delaware

RESEARCH INSIGHT REPORT

Innovation driven by necessity

Why flexibility and transformation are key for manufacturers to deliver in uncertain times

Preface

A supply chain is only as a strong as its weakest link. The COVID-19 pandemic has shown that a shut-down of a raw material supplier in India can disrupt an entire supply chain just as easily as the closure of a manufacturing plant in the UK. Companies that have prioritised cost minimisation in the past, now need to prioritise supply chain resilience which includes transparency of supplier activities, end-to-end supply chain visibility and spreading sourcing risks. Supplier transparency includes a detailed supply chain audit to identify supplier clusters and bottleneck suppliers. Clustering in a particular geographical region exposes the company to localised shutdowns from the re-emergence of the virus and should prompt a shift to other sources of supply. Bottleneck suppliers are when only 1-2 suppliers are able to produce a particular material or subcomponent. By identifying bottleneck suppliers, the company can hedge against this risk by developing similar manufacturing capabilities with alternative suppliers over time, so redundancies are in place when a crisis strikes again. Companies can develop Overall Time To Recover (OTTR) metrics which measure the total time is takes a supplier to return to 100% productivity following a natural or man-made crisis.

End-to-end supply chain visibility allows the company to have detailed knowledge of the source of each item on the bill of materials. Such visibility means the company has an early warning system for when a virus or other disaster is flaring up in the sub-tiers of the supply chain, so suppliers can be quickly switched and inventory can be built up to hedge against anticipated shocks. End-to-End visibility requires integrated Enterprise Resource Planning (ERP) systems between the company and its suppliers, including raw material providers. Other enabling technologies, such as blockchain and artificial intelligence, are allowing proactiveness in identifying fluctuations in supply and demand and providing the visibility that allows companies to flexibly move production capacity.

Finally, COVID-19 has shown that the supply chain model of centralised manufacturing facilities in low wage economies, which make products and ship them around the world, is inherently risky and no longer sustainable. Companies need to spread supply chain risk by having multiple manufacturing facilities, or sourcing locations, in different regions around the globe. One particularly promising model is that of parallel supply chains, where the company maintains 80% of its production volumes using a regionalised and dispersed mode of production, while the other 20% of volume is produced using a discrete, localised supply chain that includes raw materials, packaging, production and distribution. When another global pandemic strikes, the company can scale up production volumes in the local supply chain to ensure products reach key centres of demand without disruption. The regional portion of the parallel supply chain spreads geographical risk, while the localised supply chains improves cash flow and working capital as less money is tied up in inventory holdings and improves responsiveness.

This research insight report discusses the digital technologies that make these propositions possible. What is clear from the pandemic is that maintaining the status quo is no longer an option; **companies now need to prioritise resilience and responsiveness over cost and efficiency.**

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Introduction

Whether or not we decide to define COVID-19 as a **black swan event**, it would have been all but impossible for any manufacturer or supply chain to have been fully prepared for the magnitude of impact created by this pandemic. One clear learning point for manufacturers from the events precipitated by the coronavirus outbreak has been the need to think and act quickly in building new business models and new ways of working that help them deliver during these difficult times. They have been forced to innovate out of necessity. The pandemic has exposed the need for manufacturers to develop smarter, more resilient supply chains, as well as highlighted the importance of far-reaching supply chain visibility, and how connected data across the entire chain is crucial for future-proofing operations.

Real-time data forms the key foundation of the latest predictive analytics and forecasting solutions. Tools like these are especially useful in the current pandemic and during other times of crisis. While forecasting based on recent historic data, prior to COVID-19, will prove difficult and potentially give inaccurate results, it will provide businesses with the tools to continually refine, learn and understand vulnerabilities in their supply chain models and help mitigate the associated risks.

In this research insight report, based on research conducted by Delaware in February 2020, we will explore how manufacturers can use the latest innovative technologies, processes and techniques to build resilience and agility to lessen the impact of risk events, with points illustrated through use cases of how we're working with customers to find innovative solutions to current challenges.

A growth in adoption

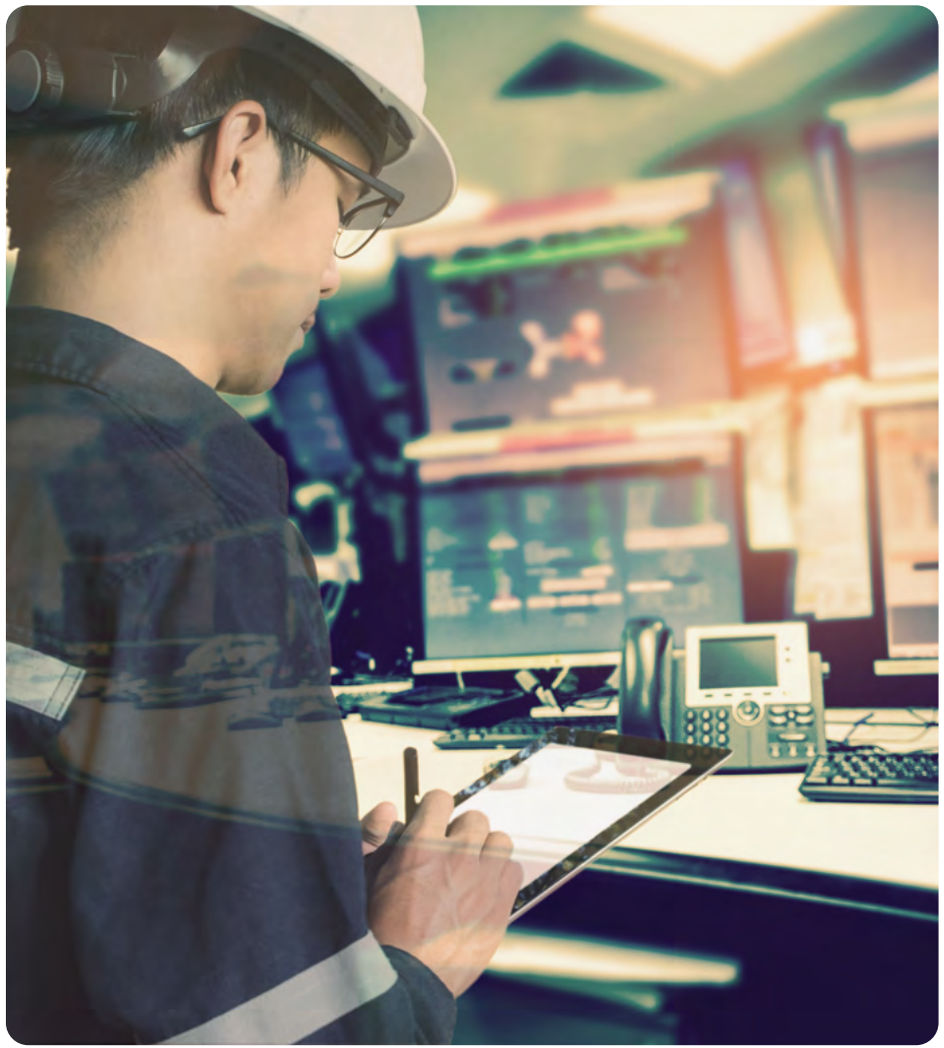
In adopting more innovative methods now demanded by the onset of COVID-19, many manufacturers will, of course, not be doing so from a standing start. Even before the advent of coronavirus, the use of innovative tools and techniques had been gathering pace across the sector. Manufacturers have been looking to embed the latest advanced technologies into their processes in order to achieve competitive advantage in the marketplace and accelerate growth.

A growth in adoption

Organisations are increasingly enabling machine integration with business applications to achieve enhanced visibility and control across all their operational procedures and their entire supply chain, together with better data management and accuracy across their operations. We are seeing growing use of AI, machine learning and robotic process automation to deliver operational efficiencies and improve and optimise processes.

But overall, there is much still to do. Before COVID-19, manufacturing was a sector on the cusp of technological change rather than one that had plunged wholesale into digital transformation. As US analyst, CBInsights, highlighted in its recent research brief, **Future Factory: How Technology Is Transforming Manufacturing**, "Despite representing 11.6% of US GDP, manufacturing remains an area of relatively low digitization – meaning there's plenty of headroom for automation and software-led improvements. In fact, in 2017, 76% of manufacturers reported having a smart factory initiative in the works."

So the roots of more wide-ranging adoption by manufacturers have been there for some time. Yet, today, in the midst of the pandemic, the need for change has become ever more urgent.



Intelligence for action

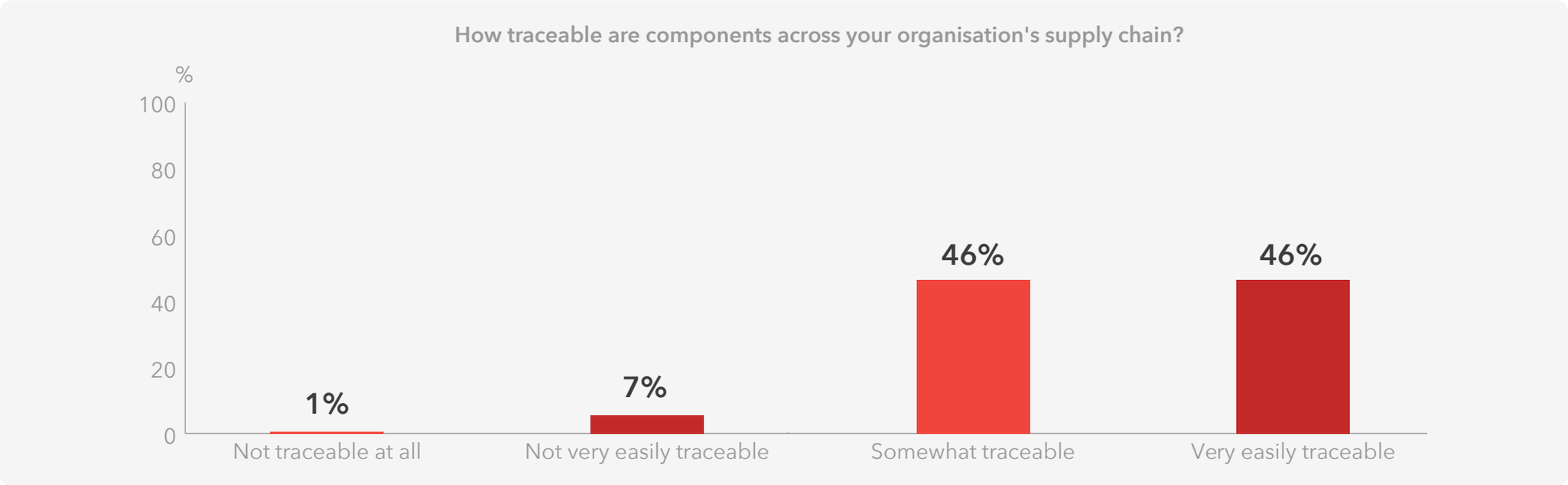
For optimised operational processes, better decision-making, higher productivity and improved safety, extended visibility and real-time data are the foundations of a resilient, successful manufacturing business.

End-to-end visibility

The global pandemic has exposed the need for smarter supply chains, therefore enhanced visibility across the entire chain is crucial. Limited visibility means that manufacturers are at risk of exposing themselves to supply chain disruption, which can have great impact on supplier inventory levels and product delivery.

Manufacturing businesses will need to move away from traditional siloed ways of working and focus on building closer links between all elements of the chain to deliver greater transparency across core manufacturing and supply chain operations.

Introducing the zero-touch automated end-to-end supply chain connecting customers and suppliers, will reduce costs and improve customer service, while also driving revenue improvements over time. This extended visibility across the supply chain will instil a culture of continuous improvement, collaboration and knowledge sharing, resulting in innovative new ways of working.



Data accuracy

Having good visibility across the supply chain will be of little value if the data gleaned from or used in the process is inaccurate. But how accurate do manufacturers really think the data derived from across their supply chains is? In a recent study commissioned by Delaware earlier this year, just prior to the pandemic taking hold, just 15% of senior decision-makers at midmarket discrete manufacturers said that their data was completely accurate. This is compelling evidence that manufacturers are not capitalising on opportunities to improve traceability and reporting in their supply chains, which is a particularly serious concern in the context of the current crisis.

> Only **15%** of respondents said their **data** is **accurate**

Forecasting and predictive analysis

To predict the future, for example customer sales demand, forecasting and predictive analytics rely on recent historic information, and existing algorithms and forecasting models rely on the future being very similar to the past. With the current crisis like nothing previously experienced, using recent historic data has made these predictions very difficult and models inaccurate. Alternative models will need to be developed based on the very short history, and this may be improved with the adoption of machine learning algorithms that can be trained with relatively small amounts of historic information, as well as new types of data feeds being captured in real time.

The connected factory

Connected manufacturing, utilising the likes of sensor technology and IoT to gather intelligence across manufacturing operations, is the foundation for the Smart Factory which provides this end-to-end connectivity of human and operational assets, integrating and using live data to improve the manufacturing performance, while connecting suppliers and customers in the extended digital supply chain. They are highly responsive, adaptive, self-optimise, run autonomously and provide real-time insights, not only providing enhanced service but also enabling better connectivity across the entire supply chain. By harnessing real-time operational data, manufacturers can achieve greater end-to-end control and gain the agility needed to fulfil new demand. This adaptability is key given the growing requirement to react quickly to shifting customer demand.

The **top three operational challenges** in the supply chain

1 / Reducing operating costs

2 / Getting products or services to market faster

3 / Improving product quality

Innovating for safety

By enabling better collaboration, providing access to real-time information and predicting and preventing issues, technologies such as AI and machine learning are helping businesses to shape the workplace of the future.

Manufacturing environments can be very dangerous, and businesses must ensure the safety of employees is paramount. With the added requirement of adhering to social distancing protocols too, businesses should review their logistics and warehousing operational processes.

Protecting the workforce

One area where technological innovation will become increasingly important through this crisis and in the post-pandemic world is around workplace safety. As employees return to offices and manufacturing sites, there will be a growing need for solutions that address the requirement for safe social distancing measures while ensuring minimal disruption to productivity. Deep learning solutions will be needed to automate safety provision for employees working in specific zones to prevent overcrowding. Beacon or thermal imaging technology could be innovatively used to gauge workers' temperatures. **Warehouse planners will need to reimagine processes** to reduce face-to-face interaction and limit the risk of contamination via shared devices.

Learn more on protecting the workforce →

Case study: Machine learning and the power of data

At Delaware, we are well versed in delivering technology that protects workers' safety. Our work with Alpro – a subsidiary of the Danone Group – is a case in point. Alpro is synonymous for soy drinks and plant-based food products. All soy beans are processed in a 50-meter-high tower, where employees need to take numerous flights of stairs 24/7. To increase the safety of 'lone workers' during weekends and at night, Alpro and Delaware are exploring the use of machine learning-based fall detection.

We realised that all the sensor technology that is required for fall detection is readily available in today's consumer smartphones, in the form of accelerometers and 3-axis gyroscopes.

To ensure high accuracy and avoid false positives as much as possible, Alpro and Delaware turned to machine learning. In order to ensure that the algorithm can tell the difference between a real fall and unsafe behaviour, data was collected by using throwing test dummies down the stairways. After collecting about 100 data points, the model had already achieved an accuracy of 88% in discerning a fall from a non-fall. In a multiclass context – with a 'safety concern' category in addition to the 'fall' and 'non-fall' categories – accuracy remained at an impressive 84%.

The delaware.ai team also recently joined forces with AI platform developer Robovision with the goal of using deep learning to tackle a human-centred problem: ensuring the safety of workers in risky production environments without going to the cloud for data processing power.

"A customer came to us with a really interesting challenge," begins Axel Vulsteke, Data Scientist at Delaware. "Their workers were using and working around heavy machinery in specific areas, and they wanted to accurately count the number of employees entering and exiting these zones, no matter the circumstances."

Time-consuming, repetitive, manual tasks like screen monitoring require lots of focus over a long period of time and can lead to fatigue and human error. "It's definitely a task more suited to the right machine, which can efficiently support the human monitor," Axel asserts. "It was up to the delaware.ai and Robovision team to develop and train that machine."

Read our case studies →

The dual-company team crafted a smart algorithm that identifies people in video on a real-time, frame-by-frame basis. “It compares changes in frames by measuring the distance between two points. In doing so, the algorithm can accurately identify people in images and track their movements.”

But first, the system had to be trained to recognise people. “In this facility, employees working in high-risk areas wear very specific clothing,” Axel goes on to say. “So, the algorithm orients its tracking to that clothing. In the future, we’d like to expand its repertoire with additional training data.”

To make things more complex, the company wanted the system to be fully wired and self-contained. Axel: “Working with machine-learning algorithms and high-speed cameras isn’t exactly light on data processing. To solve this issue, Robovision has developed an application that simplifies AI module training, shrinking the hardware footprint needed for real-time data processing. After all, real-time, high-frame-rate tracking is absolutely essential in a safety context – every millisecond counts.”

While the system is still a proof of concept, the Robovision-Delaware team has successfully created a solution that is extremely fast and highly accurate. “People bunching up together? Workers lurking around the edge of a zone? People who almost cross the boundary but then go back in? The system doesn’t lose track.”

Innovating to drive efficiency and excellence

The ability to quickly and consistently innovate will be one of the most critical factors of differentiation for manufacturers going forward.

Smart businesses constantly pursue new ways to improve operational processes, improve decision-making and transform the business to create strategic advantage, enabling cost optimisation while improving the quality of products and providing a rapid, individualistic customer service.

Driving cost efficiencies

When we conducted our research before the pandemic hit, at the most granular level, the ability to cut costs and achieve efficiencies were top of the priority list for most manufacturers. When asked to name the top two reasons why they want to innovate or make changes to their organisation, almost half (47%) of senior decision-makers at mid-market discrete manufacturers polled in our recent survey claimed it was **'to reduce costs'** while more than four out of ten (42%) said the approach was designed to "**drive operational efficiencies and productivity."**

It was clear from the research that manufacturers innovating to improve processes choose to leverage technologies such as robotic process automation (RPA), advanced analytics, blockchain and cyber security, indicating the trend of making operations more transparent, data-driven, robust and secure, for both internal and external stakeholders, as well as the opportunity for new business models.

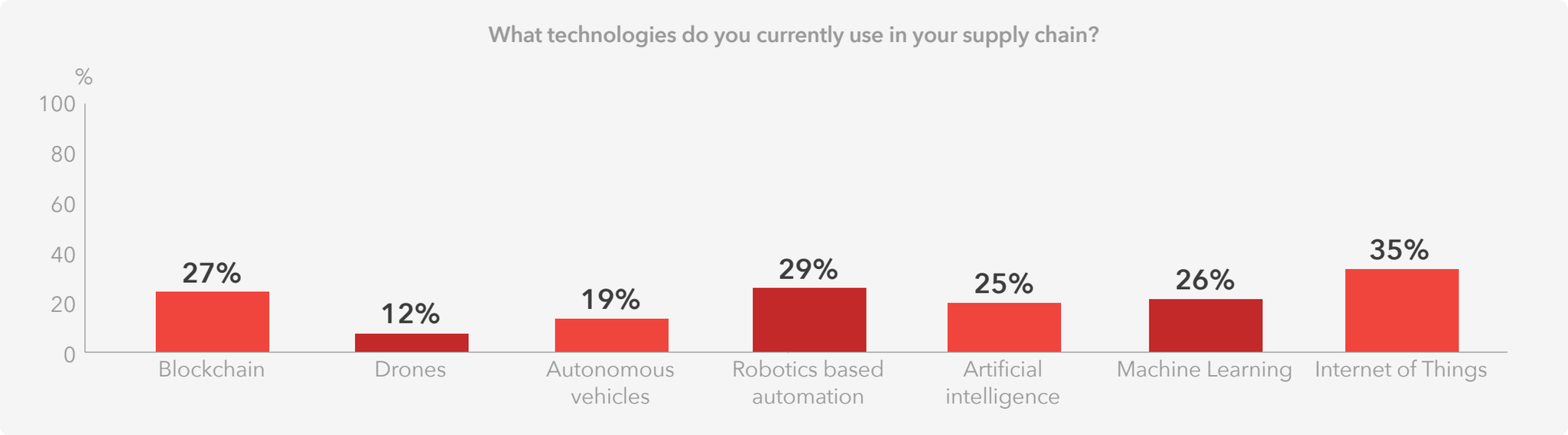
47% of manufacturers stated that **‘cost reduction’** was the **key motive** behind innovating

Adoption of technology and innovation

Achieving innovation that delivers tangible benefits is a fundamental challenge for any manufacturing business, particularly now as they face a barrage of business and operational challenges in today's world.

Manufacturers must balance the need to reduce costs with making critical investments in innovation and exponential technologies that will enable them to streamline operations and increase productivity.

Despite the correlation identified between manufacturers using certain technologies such as RPA, advanced analytics and blockchain for process innovation, our research indicated that many manufacturers remained behind the curve, with 75% and 74% not using AI or machine learning in their supply chain respectively. IoT was the technology most widely used. Of course, IoT provides real business benefits by optimising process and asset utilisation. It provides the opportunity to connect virtually anything to the internet and accelerate real time data-driven decisions, providing transparency, traceability, and reliability during complex logistics operations, ultimately increasing operational efficiency and reducing cost.



Automation

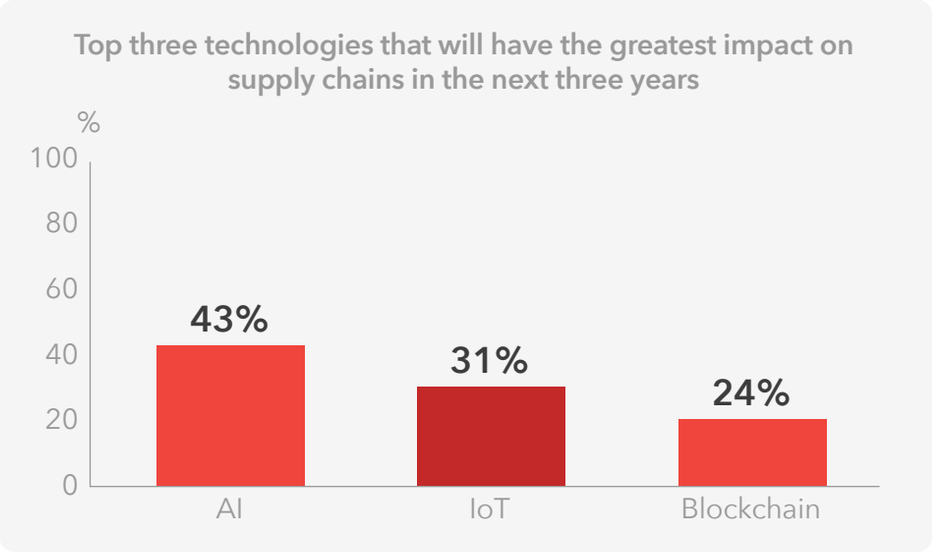
What we are seeing now is a real sea of change in manufacturers' approach to automation. The speed of automation and digital transformation in the sector is set to increase considerably, with more than two-thirds of manufacturers evaluating or already taking steps toward transformation on both fronts (78% and 67%, respectively), according to the latest edition of the **EY Global Capital Confidence Barometer**.

The shift to automation for many manufacturers will be accelerated at a pace possibly never seen before. According to our research, conducted shortly before COVID-19, only 9% of mid-sized manufacturers stated that they managed assets within their supply chain in a fully automated way, while a third (33%) said their supply chain was primarily automated with some manual processes. Now is the time for manufacturers to take stock of their supply chain operations, and consider how robotics and automation can benefit the bottom line, such as boost productivity efficiency, augment human experience and reduce labour costs, improve order accuracy and traceability and improve safety and security.

> Only **9%** of respondents said their assets are managed in a **fully automated** way

Blockchain and AI

We believe that technologies such as blockchain and AI will be critical for manufacturing going forward.



One of the main problems faced by OEMs during this crisis was the inability to forecast where supplies would dry up because the sourcing decisions were down to the contract manufacturers. Blockchain provides a secure means to track and trace every critical component of the entire extended supply chain, right from the source to the end customer. Blockchain is so useful within this context as it does not rely on the creation of a single, centralised database to store the information. Irrespective of blockchain, manufacturers still need to adopt an approach where they are working with their suppliers to build this traceability information along the entire supply chain. AI could be a fundamental tool in developing the links and building that database. As we discussed earlier, the key to unlocking the value of such technologies will be the ability to collect reliable data to support AI and analytics.

Investing in innovation to build future resilience

There is no doubt that the ramifications of COVID-19 will continue to be felt for a long time. One of the greatest lessons to emerge is the need for long-term business resilience. Manufacturers must balance their short-term supply chain challenges with the need to innovate and develop long-term holistic risk management strategies for the future. Investment in technology and innovation, though often requiring significant upfront expenditure, is a great need for today's most pressing challenges. Such solutions, that can be implemented rapidly, can bring great efficiencies, reduce costs and simplify processes, enabling manufacturers to build a robust foundation for the future.

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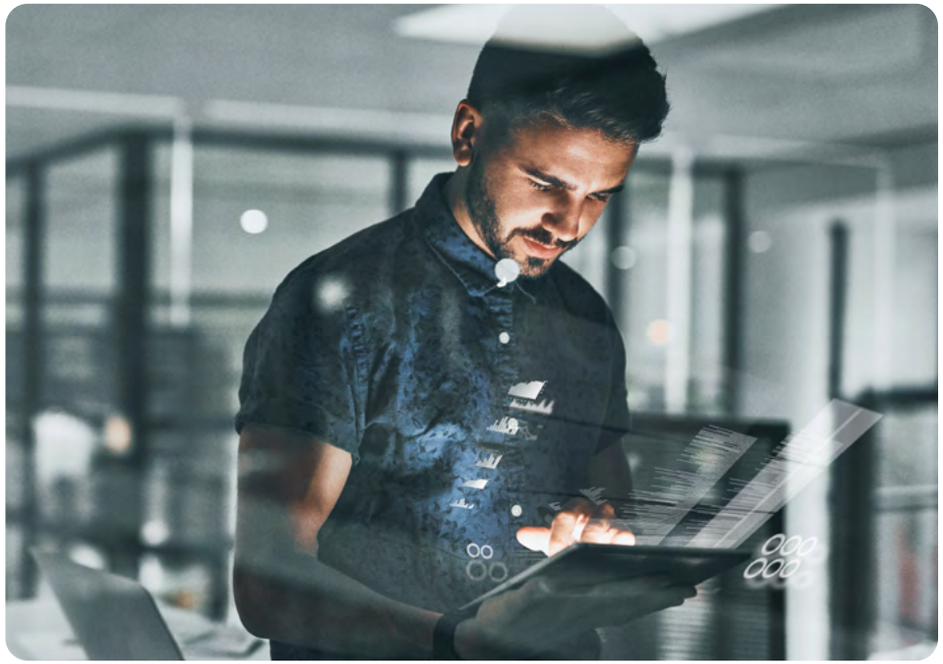
About this research

Our survey ran from January to February 2020.

In total, 100 senior decision-makers from mid-market UK manufacturing businesses participated.



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