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# The New Era of Industrial Strategies: Tackling Grand Challenges through Public-Private Collaboration

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# Foreword



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Historically, manufacturing industries have fuelled social and economic growth, often guided by industrial strategies from the private and public sectors. By the turn of the 20th century, however, the predominant discourse minimized the role of industrial policies.<sup>1</sup> A recent shift, influenced by the newly-emerging Brussels-Beijing-Washington Consensus,<sup>2</sup> is steering back towards prioritizing industrial policies as integral to economic development. Recognizing the potential of industrial strategies to address contemporary challenges, such as geopolitical tensions, climate change and technological disruptions, global adoption of industrial strategies doubled within a decade, comprising 50% of policies in the Global Trade Atlas by 2019.<sup>3</sup>

As industrial strategies regain prominence, the World Economic Forum, in collaboration with Cambridge Industrial Innovation Policy (CIIP) at the University of Cambridge and the United Nations Industrial Development Organization (UNIDO), is actively engaging with governments and companies. This collaboration aims to comprehend modern industrial strategy trends and shed light on the opportunities for governments, the private sector, research organizations and civil society to co-create the next generation of industrial strategies. This paper, drawing from our global communities, structures the conversation on the future of industrial strategies and the opportunities for collaboration between public and private sectors. The goal is to catalyse dialogue on best practices, priorities and opportunities, ensuring that industrial strategies continue to drive inclusive growth amid evolving global dynamics.

# Executive summary

Adaptive industrial policies that achieve parity between societal and economic success desire coordinated and inclusive approaches.

The world is in a constant state of flux, marked by new technological innovations, geopolitical shifts, and environmental crises. Industrial strategies are now recognized as multifaceted tools, impacting economic, social and national security dimensions.

Despite diverse approaches across sectors and regions, stakeholders face common challenges in this new era of industrial strategy.

The 2023 World Economic Forum report *The Future of Industrial Strategies*, written in collaboration with Cambridge Industrial Innovation Policy (CIIP) and the United Nations Industrial Development Organization (UNIDO), identified five grand challenges that are fundamentally shaping the future of industrial strategies. These grand challenges are environmental sustainability, supply chain resilience, technology scale-up and adoption, securing future workforce skills, and linking social

and business value. This report delves into the key intervention areas where the public and private sector leaders need to design new mechanisms for collaboration and coordination if these challenges are to be tackled successfully.

Based on a priorities survey with 32 officials from governments, companies, and research organizations, expert focus groups with 26 specialists, and a careful curation of case studies, this report outlines current industrial strategy approaches. Emphasis is given to consensus-driven approaches and areas of ongoing debate. Concrete examples serve as reference points on approaches that can be taken. The goal is to simplify the understanding of global challenges, informing the design of next-generation industrial strategies and promoting dialogue among companies, academia and governments on best practices, priorities, and transformative opportunities for change.

FIGURE 1 Five grand challenges for industrial strategies



TABLE 1 | Key priorities by challenge area

	Key issues	Public sector priorities	Private sector priorities
 <p><b>Achieving environmental sustainability of manufacturing operations, products and supply chains</b></p>	<ul style="list-style-type: none"> <li>– Decarbonizing within and across supply chains</li> <li>– Reconceptualizing product design, business models and industrial processes towards circularity and resource efficiency</li> <li>– Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>– Data standardization</li> <li>– Regulations</li> <li>– Informing consumers</li> <li>– Risk offsetting</li> <li>– Bolstering affordability in developing countries</li> </ul>	<ul style="list-style-type: none"> <li>– Increasing resource efficiency and material substitution</li> <li>– Supply chain partner selection</li> <li>– In-house innovation hubs</li> <li>– Sharing solutions and data across the sector</li> </ul>
 <p><b>Enhancing supply chain transparency and resilience</b></p>	<ul style="list-style-type: none"> <li>– Improving the understanding and end-to-end visibility of supply chains</li> <li>– Widespread adoption of resilience-enhancing technology</li> </ul>	<ul style="list-style-type: none"> <li>– Strengthening international coordination and collaboration</li> <li>– Restructuring essential supply chains</li> <li>– Long-term visibility of demand</li> <li>– Regulatory frameworks on business transparency</li> <li>– Supporting technology adoption</li> <li>– Stockpiling emergency resources</li> </ul>	<ul style="list-style-type: none"> <li>– Information sharing</li> <li>– Adopting resilience-enhancing technology</li> <li>– New profit models</li> <li>– Long-term perspective</li> <li>– Grounded risk assessment</li> </ul>
 <p><b>Accelerating the scale-up and adoption of industrial technologies</b></p>	<ul style="list-style-type: none"> <li>– Fostering numerous robust collaborative linkages</li> <li>– Integrating industry perspectives</li> <li>– Interlinking workforce skills development and technology</li> </ul>	<ul style="list-style-type: none"> <li>– Consultative bodies</li> <li>– Data gathering and benchmarking</li> <li>– Experimental spaces</li> <li>– International collaboration</li> <li>– Mission-setting</li> <li>– Funding the risky parts of innovation</li> </ul>	<ul style="list-style-type: none"> <li>– Liaising with academia</li> <li>– Integrated approach to skills and technology development</li> <li>– Defining technology priorities</li> <li>– Technology adoption advocacy</li> <li>– Developing learning networks</li> </ul>
 <p><b>Securing the future of the manufacturing workforce</b></p>	<ul style="list-style-type: none"> <li>– Ensuring a just transition</li> <li>– Developing a workforce fit for the future</li> <li>– Making training more affordable, accessible, and realistic</li> </ul>	<ul style="list-style-type: none"> <li>– Early-stage skills development</li> <li>– Integrated approach to technology and skills</li> <li>– Balancing stability and reactivity</li> <li>– Safety nets</li> <li>– Establishing training requirements for large firms</li> </ul>	<ul style="list-style-type: none"> <li>– Proactively partnering on training curricula</li> <li>– Lifelong learning</li> <li>– On-the-job training and re-training</li> </ul>
 <p><b>Linking business value with social and environmental values</b></p>	<ul style="list-style-type: none"> <li>– Increased transparency of business practices</li> <li>– Centering workers' safety, rights, and development</li> <li>– Decreasing gender disparities and promoting diversity in the manufacturing sector</li> </ul>	<ul style="list-style-type: none"> <li>– Bolstering transparency</li> <li>– Regulations</li> <li>– Protecting workers</li> </ul>	<ul style="list-style-type: none"> <li>– Employee dialogue mechanisms</li> <li>– Using technology for safety improvements</li> <li>– Promoting corporate social responsibility across supply chains</li> </ul>

1

# The new era of industrial strategy

Industrial strategies are increasingly being seen as a crucial tool for economic advancement.

After decades of marginalizing industrial policy, a paradigm shift is revitalizing the role of proactive industrial strategies across the private and public sectors. Now, new production ecosystems are being intentionally crafted to transcend a traditional focus on efficiency and profitability in service of broader societal, national and global goals.

## Trends driving this resurgence:

- **Production and security intersection:** Global events, including the COVID-19 pandemic and geopolitical uncertainties, exposed vulnerabilities in production systems, prompting a re-evaluation of the importance of strategic planning both in governments and companies. Focus now includes enhancing production capacity, meticulous supply chain mapping, and discussions on reshoring and nearshoring for economic and national security.
- **Green imperative:** Growing environmental disruptions and a sense of industry responsibility are reshaping business practices and government policy focus towards greater sustainability. Climate change concerns drive a collective effort to adopt eco-friendly approaches.
- **Social demands:** Industrial strategy is recognized as essential for creating fairer societies. Increasingly, citizens demand sustainable business practices to address environmental issues and inequality, both within and across nations.
- **Future technologies:** The green and digital revolutions necessitate rapid adaptation. Staying competitive requires businesses and governments to embrace new technologies and cultivate a future-ready workforce.
- **Global rebalancing:** The last 20 years witnessed the rise of East Asia, in particular China, as the new industrial centre of gravity. The share of Asia-Pacific developing economies in global GDP increased threefold in the last 20 years.<sup>4</sup> Inspired by China's success, other nations are adopting industrial strategies that emphasize increased state guidance, the bolstering of manufacturing value added, and integration into higher value-added segments of global value chains.

## Are industrial strategies effective tools to respond to today's challenges?

Recognizing the crucial role of production in navigating geopolitical turmoil, technological advancement and the climate crisis, industrial strategies offer vital support and direction.

Industrial strategies are emerging as vital tools to address current challenges, underpinning a range of Sustainable Development Goals (SDGs). SDG 9 in particular plays a pivotal role in driving progress in other SDGs due to its multiplier effect and its interlinkages.<sup>5</sup> These strategies, therefore, are not just about economic growth; they are about shaping economies that contribute to economic security, inclusive growth and environmental sustainability.

However, the revival of industrial strategies is predominantly led by the most industrialized nations. Between 2009 and 2019, for instance, high-income countries implemented an average of 95 industrial policies, compared to just 18 in low- to middle-income countries.<sup>6,7</sup> This disparity highlights a significant challenge: low-income countries, with fewer productive and competitive manufacturing sectors, are at a disadvantage. The intensification of industrial strategies in advanced economies could exacerbate global divides, posing additional challenges for developing countries in their industrialization journeys.

There are no one-size-fits-all solutions. However, within the specific context of each country, it is clear that private sector efforts alone are insufficient. A collaborative approach, where the state works in tandem with companies, is essential for a prosperous, fair and sustainable future.

Achieving visionary goals requires a long-term commitment, involving training, infrastructure development, technology deployment and trade negotiations. Responding to global challenges is an evolving process, and this report outlines actions not only for immediate needs but also for future technological, skills and environmental demands.<sup>8</sup>

“ Between 2009 and 2019, high-income countries implemented an average of 95 industrial policies, compared to just 18 in low- to middle-income countries.



## 2 Grand challenge 1: Achieving environmental sustainability of manufacturing operations, products and supply chains

Reaching key climate targets is not possible without significant industrial production transformation.

Meeting global climate targets requires a drastic overhaul of industrial production. Manufacturing and construction are responsible for a large share of global greenhouse gas emissions and other environmental issues such as material depletion and land and water pollution. At the same time, the industrial sector stands at the forefront of green technological solutions that address the urgent challenges posed by climate change. In the past decade, there has been an acceleration in green

technological advancements, with manufacturing firms accounting for 60% of green patents globally.<sup>9</sup> With diverse production processes and fragmented supply chains, transforming the sector poses challenges. Addressing these demands requires varied responses and stakeholder coordination. Although the public and private sectors differ in their approaches, some consensus emerges on what industrial strategies can do for environmental sustainability.

## 2.1 Key issues

“ Financial incentives and tax breaks can further encourage companies to adopt energy-efficient technologies and practices.

### Decarbonizing within and across supply chains

Since emission reduction goes beyond a company's operational processes, effective decarbonization demands systemic collaboration. Supply chain emissions, averaging 11 times higher than operational emissions, underscore the need for a comprehensive approach.<sup>10</sup> Decarbonizing production requires action at every supply chain level, from raw materials to final disposal. This extensive task involves data collection and specific actions, like certification schemes or internal metrics. Industrial strategies guide resource allocation for mapping and securing public supply chains, enhancing visibility for private sector organizations.

### Reconceptualizing product design, business models and industrial processes towards circularity and resource efficiency

The prevailing short-term profit-focused economic model requires a fundamental shift in business and production practices for a sustainable future.

Central to this transformation is the move from a linear to a circular, low-carbon model. Circular production involves transitioning to renewable, recyclable or biodegradable inputs. Efforts include extending product value through upcycling, redesigning for repairs, and combating planned obsolescence. Embracing an access and performance model like product leasing, as in car-sharing programmes, reduces overall production.

### Energy efficiency

Boosting the energy efficiency of industrial processes is universally recognized as a key decarbonization strategy. Successful cases demonstrate that substantial efficiency gains are not only possible but often exceed expectations. Recognizing the use of public and private standards as a benchmark, such as Minimum Energy Performance Standards and Labels for designing energy efficient appliances or the ISO 50001 Energy Management Systems standards for industrial operation, governments can incentivize adherence to international energy efficiency standards, establishing a baseline for sustainable practices. Financial incentives and tax breaks can further encourage companies to adopt energy-efficient technologies and practices.

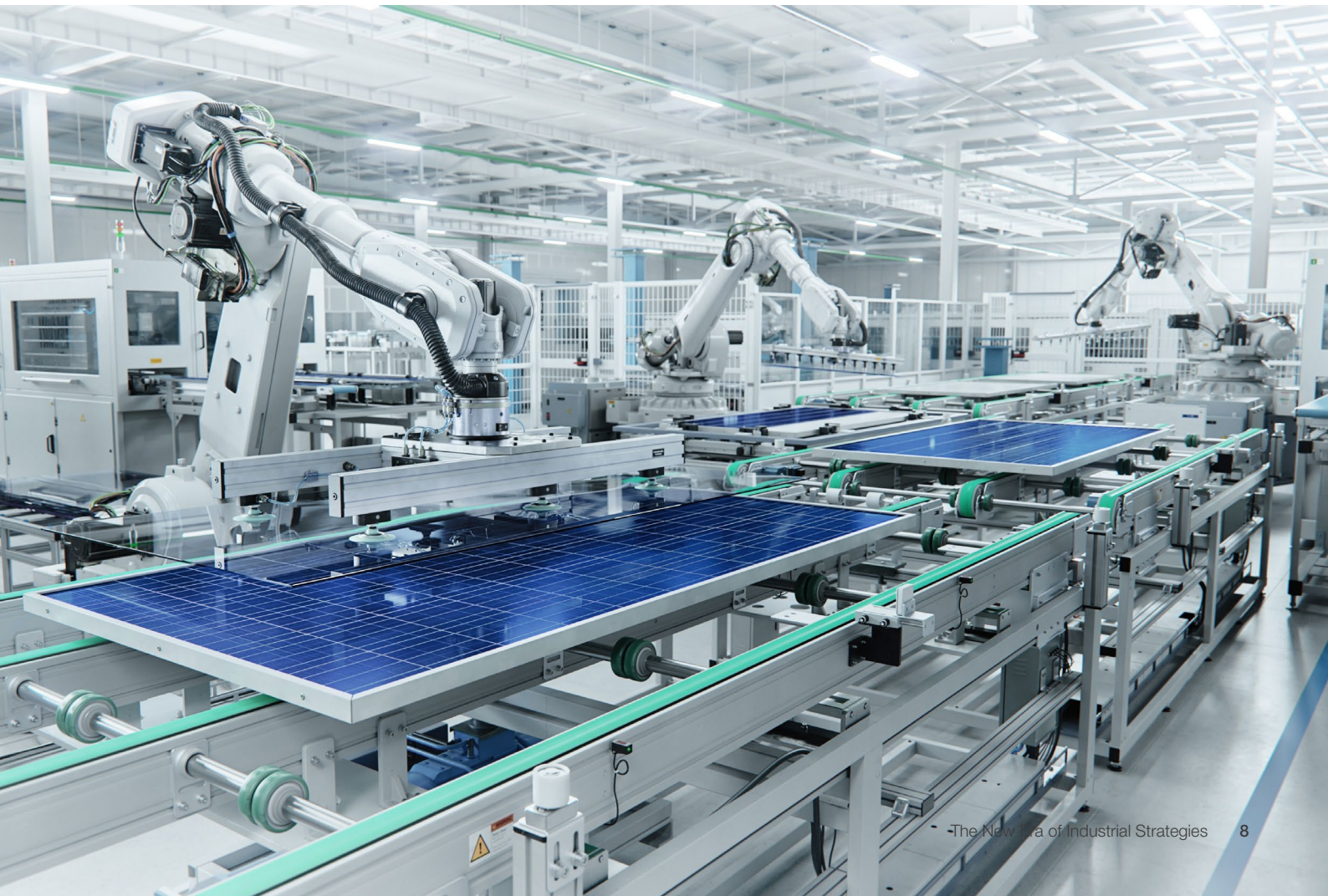




TABLE 2 | Public and private sector priorities for environmental sustainability

Public sector priorities	
<b>Data standardization</b>	<p><b>Promoting transparency:</b> Encouraging the adoption of standardized data reporting frameworks, such as those exemplified by the European Commission's Open Energy Forum.<sup>11</sup></p> <p>Global collaboration: Actively participating in international collaborations to standardize data reporting practices globally, thus fostering consistency and coherence in assessing environmental impacts.</p>
<b>Regulations</b>	<p><b>Streamlining processes:</b> Streamlining permitting processes and revising standards to simplify and expedite approval processes for sustainability initiatives, such as reforms to the US National Environmental Protection Act, that clear away unnecessary red tape excessively inhibiting the development of green infrastructure.<sup>12</sup></p> <p>Harmonizing regulations: Facilitating multilateral agreements to harmonize environmental regulations (e.g. Montreal Protocol on ozone layer depletion, Basel convention on waste exports etc.), making it easier for companies to operate sustainably across borders.<sup>13,14</sup></p>
<b>Informing consumers</b>	<p><b>Empowering consumers:</b> Empowering consumers to make informed choices by developing transparency regulations and implementing clear and standardized labelling systems that convey the environmental impact of products.</p> <p><b>Enhancing communication:</b> Developing communication campaigns to dispel incorrect environmental information.</p>
<b>Risk offsetting</b>	<p><b>Leading public-private partnerships:</b> Facilitating public-private collaboration to share the financial risks associated with transitioning to sustainable practices. The public sector can act as a stabilizing force, crowding in private investment in initiatives such as renewable energy infrastructure and the development of new green technologies. This can be done through direct government investment, green bonds and loans, and partnerships between public and private financial institutions. Additionally, governments can take the lead in setting minimum conditions in public procurement.</p> <p><b>Long-term investments:</b> Providing financial support and incentives for long-term investments in risky and/or cost-intensive sustainable technology innovation and upscaling, such as fuel switching.</p>
<b>Bolstering affordability in developing countries</b>	<p><b>Financial support:</b> Offering financial assistance to enable developing countries to adopt sustainable technologies when developing their industries. This may include concessional loans and grants to ensure that the transition to sustainability is economically viable for these nations.</p> <p><b>Technology transfer:</b> Facilitating the transfer of sustainable technologies from developed to developing countries, ensuring that cost-effective and environmentally friendly solutions are accessible to all. Penalize the dumping of obsolete technologies on developing countries (for instance, the EU F-gas regulation).<sup>15</sup></p>
Private sector priorities	
<b>Increasing resource efficiency and material substitution</b>	<p><b>Circular design principles:</b> Embracing circular design principles that prioritize the use of renewable materials, facilitate easier recycling, and promote the reuse of components.</p> <p><b>Resource efficiency:</b> Investing in and adopting resource-efficient technologies and systems that optimize energy and material usage in product development and manufacturing processes. This includes everything from additive manufacturing using lightweight design to increasing water efficiency in mineral extraction processes.</p>
<b>Supply chain partner selection</b>	<p><b>Sustainable partnerships:</b> Selecting partners throughout the supply chain that share a commitment to sustainability. This involves establishing criteria for suppliers, distributors and collaborators, ensuring that the entire value chain operates with similar environmental and social responsibility standards.</p>
<b>In-house innovation</b>	<p><b>In-house innovation:</b> Establishing internal innovation hubs or R&amp;D departments dedicated to climate-friendly technologies. By having a space dedicated to ideation, experimentation, collaboration and the exploration of new business models, employees are encouraged to contribute ideas and a broad culture of innovation is fostered.</p>
<b>Sharing solutions and data across the sector</b>	<p><b>Collaborative platforms:</b> Engaging in collaborative platforms and industry networks to share best practices, success stories and challenges related to sustainability. This collective sharing of information encourages a community-driven approach to addressing environmental issues.</p> <p><b>Data sharing:</b> Participating in data-sharing initiatives to collectively track and benchmark sustainability performance. Sharing aggregated data can contribute to industry-wide improvements, while remaining sensitive to data privacy concerns.</p>

## 2.2 Under debate

### Carbon capture and storage (CCS) technologies

There is significant potential in these technologies, especially as crucial components in the array of carbon offset mechanisms. It is important, however, to approach CCS as part of a broader, more holistic strategy towards environmental sustainability. This includes not only investing in and improving CCS technologies but also ensuring that these efforts complement, rather than replace, other essential measures in reducing emissions and promoting sustainable practices. Additionally, further research needs to be done to better understand the technical viability of CCS at the required scale.

### Fuel switching

Discussing fuel switching requires a thorough understanding of the specific resource, technologies

and development conditions in each country. The benefits and challenges of solutions such as electrification, green hydrogen and biofuel must be analysed in a holistic approach towards sustainability – including accounting for potential loss of competitiveness of certain established industries.

### Specific actions in carbon-intensive industries

Carbon-intensive industries such as concrete and steel are very high on the environmental sustainability agenda, given their outsized carbon impact. There is a consensus on the need for action in these sectors but less so on how this should be done. Special attention has been given to the fact that phasing out these industries without proper timeframes and adjustment mechanisms can lead to economic and social losses to the businesses and families currently reliant on them.

## 2.3 Case studies

### CASE STUDY 1

#### Commercializing green steel production

Initiative:

#### Swedish SOE Joint Venture HYBRIT

HYBRIT (Hydrogen Breakthrough Ironmaking Technology) is producing the world's first steel that is completely fossil-free, from mine to steel. Steelmaking is one of the powerhouses of the European economy, but the steel industry alone contributes 7% of global CO<sub>2</sub> emissions. Three Swedish SOEs – mining company LKAB, energy company Vattenfall,

and steel company SSAB – used an EU Innovation Fund grant to establish HYBRIT, a joint venture commercializing green steel production. Following 7 years of piloting and infrastructure building, HYBRIT sold its first green steel to Volvo in 2021. HYBRIT is scaling up to be able to serve the global steel market by 2026 and is on track to produce 1.3 million tonnes of green steel per year (a quarter of Sweden's total output). The project will prevent more than 14 million tonnes of CO<sub>2</sub> emissions in its first ten years of operation, and safeguard as many as 10,000 steel jobs.

Source: [HYBRIT](#)

## CASE STUDY 2

# Drastically reducing energy use in industrial processes and sharing lessons with others

Initiative:

### Toyota Motor Manufacturing UK (TMUK) Collaboration

Upon initiating operations in 1992, TMUK integrated environmental key performance indicators and targets. In 2015 the Global Environmental Challenge 2050 also emphasized carbon dioxide (CO<sub>2</sub>) reduction.

To encourage further comprehensive energy reduction, a dedicated energy team was established in 2009. Practical steps included comprehensive training, which applied the Toyota Production System (TPS) philosophy and provided measuring equipment. The programme considered both “Kaizen” – continuous improvement through small, member-driven, low-cost, quick improvements – and “Henkaten”, strategic step-change opportunities such as model changes.

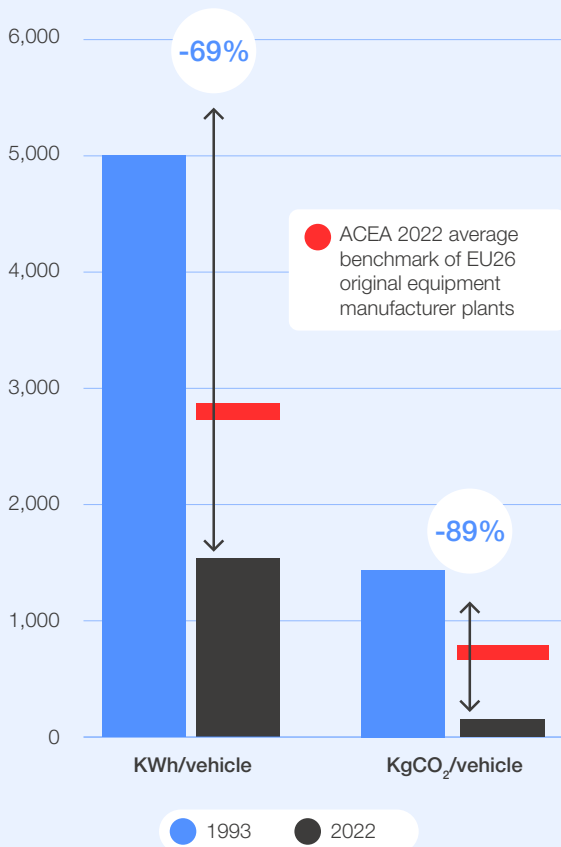
**Kaizen:** After making many zero-cost adjustments to control parameters in the paint booths, a new opportunity to recover process heat within the building was revealed. A combined

annual saving of 18 million kilowatt hours (MKWh) and 3,300 tonnes of equivalent CO<sub>2</sub> (TeCO<sub>2</sub>) was achieved and globally recognised with a Gold Kaizen Award. Air conditioning investigations in offices identified daily cycles of overheating and overcooling. By introducing “deadbands” that prevent wasted energy, a 40% reduction in energy and CO<sub>2</sub> was achieved with zero investment.

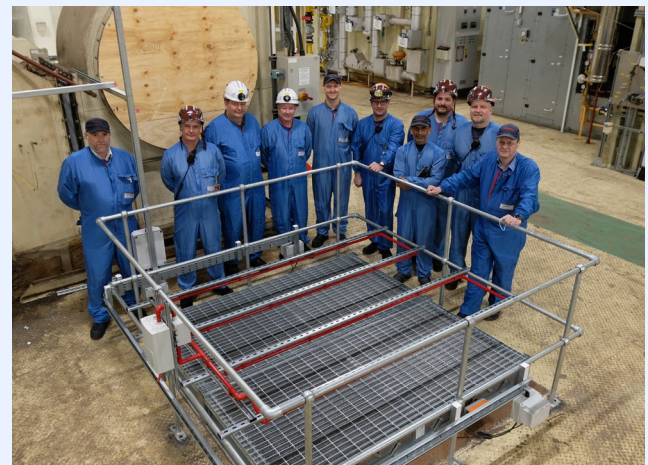
**Henkaten:** Toyota replaced end-of-life melting furnaces with high-efficiency equipment, which optimized environmental impact. This resulted in annual savings of 3.25 MKWh and 650 TeCO<sub>2</sub> and a more than 84% reduction in carbon monoxide, nitrogen oxides and volatile organic compounds (CO/NOx/VOC) emissions. Benefits extend to permitting 100% recycling of process scrap and the ability to directly smelt external scrap which eliminates a complete melting cycle in the supply chain.

Throughout TMUK’s efforts, the company has collaborated with university departments, such as the Institute for Manufacturing of the University of Cambridge, to refine and share the lessons learned and help replicate the achievements in other companies.

FIGURE 2 Toyota Motor Manufacturing (UK) performance history



Source: Consultation



↑ TMUK energy team by a new heat recover modification



↑ New high efficiency aluminium melting furnace

3

# Grand challenge 2: Enhancing supply chain transparency and resilience

Avoiding and mitigating shocks requires concerted action for enhanced visibility and changes in supply chain structures.

Boosting supply chain resilience and transparency is a shared priority across private and public sectors, academia and research organizations. Acknowledging the vulnerabilities exposed by events like COVID-19 and the armed conflict in Ukraine, some manufacturing supply chains are perceived as untenable. Opaque and undiversified supply chains are seen as increasingly precarious, underscoring the importance of transparency and diversity alongside cost considerations. Economic security concerns are driving a global production system reconfiguration.<sup>16</sup>

Total risk elimination is impossible; however, strategic policies can enhance organizations' understanding of multifaceted risks (geopolitics, health emergencies, climate change etc.) and guide decisions on acceptable risk levels. The challenge lies in strengthening supply chain resilience without significantly compromising economic competitiveness.

## 3.1 Key issues

### Improving the understanding and end-to-end visibility of supply chains

Collaborative efforts can be directed towards identifying current and future supply chain risks, scrutinizing existing limitations in handling, transport and storage processes, and devising prospective methods and routes to minimize and circumvent disruptions. By fostering a shared understanding and comprehensive visibility of supply chains from end to end, stakeholders can lay the foundation for a more resilient and transparent global supply network.

### Widespread adoption of resilience-enhancing technology

Emerging technologies can help enhance supply chain resilience.<sup>17</sup> Digital twins simulate “what if” scenarios, aiding organizations in preparedness. Artificial intelligence optimizes supply network performance in real time and predicts “hidden dependencies”. Importantly, these solutions don't necessitate full supply chain digitalization; values can be inputted into digital models, enabling simulations to anticipate disruptions effectively.

TABLE 3 | Public and private sector priorities for supply chain resilience

Public sector priorities	
<b>Strengthening international coordination and collaboration</b>	<p><b>Data and information sharing:</b> Robust information-sharing practices between governments are a linchpin in creating a resilient, interconnected global supply chain ecosystem that ensures the continuity of essential processes and the seamless flow of goods.</p> <p><b>Secure sourcing of critical raw materials:</b> International agreements can create a collaborative approach to critical raw materials (such as critical minerals and fuel) across borders and industries. Diversifying providers collectively enhances resilience against geopolitical and other types of disruptions.</p>
<b>Restructuring essential supply chains</b>	Incentivizing the restructuring of essential supply chains through diversification of suppliers. This means not just highlighting key supply vulnerabilities but helping to de-risk long-term investments in skills and technologies.
<b>Long-term visibility of demand</b>	<b>Focusing on longer time horizons:</b> Discordant planning timelines between the public and private sectors hinder effective collaboration and risk management. The public sector can boost supply chain resilience by giving companies early visibility of long-term public demand, thereby enabling planning and proactive risk management.
<b>Regulatory frameworks on business transparency</b>	<b>Establishing robust regulatory frameworks that encourage transparency and collaboration:</b> Governments can enact policies that incentivize businesses to share information on supply chain vulnerabilities and disruptions. This key information enables the development of effective risk mitigation strategies and promotes a culture of resilience.
<b>Supporting technology adoption</b>	Working with industry to encourage resilience-enhancing technology adoption through instruments such as technical advisory services, technology adoption incentives and digital skills development programmes.
<b>Stockpiling emergency resources</b>	Governments can take the lead in the stockpiling of critical emergency-related products such as protective equipment, vaccines and critical materials. Due to its higher sensitivity to costs, the private sector is less well-positioned to take up this task.
Private sector priorities	
<b>Information sharing</b>	<p><b>Data sharing:</b> By fostering transparent information exchange, firms can collectively respond to disruptions more effectively and build a network of support that extends beyond individual organizations.</p> <p><b>Providing key information to governments:</b> Private entities can contribute to end-to-end supply chain visibility by sharing information that enables governments to make informed decisions and implement strategies that enhance the overall resilience of supply chains, especially when critical goods are involved.</p>
<b>Adopting resilience-enhancing technology</b>	Certain technologies can play a key role in enhancing resilience, such as those enabling real-time monitoring and information exchange among actors in the chain, production flexibility, and remote working and workspace reconfiguration.
<b>New profit models</b>	By embracing profit models that reward collective resilience efforts (such as joint investment funds, risk-sharing agreements between companies etc.) over zero-sum competition, companies can encourage a culture of mutual support that strengthens the entire supply chain network.
<b>Long-term perspective</b>	Companies can undertake scenario planning, invest in technologies and undertake skills training on crisis response and risk assessment. They can also invest in sustainable practices that simultaneously increase environmental sustainability and supply chain resilience, such as a circular economy approach which diversifies inputs, decreases resource scarcity and increases supply chain transparency.
<b>Grounded risk assessment</b>	Risk is an intrinsic part of global production systems. Given the evolution of climate change threats, geopolitical disruptions and other modern iterations of risk, business teams need to work to understand how risk is changing and what levels of risk are acceptable in which spaces.

“ Governments can take the lead in the stockpiling of critical emergency-related products such as protective equipment, vaccines and critical materials.

## 3.2 Under debate

### Derisking by reshoring, nearshoring, and friendshoring

Reshoring, nearshoring, and friendshoring are emerging strategies in developed countries.<sup>18</sup> Reshoring, the relocation of production to domestic markets, boosts control and aligns with local economic interests. Nearshoring, emphasizing proximity and efficiency, reduces lead times and geopolitical risks. Friendshoring fosters alliances based on shared values, transcending geographical constraints.

These strategies are contentious for several reasons. First, despite some high-level cases such as the US' push for domestic production of semiconductors with the CHIPS and Science Act, there is still not enough evidence of a generalized change in localization decisions. This may be

because we are still at the beginning of these processes. However, it may also indicate that despite strong rhetoric around the topic, cost considerations still prevail over resilience ones, or there may be technical and infrastructural factors that make changing production locations difficult.

### Data sharing regulations and incentives

Enhancing data sharing for comprehensive supply chain visibility is acknowledged as positive, although confidentiality and firms' reluctance pose barriers.<sup>19</sup> Certain critical data, essential for competitive performance, remains off-limits regardless of incentives. Overcoming these barriers necessitates a shift towards recognizing the collective benefits of collaborative efforts for supply chain resilience.

## 4.3 Case studies

### CASE STUDY 3

#### Collaboratively sharing data across supply chains

Initiative:

#### Manufacturing-X

The Manufacturing-X initiative, developed by Plattform Industrie 4.0 stakeholders, represents a significant leap towards a digitally networked industry. This collaborative effort, involving key players from business, politics and academia, is centred on the creation of DataSpace Industrie 4.0. This enables companies to autonomously and jointly utilize data across the entire production and supply chain, thereby fostering digital innovations that enhance resilience, sustainability and competitiveness in the industry.

Source: [Manufacturing-X](#)

Building upon the foundations laid by the Industrie 4.0 community, Manufacturing-X uses key building blocks like the Asset Administration Shell standard (digital twin), the European initiative GAIA-X, and the flagship project Catena-X for digitalizing automotive supply chains. Manufacturing-X aspires to become a global standard for data-driven industry. It is more than a collection of individual projects; it represents a broad alliance of companies, associations, academia and politics, working together in a public-private innovation partnership. The initiative emphasizes the importance of medium-sized companies in this transformation, acknowledging their critical role in the industry's success. Plattform Industrie 4.0 serves as the central hub for this initiative, facilitating cross-domain dialogue and consolidating technical, legal and business administration issues in a pre-competitive manner.

## CASE STUDY 4

### Using cyber-physical systems to increase resilience

Initiative:

#### Celonis AI4Pro collaboration

Celonis SE, a global information technology company for process mining, joined by the Fraunhofer IIS, AST-X GmbH, Maxsyma GmbH, Rauschert GmbH, PASS Stanztechnik, and funded by the Bavarian Ministry of Economic Affairs, launched the AI4Pro collaboration targeting the integration of AI-based process management on cyber-physical systems (CPS).

Source: Consultation

Bringing hardware and software engineers together with shop floor operators, production planners, academics and government stakeholders, AI4Pro established artificial intelligence methods for process optimization in recording and processing existing process data from warehousing, logistics, assembly and other production areas with a focus on how best practices can be shared with SMEs. Mobile CPS increases resilience in supply chains through the ability to simultaneously collect data from different locations and by enhancing the capacity of systems to adapt to changing conditions. The CPS data can then be used to analyse the assembly line with process mining technology, derive AI-supported process improvements and share them via smart devices (e.g. smart watches) with shop floor workers.

## CASE STUDY 5

### Local-for-local sourcing

Initiative:

#### Siemens, Singapore EDB Greenfield

To build out its South-East Asia market local-to-local sourcing, Siemens, in collaboration with the Singapore Economic Development Board (EDB) and local ecosystem, has chosen Singapore for one of its new smart factories. The partnership focuses on Industry 4.0, creating a skilled workforce and establishing a green, sustainable factory aligned with the Singapore Green Plan 2030.

Siemens is working with the EDB, universities, such as Singapore Institute of Technology (SIT), and research institutions, in developing the “SkillsFuture Queen Bee”

Source: Consultation

programme and a Robotics Systems degree specialization. The collaboration involves monthly check-ins, quarterly reviews and daily interactions for educational and sustainability initiatives. Additionally, in line with the nation's green plan, Siemens is working with the EDB to ensure the factory is sustainable through engagement with local renewable energy providers, focusing primarily on solar.

Siemens Singapore aims to train 1,000 workers and co-develop 150 Industry 4.0 proof-of-concepts, part of its greater €2 billion commitment to manufacturing capacity expansion. The private sector benefits from local insights, tax schemes and talent access, while the public sector diversifies the economy and attracts a global manufacturing leader. Success metrics include trained employees, local hires and course creation.

4

# Grand challenge 3: Accelerating the scale-up and adoption of industrial technologies

Reaping the benefits of technological innovation requires collaborative scale-up pathways and broad deployment in industry.

A core focus of industrial strategies is accelerating the development and adoption of new technologies, addressing challenges across productivity, competitiveness, environmental sustainability, supply chain resilience and worker safety.

Realizing the full potential of manufacturing innovation poses challenges. Scaling up technologies from research and development contexts involves complex processes, requiring changes in production,

business organization and sometimes regulations. Additionally, widespread implementation of available technologies faces barriers such as lack of awareness, understanding and organizational capabilities, along with resistance to change.

In this context, the public, private and research sectors play pivotal roles in developing and scaling up innovative technologies, expediting their diffusion for broad stakeholder benefit.

## 4.1 Key issues

### Creating numerous robust collaborative links

More than any other action area, both public and private sector actors repeatedly highlight the need for collaboration, be it increased supply chain collaboration, boosting cooperation between industry and various research actors, or diversifying the voices in the discourse within and between companies. As a result, interdisciplinary cooperative approaches must be developed alongside robust incentive programmes.

### Integrating industry perspectives

Enhancing mechanisms to integrate industry voices into technology policy programmes is vital for effective policy-making. Establishing formal dialogue

mechanisms ensures a systematic integration of industry input into decision-making processes across the public sector, research organizations and industry actors. This involves actively seeking feedback, conducting regular consultations and fostering ongoing dialogue.

### Interlinking workforce skills development and technology

A symbiotic relationship exists between workforce skills development and the integration of technology.<sup>20</sup> The foundation of successful technological scaling lies in aligning the capabilities of the workforce with the demands of evolving technologies, as well as developing technologies that fit with current skill sets when possible. Interlinking these elements ensures a seamless transition towards a technologically adept and skilled workforce.



TABLE 4 | Public and private sector priorities for the adoption and scale of industrial technologies

**Public sector priorities**

<b>Consultative bodies</b>	Consultative bodies can act as inclusive platforms, bringing together diverse voices from across the manufacturing ecosystem. These forums can become conduits for collaboration, fostering an environment where industry partners contribute valuable domain knowledge to shape technologies into domain-specific products and solutions. Examples include the UK Industrial Strategy Council and Brazil's 4.0 Chambers. <sup>21,22</sup>
<b>Data gathering and benchmarking</b>	Data gathering and benchmarking initiatives about the technological state of industries not only accelerates the adoption of novel technologies but also helps governments create more informed policies. A good example is the Smart Industry Readiness Index (SIRI) benchmarking model. <sup>23</sup>
<b>Experimental spaces</b>	Experimental spaces and demonstration facilities that serve as testing grounds for technologies can play a crucial role in pushing technologies further into the market by providing a real-world environment for testing, refining and showcasing innovations.
<b>International collaboration</b>	Exchanging information and sharing technology across borders is particularly critical for more rapid progress in developing countries via technology transfer, licensing agreements and capacity-building efforts. Developed economies can also collaborate by creating cross-border innovation ecosystems that enable countries to learn from each other's experiences, research outcomes and best practices. Examples include the Horizon Europe programme and EUREKA networks. <sup>24,25</sup>
<b>Mission-setting</b>	Although the public sector has a direct, hands-on role to play in innovation and deployment, it is critical that it takes the lead in considering what the most pressing challenges are, how the issues should be addressed, how to measure success and other big-picture questions. This would help going beyond concrete technology development to more broadly define and explore the key problems requiring technological solutions.
<b>Funding the risky parts of innovation</b>	Innovation is an inevitably risky endeavour. However, in some areas, the private sector may be too risk-averse to commit relevant amounts of resources. It is in these risky areas that the state has a crucial role to play. These risky areas can be in basic research (too far from commercialization to attract private funding) or the so-called "valleys of death" of innovation, which are the middle stages of Technology Readiness Levels where traditional government investments are no longer present and the private sector (such as venture capital) still does not demonstrate interest.

“ By sharing success stories, lessons learned and tangible outcomes of technology adoption, companies inspire confidence and enthusiasm within the industry.

**Private sector priorities**

<b>Liaising with academia</b>	Cultivating relationships with academic institutions helps communicate industry needs and co-develop relevant technological responses and skills. This learning model keeps the curriculum of educational institutions aligned with the evolving needs of the industry and extends beyond mere information transfer to establishing bidirectional learning. Finally, it helps address critical disconnects between research and commercialization prospects.
<b>Integrated approach to skills and technology development</b>	Adopting an integrated approach to skills and technology development that extends beyond immediate needs. This means ensuring that trainers, universities and other educational institutions are well-informed about the skills and technical expertise demanded not just today but in the future, keeping skills aligned with the evolving technological landscape.
<b>Defining technology priorities</b>	Collaborating with technology providers, research institutions and start-ups contributes to harnessing diverse expertise, driving innovation and setting technology priorities. These partnerships can take the form of joint research and development projects, co-investment in emerging technologies or participation in innovation ecosystems.
<b>Technology adoption advocacy</b>	By sharing success stories, lessons learned and tangible outcomes of technology adoption, companies inspire confidence and enthusiasm within the industry. This advocacy extends beyond internal operations to influence broader industry norms, encouraging a culture of continuous improvement and innovation.
<b>Developing learning networks</b>	Through collaborative platforms, industry players can share experiences, best practices and innovative approaches to successfully upgrade existing infrastructure and integrate new technologies, including in the retrofitting of legacy systems with new digital solutions. The German network Plattform Industrie 4.0 is an example of this. <sup>26</sup>

## 4.2 Under debate

### Technical assistance

Technical assistance programmes are an important policy tool, especially for SMEs who might not have the resources to access relevant information and skills. However, technical assistance is not feasible for all manufacturing sectors and all types of firms. More specifically, for large corporations, approaches that focus on de-risking technological endeavours and provide facilities for testing and experimentation appear to be more relevant.

### Unfocused subsidies

Subsidies, in various forms, are crucial industrial policy tools; however, their unfocused application poses risks. Indiscriminate subsidies may result in wasted resources, benefiting non-strategic industries or oversaturated markets. Additionally, long-term subsidy plans need consideration, questioning whether governments intend indefinite support, as seen in the EU's Common Agricultural Policy, or aim for eventual independent competitiveness, as observed in Japanese automotive subsidies.<sup>27</sup>

## 4.3 Case studies

### CASE STUDY 6

#### Public-private partnership to keep manufacturers competitive

Initiative:

#### US Manufacturing Extension Partnership National Network

The Manufacturing Extension Partnership (MEP) is a public-private partnership established in 1989 under the National Institute of Standards and Technology (NIST) to maintain and improve the competitiveness of US manufacturers. It operates through regional centres in all 50 states and Puerto Rico, with a total staff of about 1,400, including 45 at MEP's NIST headquarters and an average of about 27 staff at each regional centre.

Source: NIST

MEP centres and partners develop services and initiatives to enable manufacturers to identify relevant opportunities that will enhance growth and competitiveness in global markets. The range of services offered by the centres varies from state to state but typically includes business growth (e.g. export services, market research, workforce development, etc.), business improvement (e.g. assessment of technology adoption strategies in Industry 4.0 technologies, coaching and training on cost reduction strategies through energy savings etc.), and risk mitigation (e.g. business continuity planning, ISO training with on-site assessments and implementation, etc.).



## CASE STUDY 7

### Digitizing MSMEs

Initiative:

#### SENAI-P's Digital Transformation Journey (Jornada de Transformação Digital)

Leading the digital transformation journey throughout the state of São Paulo, the Federation of Industries of the State of São Paulo (FIESP), Center of Industries of the State of São Paulo (CIESP) and the São Paulo branches of the National Service of Industrial Learning (SENAI) and of the National SME Support Service (SEBRAE-SP) have unrolled

a joint programme designed to service 40,000 micro, small and medium-sized industries. Fully subsidized participation for companies under an annual revenue of \$8 million in the programme by SENAI-SP and SEBRAE-SP allows SMEs to participate in the eight-stage consultancy, which is tailored to the needs and availability of each industrial participant. Services range from the diagnostic of the firms' digital needs to implementing automation, digitalization, integration and smart-industry solutions. The collaboration boasts an aim for participatory organizations to achieve gains of at least 20% in industry productivity.

Source: [Jornada de Transformação Digital](#)

## CASE STUDY 8

### State investments in modernizing factories

Initiative:

#### Saudi Arabia Centre for the Fourth Industrial Revolution's Future Factories Program

Saudi Arabia's Future Factories Program (FFP), led by the Ministry of Industry and Mineral Resources, is reshaping the nation's industrial landscape. Aimed at transforming 4,000 factories through digital technology adoption, FFP

collaborates across sectors for holistic impact. Its eight-pronged strategy, from strategic alignment to financial sustainability, has yielded impressive results: 21% reduced operational costs, 13% enhanced supply chain responsiveness and a 60% improvement in product quality. FFP's incentives, audited evaluations and multi-pronged approach, including digital capability centres and international certifications, showcase how effective public-private collaboration can drive innovation, digital transformation and economic growth.

Source: Saudi Arabia Centre for the Fourth Industrial Revolution

# Grand challenge 4: Securing the future of the manufacturing workforce

Securing a skilled workforce fit for the future is one of the most pressing challenges for manufacturing and governments alike.

The green and digital transitions will transform the manufacturing workforce, creating new opportunities amid job changes.<sup>28</sup> The challenge lies in managing this transformation to avoid excessive hardships and develop sought-after skill sets. Both public and private sectors have tools to secure the manufacturing workforce's future, emphasizing necessary skills for this dynamic era.

Complicating matters, ageing populations in developed economies means the labour force is shrinking. Meanwhile, developing economies often lack the educational infrastructure to supply the skilled labour required for modernizing factories, posing challenges for firms in attracting qualified talent.

## 5.1 Key issues

### Ensuring a just transition

Placing individuals at the heart of technology transitions and sectoral shifts is key to ensuring a just transition as the economy transforms. This means organizations need to emphasize the importance of addressing people's needs, not exclusively jobs and skills. This entails implementing programmes and initiatives that actively retrain and upskill workers affected by technological shifts and robust support mechanisms for individuals who lose their jobs due to automation or other advancements, ensuring pathways for their transition into new roles or industries.

### Developing a workforce fit for the future

Global labour and skill gaps are significant, impacting both developing countries and advanced economies. Urgent attention is needed to address current needs; however, focusing solely on present demands risks future skills shortages. Anticipating future skill demands, especially in growing markets and technologies, is crucial. Collaboration between government education departments and institutions

can align curricula with emerging needs, and companies can communicate anticipated skill requirements. Initiatives to build a future-ready workforce must begin now, emphasizing the importance of foresight and strategic planning for sustained success.

### Making training more affordable, accessible and realistic

To cultivate a dynamic workforce, promoting self-learning through activity-based and online tools is crucial. Encouraging employees to take ownership of their development reduces costs for educational institutions and extends reach to hard-to-access communities. Investing in innovative learning solutions, such as language, coding and soft skills, empowers individual autonomy.

A critical aspect is addressing the challenge and expense trainers face in providing specialized equipment for manufacturing training. Establishing closer connections between trainers and employers ensures access to the necessary equipment, either in public facilities or on the shop floor. This not only cuts training costs but also enhances programme effectiveness by seamlessly connecting training environments with actual work settings.

“ Encouraging employees to take ownership of their development reduces costs for educational institutions and extends reach to hard-to-access communities.

TABLE 5 | Public and private sector priorities for the manufacturing workforce

Public sector priorities	
<b>Early-stage skills development</b>	<p><b>Education:</b> Some important skills for modern industries, such as soft skills like communication and critical thinking, are learned in schools and universities. These skills help employees succeed and progress to higher career levels. This means that educational organizations should work closely with industry to revamp the manufacturing curriculum at various levels (industrial training centres, engineering schools, graduate degrees etc.). Ultimately, building the needed talent pool begins with education.</p> <p><b>Launching careers early:</b> Programmes that target young people transitioning from school to work. Early career training programmes can equip them with the necessary skills for a career in manufacturing. This involves creating pathways for seamless transitions from education to employment, ensuring a continuous flow of skilled individuals into the workforce.</p>
<b>Integrated approach to technology and skills</b>	<p>Innovators should keep in mind the skills needed to utilize their technology, the length of time for that skill set to be developed, and if the technology can be tweaked to better fit the current supply of skills when developing new technologies. On the flip side, new skills have to be developed taking in consideration the technological trajectories that are likely to create demand for them. SkillsFuture Singapore and Manufacturing USA's Digital Manufacturing &amp; Design Jobs Taxonomy are robust examples of how technological foresight exercises can inform skills development programming.<sup>29,30</sup></p>
<b>Balancing stability and reactivity</b>	<p>Striking a delicate balance between stability and adaptability of training curricula to ensure skill needs are met without overcompensating. Constant reassessment ensures that training programmes remain aligned with evolving industry transitions, promoting a responsive and effective workforce.</p>
<b>Safety nets</b>	<p>When reskilling and upskilling cannot fully help quickly absorb displaced labour, safety nets are key to give vulnerable workers the support they need to transition to new occupations. Robust safety nets can make labour markets more dynamic and responsive when paired with flexible and active labour market policies that allow for high mobility between jobs as the economy rapidly shifts and transforms. Denmark's <b>flexicurity</b> model is one successful iteration.<sup>31</sup></p>
<b>Establishing training requirements for large firms</b>	<p>Due to the impossibility of fully appropriating a firm's contribution to worker skills (workers can move to different companies), large private sector firms may under-invest in worker training. The government can step in by creating requirements that companies of a certain size invest in worker training.</p>
Private sector priorities	
<b>Proactively partnering on training curricula</b>	<p>Actively engaging with trainers to develop a more proactive approach to skill development. Establishing collaborative relationships with trainers allows for a real-time response to current skill demands and the information needed to anticipate future needs.</p>
<b>Lifelong learning</b>	<p>Establishing learning and training centres that support continuous learning opportunities internally can preserve pre-existing investments and institutional knowledge while allowing for continuous growth.</p>
<b>On-the-job training and re-training</b>	<p>Arguably one of the best places for workers to learn new skills is on the job through "learning by doing", with the help of supervisors and colleagues. The private sector can therefore take the lead in making sure that workers are properly trained, or re-trained for a different function, in the case that transformations such as the introduction of a new technology make certain functions redundant.</p>

## 5.2 Under debate

### Challenging outdated public perceptions of manufacturing

Reforming outdated perceptions of manufacturing jobs is crucial for attracting talent, yet it is not often considered a priority by stakeholders in the private or public sectors.<sup>32</sup> This may be due to other issues taking precedence or perceiving perception challenges as primarily social. To make manufacturing jobs more attractive and address talent gaps, it is essential to highlight the pivotal role of manufacturing in the future, the use of advanced technologies, its significant economic impact and the exciting role of innovation.

### Attracting foreign workers

Attracting qualified foreign workers is a strategy used by many countries and firms. What makes this contentious is that it is a “beggar thy neighbour” policy, especially with regard to developing countries that have fewer resources to retain skilled talent. The attraction of skilled workers to one country can lead to a “brain drain” in another. The complex interplay of factors that causes workers to move across country borders needs to be understood, and attention should be given to the potentially pervasive effects of worker attraction policies. Policy coordination at the regional and international level is key to avoid these pervasive effects.

## 5.3 Case studies

### CASE STUDY 9

#### Curriculum reform in partnership with industry

Initiative:

#### Guidance, Tamil Nadu curriculum reform

Guidance, the investment promotion agency of the Indian state of Tamil Nadu, and Tamil Nadu’s Directorate of Technical Education are working together to update curriculum at polytechnic colleges to ensure the development of a workforce that can bolster Tamil Nadu’s transition to high-technology and knowledge-based industries. Up-to-

Source: Consultation

date information on industry demands is key in shaping curriculum, leading to consultations with subject matter experts from over 45 industries alongside faculty from 54 polytechnic colleges.

Student employability is a top priority, leading to the creation of diploma programmes aligned with the National Skills Qualification Framework (NSQF) and the implementation of outcome-based education in 450 polytechnic colleges across Tamil Nadu reaching 180,000 students.

### CASE STUDY 10

#### Training a manufacturing workforce aligned with industry needs

Initiative:

#### Empresa Centro

The Empresa Centro programme, launched in El Salvador in 2002, represents a pioneering public-private collaboration between the Salvadoran government’s Instituto Salvadoreño de Formación Profesional (INSAFORP) and the Asociación Salvadoreña de Industriales (ASI). The programme develops training curriculum responsive to industry needs in order to equip young people with the in-demand skills they need to integrate into the local industrial workforce.

Source: Consultation

Participants, aged eighteen to thirty-five, gain a theoretical background from ASI, then experience hands-on training with participating manufacturing companies, all under the expert supervision of INSAFORP. The training is 100% financed by INSAFORP, ensuring no cost to the participants.

To date, Empresa Centro has trained over 1,000 students in six specialized career paths, such as industrial electrician and production supervisor. These graduates are now equipped with relevant skills and experience, significantly contributing to the Salvadoran industrial sector’s growth and efficiency.

## Bolstering AI skills for regional business

Initiative:

### UNIST AI Innovation Park

The Ulsan National Institute of Science and Technology (UNIST), in collaboration with the Republic of Korea's Ministry of Science and Information and Communication Technology (ICT) and Ulsan Metropolitan City, convened regional players (including 158 industrial organizations) in January 2021 to form an AI Innovation Park dedicated to bolstering workforce AI skills. The AI Innovation Park delivers a semi-annual, five-month-long AI programme to increase the numbers of workers capable of applying AI in their businesses, expand AI use in regional companies, develop a repository of AI use cases and highlight participant companies' financial benefits.

Twenty-eight Graduate School of Artificial Intelligence professors and their teaching assistants split time between theory lectures and project-based learning to work on developing AI solutions addressing participating manufacturers' pain points. This focus on real-world challenges utilizing field data allows the collaboration to develop particularly impactful step-by-step AI models.

To date, the initiative's collaborative scope has trained 221 industrial employees, developed 61 AI use cases and launched five R&D projects that have resulted in publications, patents and new products. Companies have seen an annual revenue increase of about \$1 million per company and a profit increase of about \$200,000 per company.

Source: Consultation



6

# Grand challenge 5: Linking business value with social and environmental values

Historically dubbed the “key to prosperity”, manufacturing has a crucial role to play as a driver of equitable societal development.

Citizens and governments increasingly demand socially and environmentally sustainable business practices.<sup>33</sup> To address this challenge, the private sector must play a significant role alongside governments, academia and civil society. Although impactful reforms are being undertaken by some companies to promote sustainability and develop a future-ready workforce, broader operational

reforms are needed. Systematically linking social and business value may involve increased transparency, exploring new corporate ownership or governance models, or other transformative measures. Organizations must make substantial strides towards sustainable and ethical practices to positively impact both employees and the environment.

## 6.1 Key issues

### Increased transparency of business practices

Increased transparency of business practices is a cornerstone of effectively linking social and business value. It fosters trust, accountability and ethical conduct, contributing to positive stakeholder relationships and more effective risk management. Governments and companies can work together to ensure the free flow of information, so companies are held accountable and supply chain partners and consumers are empowered to make more informed decisions. A regulatory push from the government is clearly impactful, but it is also evident that the private sector must be proactive in driving this effort. The International Labour Organization’s (ILO) Better Work is an example of a model for increasing transparency on labour issues.<sup>34</sup> Unilever’s Sustainable Living Plan, which discloses the environmental and social impacts of products and operations, is another example.<sup>35</sup>

skills development in all industrial strategies. The public sector can play a pivotal role in shaping the landscape that governs labour practices, workplace safety and skills development through robust regulatory frameworks and educational initiatives. In tandem, the private sector must align its practices with a commitment to employee welfare. From comprehensive training programmes to transparent reporting and collaboration with labour unions, the private sector must contribute to the holistic well-being and growth of their workforce.

### Decreasing gender disparities and promoting diversity in the manufacturing sector

Increasing diversity is consistently emphasized as a top priority in national policies and company missions.<sup>37</sup> Creating a more inclusive manufacturing environment is crucial for empowering a diverse workforce, enhancing performance and fostering innovation. The public sector can proactively engage women and minority groups in STEM education, invest in the care economy and enforce anti-discrimination laws. Complementary measures by companies include implementing equal pay policies and non-discriminatory hiring procedures, supporting access to management positions, addressing care demands, implementing anti-harassment measures and accommodating diverse needs.

### Centring workers’ safety, rights and development

There is broad consensus that workers need to be at the centre of all discussions on increasing social and business value.<sup>36</sup> This means there is a responsibility to promote workers’ safety, rights and

“ The public sector can proactively engage women and minority groups in STEM education, invest in the care economy and enforce anti-discrimination laws.



TABLE 6 | Public and private sector priorities for linking business value with social and environmental values

Public sector priorities	
<b>Bolstering transparency</b>	<p>Informing consumers: Transparency can be bolstered by implementing standards and regulations that encourage companies to provide consumers with transparent information about the carbon footprint, labour practices and other sustainability aspects of the company and its products (e.g. ILO Better Work, and Unilever’s Sustainable Living Plan).<sup>38,39</sup></p> <p>Business ecosystem: Certifying products and solutions ensures adherence to sustainability standards within the industry and allows companies to make more informed decisions on collaborations.</p>
<b>Regulations</b>	<p>Labour rights: Safeguarding and enforcing labour rights are still paramount for the new wave of industrial strategies.</p> <p>Regulating new forms of corporate ownership and governance: Governments can have a transformative role in creating new legal forms of corporate ownership and governance, making it possible for policies to be directed to specific types of firms and organizations.</p>
<b>Protecting workers</b>	<p>Safety infrastructure: Investing in national occupational safety and health infrastructure, encompassing regulations, compliance measures, data management, qualifications and specialized services to enhance workplace safety.</p> <p>Technological overreach: Safeguarding workers from the potential overreach of efficiency-enhancing technologies, particularly surveillance technologies. Governments can impose limitations on the use of worker productivity data, preventing abuse and ensuring the provision of legally required breaks.</p>
Private sector priorities	
<b>Employee dialogue mechanisms</b>	<p>Within companies: Establishing effective mechanisms for dialogue within companies to engage employees in discussions about goals and challenges and giving workers an active role in shaping the company’s future, akin to the Scandinavian corporatist model.</p> <p>Across production ecosystems: Working with smaller firms in the supply chain to ensure the dialogue on promoting social value has diverse, inclusive input.</p>
<b>Using technology for safety improvements</b>	<p>Technology can be leveraged for safety improvements. Predictive maintenance, drones and data analytics can reduce safety risks for workers. Treating safety as a key management issue, improving compliance with legislation and understanding the interlinks between safety and company performance are crucial.</p>
<b>Promoting corporate social responsibility across supply chains</b>	<p>Social responsibility should be extended beyond internal operations to include choices about partnerships. Companies must ensure they are aware of how production occurs at all stages of their supply chains. Conducting regular human rights due diligence, gaining input from smaller players in the supply chain and gathering thorough information on environmental impacts is key.</p>

## 6.2 Under debate

### Exploring new forms of corporate governance and ownership

New forms of corporate governance and ownership can systematically elevate social values, creating parity with traditional business values. However, such fundamental transformations are naturally contentious because of the challenges of restructuring entrenched interests. Not all new corporate models will work for all companies, but exploring alternatives to the status quo is an important process of self-assessment. Alternative models of governance to consider include social enterprises;<sup>40</sup> governance focused on stakeholders (employees, customers, communities), not only

shareholders; and ESG metric governance. Alternative types of ownership, such as cooperatives and Employee Stock Ownership Plans (ESOPs),<sup>41</sup> could also be considered.

### Putting burden on consumers

Many of the positive steps companies can take involve offering additional information to consumers so they can make more informed decisions. As valuable as this is, responsibility cannot be shifted excessively to consumers. Producers’ responsibility must remain at the heart of all industrial strategies.

### CASE STUDY 12

#### Promoting £1 billion in social procurement

Initiative:

##### Social Enterprise UK's Buy Social Corporate Challenge

Launched in April 2016, the Buy Social Corporate Challenge is a groundbreaking commitment to social procurement led by Social Enterprise UK. The goal of the influential group of businesses is to collectively spend £1 billion with social enterprises by 2026.

This helps large businesses integrate sustainability and diversity into their core operations by engaging with innovative social enterprise suppliers. Furthermore, it aids high-performing social enterprises in expanding their impact and revenues through corporate purchasing power. The programme provides comprehensive support, including supply chain diagnostics, training sessions, roundtable discussions and buyer-supplier matching.

In its eighth year, the Buy Social Corporate Challenge has surpassed £350 million in total spending and helped create 3,400 jobs, particularly benefiting individuals facing labour market barriers.

Source: "[Buy Social Corporate Challenge](#)", Social Enterprise UK

### CASE STUDY 13

#### Improving working conditions in the garment industry

Initiative:

##### ILO and IFC's Better Work

Better Work, a collaboration between the United Nations' ILO and the International Finance Corporation (IFC), has had impacts across 13 countries in improving working conditions in the garment industry while maintaining competitiveness.

The programme's core mission is to improve compliance with ILO labour standards and national laws by collaborating with varied stakeholders to improve compensation, contracts, occupational safety and health, and working hours.

Better Work's approach includes direct factory engagement through assessments, advisory services and training, coupled with efforts to influence national and international policies. Workers and unions are empowered to advocate for their rights and engage in meaningful dialogue with employers.

The impacts of Better Work are significant. Factories participating in the programme report increased revenue and profitability, due to improved working conditions resulting in a motivated and loyal workforce. The programme has been instrumental in closing 85% of the gender pay gap in factories engaged for at least four years and reduced staff turnover at participating factories by 7%.

Source: Better Work Strategy 2022-2027, Sustaining Impact

# Conclusion and next steps

The world is going through a new era of industrial policies. As the pressure of global challenges intensifies, industrial strategies provide a conduit for governments and companies to seize emerging opportunities and face global challenges head on. This collaboration between the World Economic Forum, Cambridge Industrial Innovation Policy (CIIP) at the University of Cambridge and the United Nations Industrial Development Organization (UNIDO) sheds light on the opportunities for governments, the private sector, research organizations and civil society to co-create the next generation of industrial strategies.

Additional research can help further shape understanding and action. This report has focused on the approaches being used to address each challenge area identified; however, future work will dig deeper into discussed approaches and address challenging questions of what does and does not work. Furthermore, moving from describing **approaches** to exploring specific effective **processes** for implementation could be invaluable for informing strategy development.

Finally, future work should further distinguish the demands of different countries, industries and technologies – especially the different challenges faced by developed and developing countries.

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# Endnotes

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