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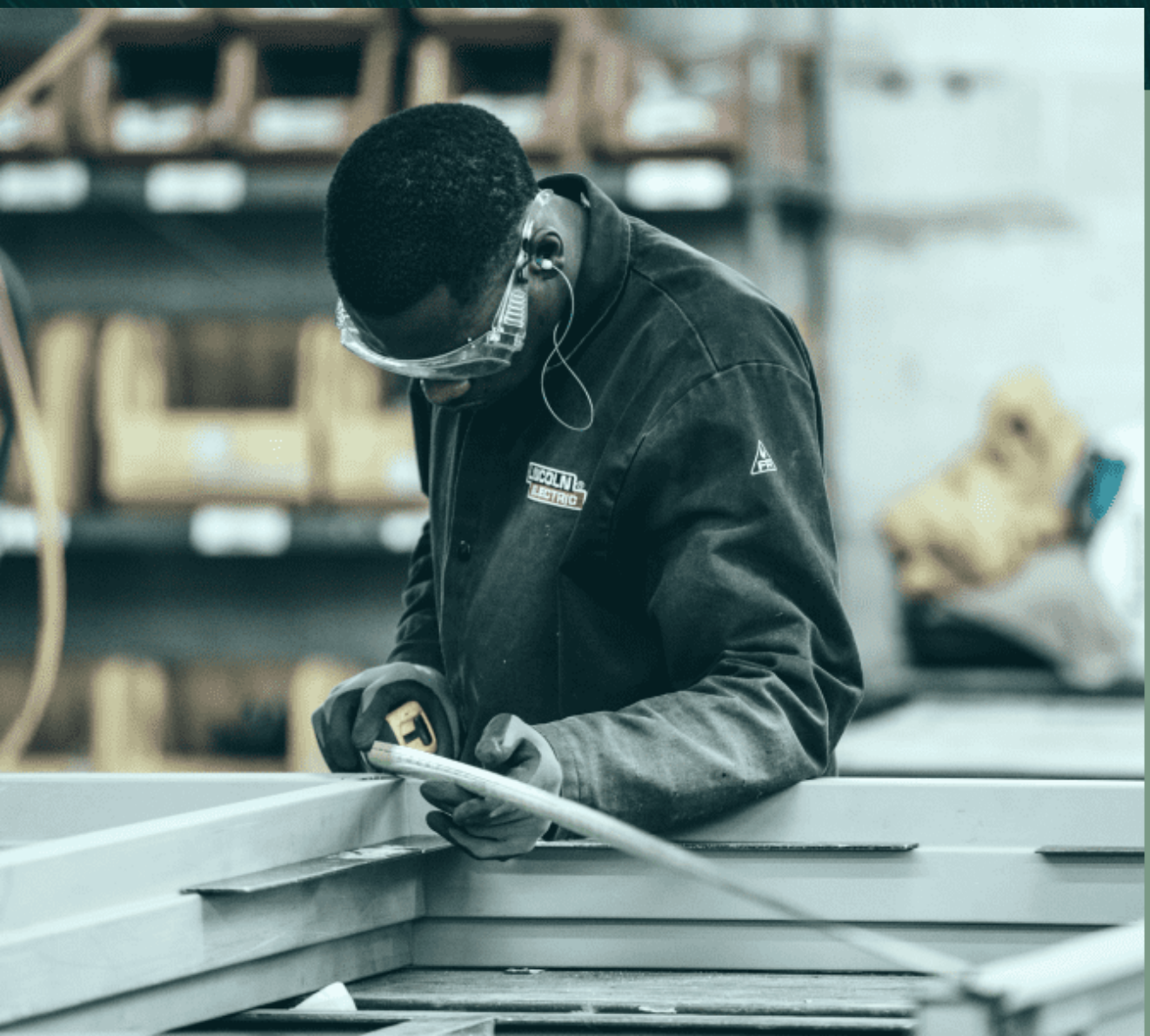
Keys to Sustainable Transformation

Re-Imagining Manufacturing and Supply Chains



For more than a century, manufacturing, materials, and supply chains have formed the foundation of modern economies and ushered in a new era of global prosperity. Similar to previous revolutions, what is sometimes called the Fourth Industrial Revolution has the potential to create unprecedented wealth and improve the lives of all citizens. In many ways, we're building on all previous revolutions by extending the business models and strategies that move us closer to sustainable growth and profitability, while discarding and reimagining those with negative impacts.

Innovators in the manufacturing sector are considering how we might reuse outputs and create more sustainable business models. Among the challenges are rising costs and the dwindling availability of finite resources. From them comes the opportunity to replace fossil fuels with clean and abundant energy (manufacturing is estimated to use as much as one-third of the world's energy).

The need to replace industrial-era production and distribution is leading to proposals for new models, including supply circles' and value networks, which incorporate reuse and repurposing of materials to create future resource independence. Resource independence is the idea that companies should become as self-reliant as possible when it comes to the raw inputs they need for production. They can do this through efficiencies, next generation manufacturing and recycling technologies, and more. Business models that aspire to create resource independence combine sustainability goals with the bottom-line economic outcomes that manufacturers must achieve to finance sustainable business transformation and future growth.

Manufacturing sector and impact and innovation

The US spends over $200 billion per year to power manufacturing.

Every dollar spent in manufacturing adds $2.79 to the economy.

By 2030, 4 million manufacturing jobs will likely be needed.

Foreign investment in U.S. manufacturing reached nearly $1.9 trillion in 2020

US manufacturers perform 57.9% of all private-sector R&D in the nation, driving more innovation than any other sector. R&D in the manufacturing sector rose from $132.5 billion in 2000 to $295.7 billion in 2020.

The current transformation is driven by rapid advances in disruptive technologies, including artificial intelligence (AI), robotics, the Internet of Things (IoT), 3D printing, 5G, and quantum computing. The next manufacturing revolution is also distinguished by blurring industry sector boundaries between the physical, digital, and biological worlds. The emerging field of nanotechnology will enable us to design and manufacture materials at an atomic level that are stronger and lighter than existing alternatives. Synthetic biology is already making it possible to "grow" things like rubber and milk in vats of genetically engineered bacteria fed mostly with sugar. One thing all of these approaches have in common is their reliance on powerful computing and advancements in artificial intelligence.

"AI is a key component in sunsetting legacy manufacturing practices and creating technologies for better monitoring, production, and equipment efficiencies. AI also will help in tracking benchmarks and compliance. The manufacturing sector will remain very competitive, but we'll also see a collaborative mindset among companies in the same industry."
—Chris Chiappa, Managing Director, Accenture

Manufacturing innovators continuously strive for new efficiencies and economic advantages. Recent months have been marked by a growing interest in finding new paths to increased resilience, resource independence, and sustainability. Pandemic times have exposed the fragility of traditional manufacturing and supply chains. Amid pandemic-induced labor shortages, costs soared, and consumer demand increased.

Sustainable is the new digital

Just as manufacturers couldn't afford not to digitally transform in order to keep pace with competitors, they won't be able to avoid the transition to a new sustainable manufacturing paradigm. The shift is being accelerated by consumer pressure and investor demand, but the root cause is that new technologies are able to make goods faster, cheaper and with less energy and resources. Cheap, ubiquitous sensors and computing power are not only making it possible to radically increase production efficiency but also to understand what happens to products after they leave the assembly line. Manufacturers can now put new features into products while they're in consumers' hands through "over the air updates," and pair them with subscription services that augment (or even replace) one-off product sales revenues.

"Things will happen faster than I think any of us realize. When it comes to sustainability at a macro level, the world will be fine whether we're here or not. It's not about preserving the world, it's about preserving humans, because the world has this magical way of reinventing itself to survive and thrive over hundreds of thousands of years. We humans just may not be around for that to happen."—Sahir Zaveri, CEO and Co-Founder, King Children.

From chains to circles

It's time to move beyond the idea of traditional supply chains as one-way, cradle to grave journeys. An alternative to this wasteful approach is a circular model, which allows companies to loop manufacturing materials, components, and products back into production rather than continuously creating and discarding them. This circular approach is increasingly becoming a way for manufacturers to declare "resource independence" by swapping out scarce, increasingly expensive, extraction-age inputs for sustainable alternatives.

The sustainable manufacturing skills challenge

"Finding the right talent with the aspirations, experience, and tenacity to work for a startup has been tough. The hiring market is really complicated. As a young entrepreneur trying to build our organization, that's one of the biggest inhibitors to our success and our mission, which is really to drive sustainability in manufacturing."—Haley Marie Keith, CEO and Co-Founder, MITO Material Solutions

Perhaps the biggest challenge to the future of manufacturing is building and maintaining a skilled workforce. As seasoned manufacturing professionals retire, about one million jobs are expected to go unfilled if we fail to develop and recruit industry talent.

Frontline staffers who are used to legacy systems and technology may need help to adjust. As with digital transformation, employers must offer a range of training tools and options to enable workers to thrive in dynamic environments. It's crucial to explain why changes must be made, clearly explain benefits, and offer appropriate incentives to adapt to change. Asking staff for input and suggestions for optimization and improvement is helpful and offers helpful perspectives. In addition, it's important to respect employees' expertise and industry experience, even as skillsets change.

Transparency and trust

A growing number of companies around the globe have pledged to help meet climate and sustainability goals. Leaders are learning to balance the need for both sustainability and economic performance goals. In the same way we've developed standardized KPIs to measure economic performance, we must have a standard set of ratings, indices, and analytical tools to measure corporate contributions to sustainability.

Just like financial reporting standards evolved over decades, it will take time to create a fully standardized system to measure, analyze, and report on sustainability goals. Yet consumers, investors, and regulators are all increasingly interested in environmental and social impacts, so manufacturers can't wait to act until there's a solid standard. As sustainable manufacturing moves to the mainstream, transparency and trust become critical.

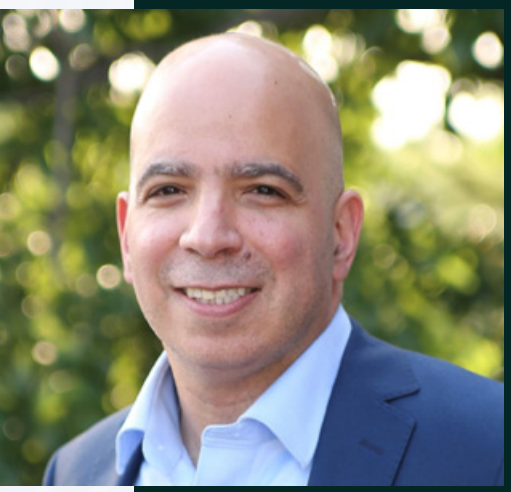
All manufacturers must rethink current approaches to reporting, compliance, and stakeholder relations to reflect growing importance of centering ESG issues within broader business strategy. One thing that's not changing: organizations that proactively create self-regulation, voluntary disclosures, and transparent reporting processes will fare better than those companies that seek to circumvent compliance and mislead stakeholders.

Tear down these industry walls

The lines between traditional industries are rapidly blurring or disappearing completely. For example, smart and connected cities will incorporate aspects of industries including healthcare, public planning and safety, construction, manufacturing, real estate, transportation, energy, and information technology. It's easy to see aspects of all industries moving to "as a service" models to leverage emerging technologies and accommodate changing consumer preferences.

"External partnerships and manufacturing alliances within industries are important, but it's becoming more worthwhile to get other industries talking together, especially if they're using the same suppliers and the same materials. Cross-pollinating industry information is one of the ways we can innovate."—Haley Marie Keith, CEO and Co-Founder, MITO Material Solutions

Agtech companies are moving toward a farming-as-a-service model to offer a variety of digital agriculture tools and services that can help farmers increase yields and profitability while taking advantage of shared data insights. Similarly, GE is committed to becoming carbon-neutral by 2030 and to having all the products it manufactures be carbon-neutral by 2050.



"I've long believed that we need a real coalition approach to this—a coalition of companies to achieve net-zero and sustainability goals. Across industries, we all come back to the same themes, like the urgency, the sense of timing, and the lack of clarity in terms of exactly how we deliver on our intentions. The more we can work together, the more likely we're going to succeed in solving this."

Roger Martella
Vice President and Chief Sustainability Officer, GE

As we move from traditional linear value chains to circular models, we need to keep in mind that traditional efficiency and optimization measures won't protect us from shocks. Covid showed that many current manufacturing and supply chain models were indeed fragile, as they ground to a halt without workers and components. We've also learned that seeking resilience, the ability to quickly recover from shocks and disruptions, may not be sufficient.

Instead, many manufacturers are exploring Nassim Taleb's concept of antifragility. An antifragile individual or organization is one that goes beyond resilience and actually improves through shocks and disruption.

Organizations that improved through the pandemic operationally and financially can be considered antifragile.

"A couple of years ago, our customers were struggling with digital transformation. What is it, where does it start and end? I'm feeling the same thing with sustainability. What is our sustainability strategy, how do I get started and get funded? How do I build a business case? I think it's very early days. A lot of organizations are struggling with how to build a sustainability business case for shareholders."—Andrew Witherspoon, Area Vice President of Manufacturing, Salesforce

Sustainable Transformation in Manufacturing

The manufacturing sector is foundational to sustainable transformation, the successor to digital transformation. It's about applying lessons learned from managing disruption, data, and agile practices, and applying them to sustainability. Using proven digital tools and processes creates a clearer path to net-zero. While there are many paths to decarbonization, there are three that are common to almost any company:

PATHWAY	EXAMPLE
Decarbonization through achieving clean energy independence.	Walmart is installing solar panels on their stores in a bid to source as much of their own power as possible. They are also one of the largest corporate buyers of renewable energy.
Supply chain reliability and waste reduction through *resource independence.*	Rolls Royce leases jet engines to airlines that pay for them only when they're on. At their end of life, the manufacturer recovers the engine and reuses as much of it as possible.
Resilience that future-proofs businesses and allows companies to adapt to climate impacts.	Companies are in the early stages of diversifying the geographical sources of supplies as more frequent natural disasters and geopolitics present unprecedented risks.

To read more about how sustainable transformation in manufacturing can shift your organization's mindset on the business goals of sustainability, read our full report.