How far is manufacturing from becoming a smart, connected industry?

verizon business

The manufacturing industry is experiencing a dramatic resurgence and reinvestment

After years of offshoring and outsourcing, the focus is shifting back to domestic production and innovation, particularly within the United States.

To understand this revival, we've spoken with industry experts who emphasize the crucial role of smart manufacturing. They highlight how strategic investments and a renewed focus on cutting-edge innovation are steering the manufacturing industry back to center stage.

A rethink on reinvestment

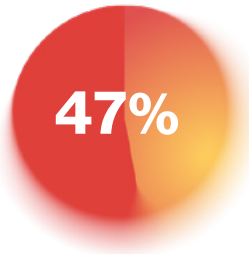
> It wasn't just COVID. Obviously the situation in Ukraine and in the Middle East demonstrated quite how fragile these extended global supply chains are. It is on everyone's agenda."

Henry Anson
Publisher of The Manufacturer

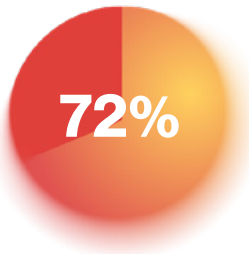
To many of us, the COVID-19 pandemic is starting to feel like a distant memory, but for those in the manufacturing industry, it's still very much top of mind. Other than the obvious effect on lives, it really exposed the fragility of extended global supply chains, a perfect example being the microchip shortage in 2021. Coupled with that, you have the geopolitical tensions in the Middle East, war between Russia and Ukraine, and disruptions in the Red Sea shipping lanes. These crises have not only prompted a reassessment of priorities; they have also highlighted the need for more robust and adaptable production networks.

Now manufacturers and governments are rethinking their strategies, embracing domestic production and the transformative power of technology. Some may call it a trend, but it's much bigger than that. With investments in manufacturing technology reaching critical mass, the industry is pivoting toward reindustrialization.

Capgemini reports:



Nearly half (47%) of organizations have already invested in reshoring their manufacturing/production.[1]



Nearly half (48%) of organizations say they are developing a strategy for reindustrialization, and 24% have a comprehensive plan already in place.[1]

1. "The resurgence of manufacturing: Reindustrialization strategies in Europe and the US," Capgemini, Apr 17, 2024. https://www.capgemini.com/wp-content/uploads/2024/03/Final-Web-Version-Report-Reindustrialization.pdf

Smart manufacturing, powered by intelligent networks

> The goal is to be smarter, more effective."
>
> **Philip Horn**
> Verizon Business's Head of Digital Transformation and Innovation

Smart. Effective. That really is what smart manufacturing is all about.

You might know it as Industry 4.0 or smart manufacturing, but whatever you call it, there's a reason why digitalization is at the core of this industry makeover. Smart manufacturing is about bringing together advanced technologies – such as robotics, artificial intelligence (AI), machine learning (ML) and digital twins – and tying them all together with the Internet of Things (IoT).

From planning to production, the benefits for manufacturers are undeniable: unprecedented levels of efficiency, productivity and flexibility. Automation uses technology to perform tasks with minimal human intervention, improving efficiency and quality. Data analytics provides near-real-time insights, while digital twins allow for virtual testing and optimization. This convergence of technologies creates a connected, data-driven ecosystem where machines, systems and humans promise a seamless collaboration.

But as much promise as there is in these technologies, the reality is there's still a way to go before we see the true benefits. As Henry Anson put it, "Manufacturers have dropped Industry 4.0 as a sort of tag, but they've embraced the concept, so virtually every manufacturer we speak to is on a journey. They're all at very different stages on that journey, but they are committed to it."

Productivity—where to from here?

> Productivity gains from digitalization remain confined to a few highly innovative and productive firms."
>
> **Isabel Schnabel**
> ECB

Isabel Schnabel, Member of the European Central Bank (ECB)'s Executive Board, highlighted the issue of missing productivity gains, referring to it as "Europe's lost IT revolution." The only way forward in terms of productivity is to look back and see the bigger picture. It was the early adoption of offshore manufacturing that created a ripple effect of reduced investment for local industry. Diane Coyle from the University of Cambridge wrote an interesting paper called "Why isn't digitalisation improving productivity growth?" in which she made a similar point to Isabel's around how only a select few firms have reaped the reward through the early and extensive implementation of digitalization.[2] So the only way to restack these fallen dominoes is to get more companies investing in the right manufacturing infrastructure closer to their shores.

2. Diane Coyle, "Why isn't digitalisation improving productivity growth?" The Productivity Institute, Nov 2023. https://www.productivity.ac.uk/wp-content/uploads/2023/11/PIP022-Why-isnt-digitalisation-improving-productivity-growth-FINAL-Nov-2023.pdf

Creating a more connected industry

> The challenge is the silos of authority within organizations."

Philip Horn
Verizon Business's Head of Digital Transformation and Innovation

To effectively tackle the inherent challenges in manufacturing, a unified approach is crucial. Historically, industry silos have fragmented efforts – business strategy, IT, cloud, network, industrial operations technology and performance often operate in isolation, hindering the widespread adoption of digital transformation. These silos can then be mirrored on the vendor side.

The push for intelligent network connectivity has grown, especially post-COVID, as companies recognize the need for resilient and interconnected systems. This isn't just about linking machines but also ensuring continuous data flow across all aspects of the business. Such connectivity is not only pivotal but also transformative, enabling the full utilization of ML and AI to drive efficiency and innovation in manufacturing.

"After COVID, people began to realize that everything needs to be more connected and more resilient," observed Henry. "Connection isn't just important; it literally holds businesses together."

From digital factories to connected enterprises

If silos are broken, then the scope of smart manufacturing can expand beyond isolated factories to encompass entire manufacturing ecosystems. By integrating operations across all levels – from individual production sites to companywide networks including supply chains, customer relations and service streams – manufacturers are engineering a cohesive environment that enhances efficiency, resilience and data-driven decision-making.

As just one example of success in this effort, Lufthansa has embraced this transformative approach by not only digitalizing passenger services on its aircraft but also connecting various operational facets such as flight operations, maintenance and customer service into a unified digital framework. This comprehensive integration exemplifies the broader objectives of a connected enterprise, making a connected airplane – and a connected airline.

Sundeep Samra, Verizon Business's Manufacturing Client Partner, noted the progression in the industry: "Lots of automation is already in place. Now, companies are trying to standardize across their global footprint." His comments reflect a shift toward more ambitious, widespread implementation of smart manufacturing practices, using pilot projects such as lighthouse or pathfinder projects to refine and extend successful strategies throughout the entire enterprise.

Is a full digital representation of the manufacturer on the horizon?

As the manufacturing industry evolves toward a connected enterprise, innovative technologies such as AI and ML are playing an increasingly critical role. These technologies are driving efficiencies in manufacturing automation, using their ability to process vast amounts of data from machines and production lines to improve output, detect anomalies and streamline operations.

BMW's use of ML in its painting process is a prime example. Cameras and machine vision systems compare each newly painted body against an ideal model, significantly improving the efficiency and accuracy of quality control. Similarly, Bosch has integrated AI into its robotics systems, allowing robots to learn and adapt over time, enhancing their performance and capabilities.

Digital twins are also gaining traction, being introduced across a wider range of operations. As a virtual replica, including inputs and outputs of a physical product, process or system, a digital twin can be used for testing, analysis and optimization. Rolls-Royce, for instance, has long used digital twins for predictive maintenance on airplane engines, allowing airline employees to anticipate and address issues before they affect efficient performance.

"The idea is really to work with a digital representation of the cyberphysical systems, to allow them to do all kinds of simulations," explained Philip Horn, Verizon Business's Head of Digital Transformation and Innovation.

With the convergence of AI, ML and digital twin technology, manufacturers will have extensive digital models and representations of their systems to test innovations and improvements.

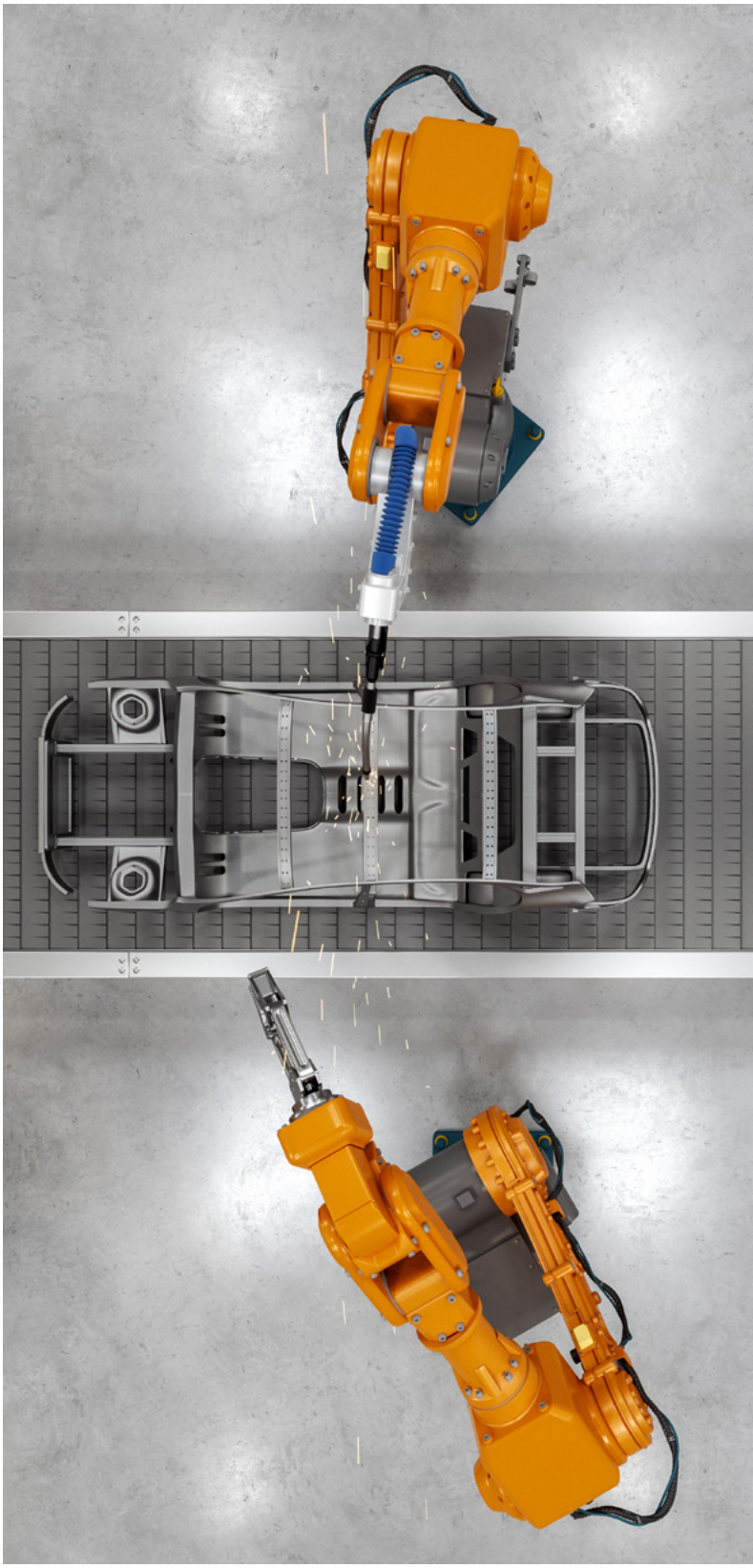
Empowering SMBs

The benefits of smart manufacturing and automation are not exclusive to large corporations. In fact, these innovations are increasingly accessible to small and medium-sized businesses (SMBs).

In Kim Povlsen's article for the Harvard Business Review, she points out that smaller, flexible, collaborative robots (cobots) can be used across a wide range of applications, from machine tending and welding to packaging, palletizing and screw-driving.[3] It's this adaptability that will allow SMBs to leverage the benefits of automation without significant capital expenditure.

Furthermore, the rise of everything as a service (EaaS) models is making robotics and other advanced technologies more affordable for SMBs. Under an EaaS model, companies can access the latest technologies on a subscription basis, eliminating the need for up-front investments in owning and maintaining the equipment. This approach reduces capital outlay and allows companies to scale their use of technology based on their needs.

"The perception is usually that such projects will require an enormous capital expenditure and that benefits won't be realized for years," said Henry, acknowledging the challenges SMBs face in justifying smart factory investments. "However, the reality is that with modest investment and the right approach, companies can start realizing the benefits of smart manufacturing in a matter of weeks or months."



3. Kim Povlsen, "A New Generation of Robots Can Help Small Manufacturers," Harvard Business Review, Nov 21, 2023. https://hbr.org/2023/11/a-new-generation-of-robots-can-help-small-manufacturers

The return of optimism

> We are now seeing far greater levels of cautious optimism in the sector than I've seen for at least eight, nine years."
>
> **Henry Anson**
> Publisher of The Manufacturer

Rockwell Automation's 9th Annual State of Smart Manufacturing Report reflects this, with technology investments up 30% over 2023. Cloud/software as a service (SaaS) deliver the biggest return on investment (ROI).[4]

This inflection point marks a critical juncture in the evolution of the manufacturing industry. It represents a time of opportunity, where lessons learned from past challenges can be used to shape a more resilient, connected and prosperous future.

4. "State of Smart Manufacturing Report," Rockwell Automation, Mar 2024. https://www.rockwellautomation.com/en-us/capabilities/digital-transformation/state-of-smart-manufacturing.html

Working with Verizon Business

Building the right connected infrastructure: partnership and cocreation

As the manufacturing industry transforms toward a connected enterprise, building the right infrastructure and architecture is paramount to building a digital thread throughout the process. However, this is not just a technical challenge; it also requires a new approach to collaboration and partnership.

"If you want to have a true transformation, the best possible solution requires cocreation," Philip emphasized.

A good digital implementation can help protect vital industrial operational assets. As operational technology (OT) becomes increasingly connected as part of a smart manufacturing infrastructure, ensuring that it's properly linked to a secure, connected network can help protect it from cyberthreats. Digital transformation can also help improve productivity, cutting cost per unit while improving safety, reducing waste and helping you track sustainable criteria.

This perspective underscores the fact that digital connectivity is not just the domain of IT. For smart manufacturing to be successful, IT and OT need to work together with a partnership of suppliers. This collaborative approach helps ensure that the implemented solutions are fit for purpose and deliver the desired benefits.

"We can show this value with demonstrations at many of our innovation centers. This offers ways to see how different key performance indicators (KPIs) are affected by digital transformation in areas such as process training, health and safety, quality control, predictive maintenance, automated vehicles, and asset tracking," said Sundeep. This can be quite revelatory and really brings the possibilities to life for customers.

"A more collaborative approach from the people looking to service and sell products and software into manufacturing would help," added Henry. "Having partners working together in a more collaborative fashion presents the manufacturing industry with an end-to-end solution rather than a simple bit part."

Learn more about how Verizon Business can help you explore and adopt the technology that's making manufacturing smarter at verizon.com/manufacturing.

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