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Against Economic Headwinds, 18 Manufacturing Lighthouses Show How to Boost Productivity and Sustainability by Scaling Advanced Technologies across Networks

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- Since 2016, the Fourth Industrial Revolution – the emerging tech-driven era that builds, combines, applies, and extends the impact of digitization in new ways – has been transforming global production.
- Yet even among countless factories, only about 130 factories exemplify best practices, showing others how to integrate advanced technologies and join a distinguished cadre in the World Economic Forum’s Global Lighthouse Network.
- Lighthouses are now opening the next chapter of the Fourth Industrial Revolution by scaling advanced technologies across production networks and beyond to concurrently drive productivity, resilience, and sustainability.
- From Brazil to Thailand and Ireland to India, 18 more Lighthouses and 3 new Sustainability Lighthouses are highlighting how mastery of strategy and scale are critical to succeeding even in adverse macro conditions.
- A new partnership with major manufacturing companies in 2023 to scale the network and its impact of enhancing sustainability, workforce empowerment, and productivity in the manufacturing sector
- Read more in the latest white paper from the Global Lighthouse Network [here](#)



Geneva, Switzerland, 13 January 2023 – Few industries have escaped the pandemic’s harsh aftermath, with factories plagued by broken supply chains, soaring inflation, escalating interest rates, looming recession, and rising geopolitical instability. Yet a core group of Lighthouses is mastering how to scale advanced technologies across manufacturing networks, showing others how to transcend those debilitating macro forces.

Today, the World Economic Forum recognizes 18 additional sites as part of its Global Lighthouse Network, now a platform of 132 leading manufacturers. Each chosen Lighthouse integrates Fourth Industrial Revolution technologies (4IR), from artificial intelligence and robotics to cloud computing and big data. In doing so, all of them show how to increase productivity, engage workforces, lower emissions, and build supply chain resilience.

In addition to the 18 new Lighthouses announced today, three sites have been awarded the status of Sustainability Lighthouse. This recognizes their outstanding reductions in environmental footprint through the implementation of 4IR solutions. The network now includes a total of 13 Sustainability Lighthouses, demonstrating that productivity and sustainability are no longer at odds with one another. More details of the new Lighthouses can be found below.

Since the Network was first conceived in 2018, companies designated as Lighthouses have ranged from global blue-chip corporations to local businesses with fewer than 100 employees. The manufacturing group has grown into a neutral platform that helps to accelerate and spread the smart adoption of Fourth Industrial Revolution technologies worldwide. The Global Lighthouse Network collaborates by forging new alliances that unlock value by sharing the most effective and sustainable practices across industries.

“By integrating 4IR technologies into their operations, Lighthouse companies are achieving double-digit impact on throughput, costs, and lead times,” said **Francisco Betti**, Head of Advanced Manufacturing and Value Chains, World Economic Forum. “In this next chapter of the Fourth Industrial Revolution, they are setting the pace across industries. Lighthouses are demonstrating how to scale advanced technologies across entire manufacturing networks and beyond towards suppliers and customers or new functions, such as procurement, logistics, and research and development.”

A linked World Economic Forum [White Paper](#), written with McKinsey & Company, showcases how Lighthouses integrate people with 4IR tools to do more, faster. What sets a Lighthouse apart from the rest? The survey behind the white paper found the difference wasn’t so much size, sector, geography, or external conditions. The real differentiators are mindset and strategic focus. Compared with non-Lighthouse companies, Lighthouses are three time more likely to consider their production networks to be advanced in the use of 4IR technologies, and 50% more likely to be ahead of schedule in scaling them.



The survey highlights how “smart followers” can learn from a Lighthouse’s early mistakes, read the waypoints and realize that success comes from strategic direction, investing in people and clear governance. Emulation brings fast, broad, global progress.

The new cohort of lighthouses announced today share a common trait of strategic focus, recognizing the need to scale advanced technology throughout their operations.

“All of the Lighthouse companies are to be congratulated on their successful adoption of 4IR technologies and the progress they have made towards scaling. In this next chapter of the Fourth Industrial Revolution, the time is now for companies to shift from localized transformations to large-scale programmes across dozens of sites and engaging thousands of people,” said **Enno de Boer**, Senior Partner, McKinsey & Company and Global Lead of its digital manufacturing work. “They are showing how dedicated strategy and governance, and the deployment of multiple, impact driven use cases across sites and value chains, are the key unlock to pursuing growth.”

Sustainability Lighthouses:

Flex (Sorocaba, Brazil): With an aim of reducing energy use, water consumption, and GHG emissions, Flex’s facility in Sorocaba implemented smart factory utilities management and optimized electronic waste in its supply chain and manufacturing operations using IoT sensors to enable circular economy solutions. Flex Sorocaba reduced scope 1 & 2 GHG emissions by 41%, for scope 3 managed to avoid 44 kilotonnes of CO₂ eq (carbon dioxide equivalent), and reduced water consumption by more than 30%.

Haier (Tianjin, China): To build resilience in the face of rising energy costs and also reduce carbon emissions, Haier applied big data and AI to establish a power load model of equipment, as well as a production scheduler optimizing for energy consumption, reducing energy consumption by 35% and GHG emissions by 36%.

Siemens (Amberg, Germany): To reach its net zero target already by 2026, four years ahead of the corporate pledge, Siemens adopted digital process analysis and measurements, reducing its scope 1 & 2 GHG emissions by 69% normalized to volumes. In addition, to decarbonize its entire supply chain (scope 3), the plant acts as an incubator to develop Fourth Industrial Revolution products such as a digital product pass and a blockchain-based software to exchange CO₂ data with suppliers.

The 18 new Lighthouses:

Advanced Semiconductor Engineering (Kaohsiung, Taiwan, China): To improve productivity and reduce lead time in an increasingly complex manufacturing environment of over 100 process steps, ASE Kaohsiung's bumping factory deployed AI applications in their processes from inspection to dispatch. As a result, the site was able to increase output by 67% while reducing order lead time by 39%.



Bosch (Bursa, Türkiye): To secure future investments and resources for production of new products such as hydrogen components, the Bosch Powertrain Solutions Plant in Bursa needed to further strengthen its cost leadership. By deploying AI use cases such as close loop process control for hydro-erosion, and upskilling 100% of the workforce, they reduced unit manufacturing cost by 9% and improved OEE by 9%.

CEAT (Halol, India): To capture greater market volumes, CEAT needed to incorporate greener materials and meet stringent in-process specifications. CEAT deployed Fourth Industrial Revolution use cases like Advanced Analytics to optimize cycle times and digitalization of the operator's touchpoints. As a result, the site reduced cycle times by 20%, process scrap by 46%, and energy consumption by 15%. Overall, this resulted in a ~2.5x increase in export and OEM sales in two years.

The Coca-Cola Company (Ballina, Ireland): Ballina site, the company's largest concentrate manufacturing facility, delivers over 3,500 SKUs to 68 countries. To enable growth, build resilience, and address increasing portfolio complexity, the site implemented digital, and analytics use cases. As a result, it improved cost by 16% while expanding its SKU portfolio by 30%, and led Fourth Industrial Revolution scaling across the network of 17 sites.

Foxconn Industrial Internet (Shenzhen, China): In response to customers' needs for rapid releases of new smartphone products and strict quality standards, Foxconn Industrial Internet enabled agile product introduction, quick capacity ramp-up, and smart mass production by deploying 37 different Fourth Industrial Revolution use cases at scale. This accelerated new product introduction by 29%, led to 50% faster ramp-ups, reduced quality non-conformance by 56%, and reduced manufacturing cost by 30%.

Haier (Hefei, China): Facing challenges in product diversity, time-to-delivery, and quality due to supplier base expansion, the site deployed 18 different Fourth Industrial Revolution use cases across their supply network, R&D, manufacturing, and customer services, leveraging their bespoke IIoT platform designed to accelerate at-scale deployment of AI, machine vision, and Advanced Analytics. Doing so cut order lead time in half and lowered on-site defect rates by 33%.

Huayi New Material (Shanghai, China): To respond to external challenges such as 30% over-capacity and higher costs due to market volatility, the company has deployed 28 different Fourth Industrial Revolution use cases, such as machine-learning-enabled process optimization and AI-enabled safety management. As a result, labour productivity increased by 33%, conversion cost fell by 20%, energy consumption dropped 31%, and recordable safety incidents reached zero.

Johnson & Johnson Consumer Health (Mulund, India): Facing a volatile demand in a highly fragmented and complex network of distributors and vendors, Johnson & Johnson India deployed Fourth Industrial Revolution solutions such as demand sensing, smart logistics, robotics, and 3D printing. As a result, they reduced OTIF



losses by 66%, accelerated new product introduction by 33%, and improved cost per piece by 34%.

Lenovo (Hefei, China): Facing fierce competition, significant demand fluctuation and growing product customization, Lenovo Hefei, as the world's largest single PC factory, deployed over 30 Fourth Industrial Revolution flexible automation and advanced analytics use cases, improving labor productivity by 45%, reducing supplier quality issue by 55%, while managing small size yet numerous customer orders (80% of them being less than five units).

LG Electronics (Clarksville, United States): Following establishment of a plant in the U.S. two years ago to be closer to customers, LG encountered various human resource risks and a lack of production know-how. By adopting Fourth Industrial Revolution technologies such as deep learning, automation, and digitalization, LG was able to strengthen its strategic production base in the US, increasing sales by 68% and growing net profit by 703%.

MantaMESH (Fröttstädt, Germany): With cost leadership being critical to compete as a SME in a highly competitive commodity market, MantaMESH developed a Fourth Industrial Revolution online manufacturing business model that connects customers to an automated fulfillment system. All online interactions are processed in real time, with a seamless connection to smart manufacturing plants. The result is a 261% increase in customer activity and 73% growth in production volumes while reducing energy consumption / kg produced by 32%.

Mondelēz (Suzhou, China): To quadruple retail channels in China, double store coverage to 4 million retail outlets, and address the impact of double-digit inflation related to labour and logistics costs, the company invested in multiple Fourth Industrial Revolution solutions. This allowed it to transform a linear supply chain into an integrated supply ecosystem, with OTIF improved by 18%, lead times reduced by 32%, and secure growth in market share from 23.4% to 28.3%.

Procter & Gamble (Takasaki, Japan): To address a 2-3% YoY business growth with limited footprint expansion potential, the site implemented Fourth Industrial Revolution use cases such as data flow integration, digital twin, and machine learning across the end-to-end value chain (from R&D to customers). As a result, the innovation lead time accelerated by 72%, shutdown days for trial were reduced by 21%, and the order horizon from customers improved 14-fold.

Unilever (Indaiatuba, Brazil): Facing a shrinking market, Unilever's site in Indaiatuba, the largest powder detergent factory in the world, top in productivity, and second in cost efficiency globally, but biggest contributor of Unilever to GHG emissions, implemented use cases such as digital twin and AI to improve cost leadership and agility to the market, while minimizing environmental footprint. As a result, Indaiatuba reduced innovation lead time by 33%, production costs per ton by 23%, and nearly eliminated GHG emissions.



Unilever (Tianjin, China): Having navigated COVID-19 uncertainties in the catering industry in the past three years, Unilever accelerated market penetration in low tier cities by deploying over 30 Fourth Industrial Revolution use cases, such as tailor-made 24/7 digital selling, optimal end-to-end advanced planning, and AI-enabled quality control. As a result, the number of customers served doubled, order-to-delivery lead time shrank by 40%, and customer complaints fell by 62%.

Western Digital (Laguna, Philippines): To build resilience in the face of volcanic eruptions, typhoons, long lead time for materials, volatile demand, and tightened product specifications, the Laguna site deployed over 25 use cases at scale, such as event anomaly detection by Advanced Analytics and end-to-end production variation compensation by machine learning. As a result, the site was able to reduce unplanned shutdowns by 82% and production cost per unit by 54%.

Western Digital (Bang Pa-in, Thailand): Bang Pa-in is producing cost sensitive consumer hard disk drives (HDDs). Facing material cost increase caused by supply chain uncertainty and with the goal to limit capital deployment due to market shifting to solid-state drives (SSD), Bang Pa-in implemented diverse Fourth Industrial Revolution use cases to reduce factory cost by 33% while reducing energy consumption/PetaByte by 40%.

Wistron (Zhongshan, China): Faced with the pressure to deliver 60% of orders in less than 72 hours, the company needed to accelerate end to end processes without compromising quality. Wistron transformed its entire value chain via 33 in house-built use cases. Despite supply shortages, productivity was enhanced by 32%, defect rates were reduced by 55% and delivery times shortened to 48 hours. Ultimately, manufacturing unit costs were reduced by 22%.

The Global Lighthouse Network is excited to announce a new partnership with major manufacturing companies in 2023 to scale the network and its impact of enhancing sustainability, workforce empowerment, and productivity in the manufacturing sector. This collaboration will broaden insights from the industry and unlock many more learning opportunities for the successful transition towards using advanced technology. More details about this partnership will be shared in the coming months.

About the Global Lighthouse Network

The Global Lighthouse Network is a community of manufacturing sites and value chains that are world leaders in the adoption and integration of the cutting-edge technologies of the Fourth Industrial Revolution. Lighthouses apply Fourth Industrial Revolution technologies such as artificial intelligence, 3D-printing and big data analytics to maximize efficiency and competitiveness at scale, transform business models and drive economic growth, while augmenting the workforce, protecting the environment and contributing to a learning journey for all-sized manufacturers across all geographies and industries. The Global Lighthouse Network is a World Economic Forum initiative in collaboration with McKinsey & Company, factories and value chains that join the network are designated by an independent panel of experts.