. However, the ability to remain secure and to retain as much flexibility as possible to deal with unforeseen, rapidly moving events, such as sanctions or Brexit, is critical."

“
The changing geopolitical landscape is certainly making businesses consider very carefully their investment strategy.”

Two highest risks

Which risks pose the greatest threat to your organization's growth?
Percentage of manufacturers selecting this as being among the greatest threats



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

Stephen Cooper
Head of Industrial
Manufacturing
KPMG in the UK

“Advances in operational technology create a ‘sensornet of things’ in which operational decisions can be made independently of humans.”

Mike Stone
Global Head of Digital Transformation for Infrastructure, Government and Healthcare
KPMG in the UK

While not topping the list of risks, CEOs understand that the enhanced connectivity of these global ecosystems is making their companies more vulnerable to cyberattacks and that they must have a heightened sense of readiness. “Advances in operational technology create a ‘sensornet of things’ in which operational decisions can be made

independently of humans,” says Mike Stone, Global Head of Digital Transformation for Infrastructure, Government and Healthcare at KPMG in the UK. “This exposes a new attack vector, which should worry CEOs almost as much as the promise of Industry 4.0 and digital transformation excite them.”

A cyber gap

How well-prepared is your organization for a future cyberattack?
Percentage of respondents who are at least “prepared”



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

Many manufacturing CEOs understand this risk, with one out of two saying that becoming a victim of a cyberattack is now a case of ‘when’ and not ‘if’ for their organization. Yet they have less confidence in their ability to manage cyber risk than CEOs in other industries (see chart above). “It [cyber risk] is a very big issue because as the technology changes, it opens up more loopholes,” says Tim Murray, CEO of Aluminium Bahrain. “We have manufacturing systems that control things, so if they were hacked or frozen or locked up, it could obviously have a major impact on us.”

But the digital transformation journey should not end by giving in to the cyber threat. Instead, there are many emerging ways to mitigate the threats, Stone says. For example, the advent of 5G chips in 2019 will help protect the sensornet of things with double encryption and negligible impact on workloads. In addition, manufacturers can seek attestation that their third-party suppliers are ‘cyber robust.’ Stone adds, “There can be no guarantee that an organization will not be breached — cyber is, after all, an arms race — but it will confirm that each party’s processes are robust.”

Whatever the external threats and opportunities, digital transformation is likely to make organizations more resilient, not less. Those companies that have progressed a long way in transforming their people and processes will be able to navigate the global complexity with speed and agility.



Taking action

- Stay abreast of the rapid changes in the geopolitical environment, so the organization is never blindsided by unforeseen political and economic developments.
- Overcome the fear of cyberattack by building a top-class organizational culture in which data security is everybody's business, not just the cyber professionals.
- Research the new technologies that can help mitigate cyber risks in a digitally connected enterprise.



In their words:

More connected than ever

Andrew Reynolds Smith
Chief Executive Officer
Smiths Group

Smiths Group, headquartered in the UK, is a FTSE 100 diversified manufacturer, positioning itself as a deliverer of complex solutions to its customers. To do this, says CEO Andrew Reynolds Smith, requires a highly innovative ecosystem of suppliers and partners.

Growing connectivity

Businesses are converging at a rate of knots at the moment and I think we're well aware that speed and connectivity around the world are increasing, not just in percentages but in orders of magnitude. This is also driving very different business models. Smiths, for example, is a leader in infusion pump technology used in hospitals. As we take that forward, we don't only sell an infusion pump any more, we sell a completely connected secure solution that links to electronic medical records and manages all the associated data security issues.

Impact on customers

The proposition we are delivering to our customer is very different. We are bringing together technologies and capabilities from other parts of the industry to create that overall solution. Our customer is changing and the world is more connected than it's ever been before. So our businesses, by definition, must be entirely global, but they must understand the needs of our different customers as well. It's not about global and local for me; it's about ensuring we can work with customers who are anywhere in the world at any time. But we will do this in a way that creates intimacy because that's what gives us sustainable growth.

Expansion and resilience

Growth is absolutely central to the Smiths agenda, but, more importantly, it has to be sustainable growth. For me, there are really three things that play into that. It's ensuring that we're always bringing products and services to customers that are more innovative than the rest of the industry, spending our money on R&D more effectively and turning it into real sales more effectively. Second, delivering more innovative products on time, quicker and at the right quality are no longer the basics. They are real competitive differentiators and we focus on designing, making and selling stuff better than the rest. The final piece is our people, and the leadership development plan really creates the capability to bring to life the plans that we have. Being able to say we are the gold standard of data security in critical areas, such as hospitals and airports, is a big part of our future value.

Conclusion: Alive with possibilities

The findings of the survey and KPMG's industry insights show that digital transformation promises a remarkable change in the way manufacturers operate, with far-reaching effects on business and industry models.

Five points emerge from these findings:

1 Create a plan that delivers on the promise

By going down the transformation path, executives will have to set out a long-term vision of what the organization plans to achieve, with ambitious, attainable goals and milestones to record progress. To do this will require striking a balance between short-term stakeholder expectations and long-term business objectives. "Investors tend to be impatient for quick results, but if they are shown at each milestone that the company is moving towards a strategic vision, they are more likely to have confidence in the strategy and implementation," says Heckler.

2 The need for speed and boldness

Not getting started on the path to digital transformation isn't an option. It requires corporate leaders to own the journey by thinking big and acting boldly. "At the end of the day, digital transformation is about change management. You need the proper training to attain the right mindset and take away the fear people feel when they hear the word 'digitalization'. This can be achieved with a combination of incentives and results that show the benefits of digitalization," says Gampenreider.

3 Machines augment the workers of the future

Manufacturing has only just begun to grasp the implications of digitalization, but it is already redefining the workforce of the future. "Almost every manufacturer I speak with recognizes the benefits that digital transformation will bring, but struggle with the impact on the current workforce and the ability to attract people for the workforce of the future," says Gates. "In the past 18 months or so, I have seen tremendous growth in the number of organizations building groups of data scientists to use machine-learning technologies. Companies are using these not only to help solve current business problems, but also to develop new and smarter connected products and services."

4 Deeper business relationships through collaboration

As supply chains evolve into multi-dimensional ecosystems, organizations will have to grow comfortable with a much higher level of collaboration and connectivity with their partners, suppliers and clients. "This will require an unprecedented level of trust among suppliers, customers and partners," says Simpson. "In addition, third-party vetting will become even more critical, given the exponentially higher level of interconnectivity."

5 Mitigate global risks

With greater global connectivity come greater risks, particularly in two spheres: political territorialism and cyber security. To mitigate the risk of nationalistic trends, the organization's senior management around the world must stay present and aware of the geopolitical happenings in the countries that they and their key suppliers and partners operate in. Cyberattacks are inevitable, but they don't need to bring business to its knees. Organizations can bounce back from attacks if everybody does their part to overcome external shocks. "Cyber should be seen as a potential threat to the reputation of the organization," says Stone. "It should, therefore, be very much on the board's agenda. Mitigation of the risk should include creating a resilient risk culture, defense in depth and comprehensive risk mitigation plans."



How KPMG can help

At KPMG member firms, our teams understand the challenges and opportunities facing industrial manufacturers. Every day, our people work shoulder to shoulder with the world's most innovative manufacturing leaders. Our experience and our research offer us (and our clients) unprecedented insight into the reality surrounding this transformative time.

This report confirms our belief that — to maximize value and competitive advantage — manufacturing leaders must take a strategy-led approach to digital transformation. They must prioritize integration across the enterprise. They must take a holistic approach to key issues such as talent, innovation, productivity and risk. They must think inside and outside of their organization. And they must be able to measure and demonstrate the value of their digital investments in a well-planned and timely fashion.

No matter where you are on your digital journey, KPMG member firm professionals are available to help you find and secure value.

We can help your organization to:

- Create your unique digital transformation strategy and vision, aligned to your business objectives.
- Quantify the business case and quickly develop the roadmap to support investment.
- Help implement changes to your operating model, on the shop floor, through your supply chain and with your workforce.
- Conduct due diligence on potential business partners and all areas of third-party risk.
- Take a global, holistic approach to managing geopolitical risk and cyber security.

Leading industrial manufacturers select KPMG member firms because we take a technology-agnostic approach that allows clients to receive truly independent advice and make sensible choices for their specific organization and situation. They choose us because they know we don't create pie-in-the-sky strategies; we focus on helping clients see the 'when', 'where' and 'how' of their business decisions. And we understand how to develop business propositions that resonate with the C-suite and board.

With deep leadership in key areas such as strategy, data & analytics, cybersecurity, intelligent automation, change and risk management, and supply chain/operational excellence, we cover all the elements of the digital transformation journey from strategy through implementation. For more information we encourage you to reach out to any of the contributors listed in this publication, or your local KPMG member firm.



Further KPMG Insights

If you have found this publication useful, you may also enjoy these other insights from KPMG related to the topics in this report. Or visit kpmg.com/industrialmanufacturing to find the latest thought leadership around the complexity of the manufacturing environment.



Data & Analytics Thought Leadership Survey | Guardians of trust: Who is responsible for trusted analytics in the digital age?

This survey explores questions of responsibility when analytics go wrong, suggesting the need for proactive governance to build and maintain trust.

KPMG International commissioned Forrester Consulting to survey 2,190 global information technology and business decision-makers with involvement in setting strategy for data initiatives at their organizations.



Digital supply chain: the hype and the risks

This report looks at how businesses who want to harness the speed to market that new supply chain technology can offer can also guard against malicious cyberattacks.

It covers the most hyped improvements in supply chain technology and case studies and KPMG's Cyber Security approach.



Beyond the hype: Separating i4.0 ambition from reality

This report offers a realistic perspective on the current state of i4.0 adoption and readiness across the market. It is based on a series of in-depth benchmarking exercises with leading industrial manufacturers around the world. And it identifies how today's market leaders are taking advantage of comprehensive i4.0 strategies to make changes to their business models, operating models and value chains.



Autonomous Vehicles Readiness Index

Autonomous vehicles (AVs) are poised to revolutionize not only transportation but the way people live and work throughout the world. But are countries ready for an AV-driven future? The 2018 KPMG Autonomous Vehicles Readiness Index (AVRI) evaluates and ranks 20 countries for their preparedness to adopt autonomous vehicles across four pillars: policy and legislation; technology and innovation; infrastructure; and consumer acceptance.



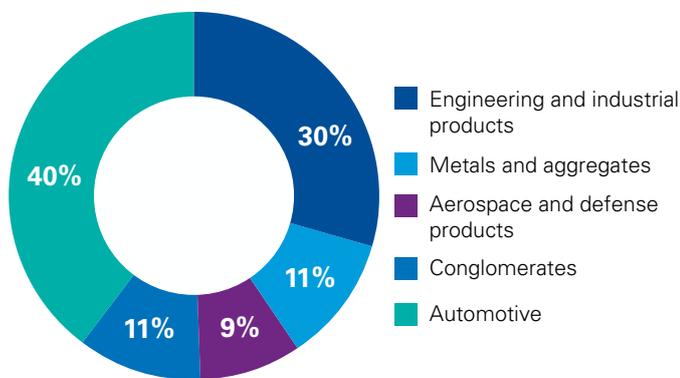
JDA & KPMG Digital Supply Chain in Retail & Manufacturing: A State of the Industry Benchmark, conducted by Incisiv

The supply chain in retail and manufacturing survey, conducted in 2018 for JDA and KPMG by Incisiv, outlines how retailers and manufacturers are leveraging innovative technologies and strategic alliances to improve speed-to-market and deliver a superior customer experience profitably. Trying to keep up with customer expectations is driving retailer investment, while agility and innovation is driving manufacturers' investment in their supply chains ability to impact every part of the supply chain.

About the survey

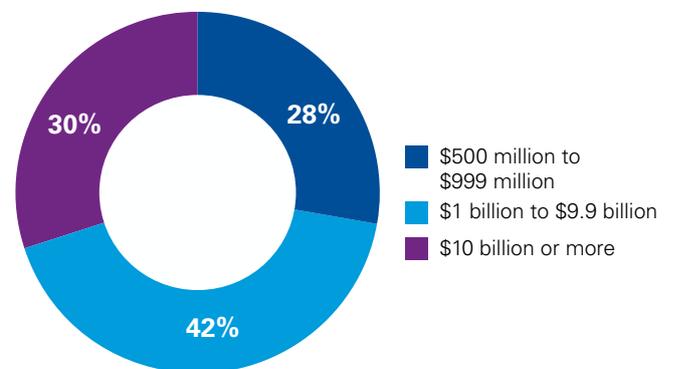
The 2018 Global Manufacturing Outlook report is based on data from 300 manufacturing industry CEOs. This data was part of the 2018 CEO Outlook, a survey of 1,300 CEOs in 11 countries, conducted in early 2018 by Forbes Insights on behalf of KPMG International. All respondents included in the survey were CEOs at their organization and 34 percent represented organizations with more than US\$10 billion in annual revenue. Respondents were distributed among the Americas, Europe and Asia.

What is your primary sector within the manufacturing industry?



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

What were your organization's revenues in its most recent fiscal year?



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

In what country is your organization headquartered?



Source: Global Manufacturing Outlook data from 2018 Global CEO Outlook, KPMG International

Our thanks

KPMG International would like to thank the following for their contributions:

Kelly Bysouth
**Vice President of Global
Procurement and Supply Chain**
Adient

Fernando Gonzalez
CEO
Cemex

Chris Harries
**Business Development Director,
Manufacturing Industry**
Microsoft

Jim Heppelmann
President and CEO
PTC

Andrew Reynolds Smith
CEO
Smiths Group

Miles Roberts
Group Chief Executive
DS Smith Plc

Tim Murray
CEO
Aluminium Bahrain B.S.C.

Kunihiro Koshizuka
Chief Technology Officer
Konica Minolta

Contacts

Project team

Doug Gates

Global Sector Chair, Industrial Manufacturing

T: +1 404 222 3609

E: dkgates@kpmg.com

Michele Hendricks

Global Executive for Industrial Manufacturing and Executive Director for Global i4.0

T: + 1 203 406 8071

E: mhhendricks@kpmg.com

Leona Mickelson

Global Senior Marketing Manager for Industrial Manufacturing

T: + 1 416 777 8822

E: lmickelson@kpmg.ca

Additional contributors

We would like to thank and acknowledge the following:

Stephen Cooper

Partner, Head of Industrial Manufacturing

KPMG in the UK

Greg Corlis

Managing Director in the IoT Practice

KPMG in the US

Brian Heckler

National Sector Leader for Industrial Manufacturing

KPMG in the US

Mike Kalms

Partner, Operations Advisory

KPMG in Australia

David Neely

Managing Director of Digital Enablement Practice

KPMG in the US

Osamu Matsushita

Leader of Industrial Manufacturing

KPMG in Japan

Michael Pleuger

Partner in Management Consulting

KPMG in Germany

Mike Stone

Global Head of Digital Transformation for Infrastructure, Government and Healthcare

KPMG in the UK

Local contacts

Australia

Cameron Slapp

T: +61 2 9335 7258

E: cslapp@kpmg.com.au

Canada

Tammy Brown

T: +1 416 777 8344

E: tammybrown@kpmg.ca

China

Norbert Meyring

T: +862122122707

E: norbert.meyring@kpmg.com

France

Stéphane Souchet

T: +33155683390

E: ssouchet@kpmg.fr

Germany

Harald von Heynitz

T: +49 89 9282-1201

E: hheynitz@kpmg.com

India

Ravind Mithe

T: +91 22 61349200

E: ravind@kpmg.com

Italy

Andrea Bontempi

T: +390514392611

E: abontempi@kpmg.it

Japan

Osamu Matsushita

T: +81335485399

E: osamu.matsushita@jp.kpmg.com

South Korea

Ja-Young Jo

T: +82 2 2112 0124

E: jjo@kr.kpmg.com

Spain

Miguel Angel Castello Sanz

T: +34914566065

E: mcastello@kpmg.es

UK

Stephen Cooper

T: +44 20 73118838

E: stephen.cooper@kpmg.co.uk

US

Brian Heckler

T: +1 312 665 2693

E: bheckler@kpmg.com

kpmg.com



The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2018 KPMG International Cooperative ("KPMG International"), a Swiss entity. Member firms of the KPMG network of independent firms are affiliated with KPMG International. KPMG International provides no client services. No member firm has any authority to obligate or bind KPMG International or any other member firm vis-à-vis third parties, nor does KPMG International have any such authority to obligate or bind any member firm. All rights reserved.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

Designed by Evalueserve.

Publication name: Global Manufacturing Outlook

Publication number: 135443-G

Publication date: June 2018