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The future of industrialization: Harnessing megatrends for sustainable growth

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Abstract

The global industrial landscape is undergoing transformative change, driven by megatrends such as the energy transition, artificial intelligence and digitalization, global value chain reconfiguration, and demographic shifts. These trends present unique opportunities for developing countries to foster sustainable and inclusive industrial growth. However, foundational challenges, including deficits in infrastructure, skills, and technological capabilities, must be addressed. This policy brief highlights the potential of targeted industrial policies to harness these megatrends while overcoming barriers. Key strategies include building future-ready infrastructure, equipping the workforce with advanced skills, adopting green industrial practices, fostering regional coordination, and strengthening government capabilities. By embracing adaptive, forward-looking policies, developing countries can navigate a fragmented and competitive global industrial environment, and unlock opportunities for economic diversification, job creation, and long-term sustainability.[1]

Key Messages

1.
Global megatrends such as the energy transition, the rise of artificial intelligence, the reconfiguration of global value chains and demographic changes are reshaping global industries, posing challenges and creating opportunities for developing countries.

2.
To thrive, developing countries must invest in critical infrastructure, upskill their workforce, foster technological innovation, and adopt sustainable industrial practices.

3.
A forward-looking, regionally coordinated approach to industrial policy is crucial for developing countries to unlock opportunities and reposition themselves in the global industrial order.

Introduction: The current industrial landscape

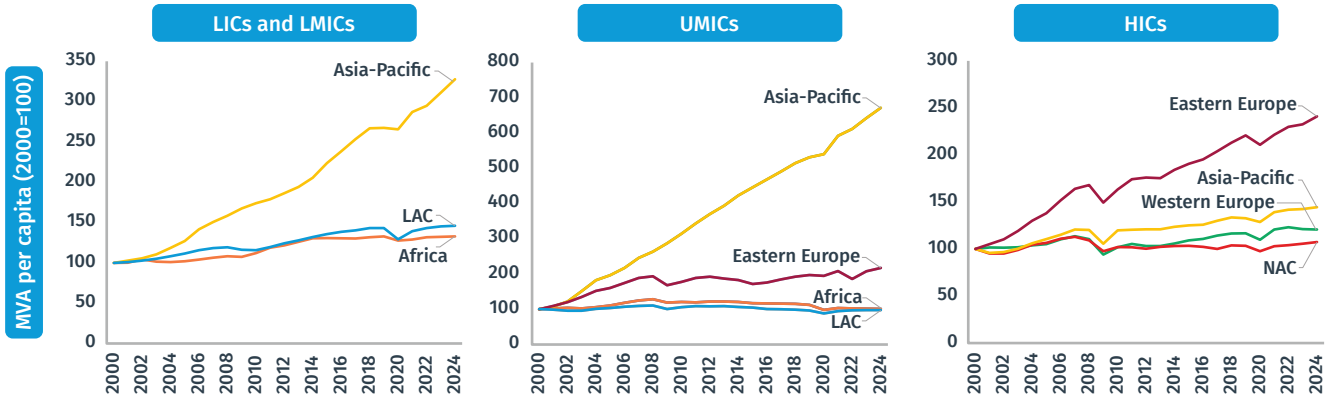
Industrialization remains a critical driver for economic development, offering pathways to address global challenges like poverty, hunger, and climate change. Traditionally, it has long been recognized as an engine for growth, a creator of quality jobs, and a source of foreign exchange earnings due to its ability to leverage economies of scale, productive linkages, and technological spillovers.[2] But beyond this role, the industrial sector is now at the forefront of innovation, serving as a hub for technological advancements and a catalyst for developing green and inclusive solutions to combat inequalities and environmental challenges.

With millions of people facing extreme poverty and malnutrition,[3] particularly in low-income (LICs) and lower-middle-income countries (LMICs), fostering a dynamic manufacturing sector becomes indispensable for economic diversification and social progress. But potential does not mean realization. The industrial sector's capacity to drive transformation, competitiveness and sustained progress hinges on deliberate industrial policy actions that guide structural changes in the economy towards targeted activities with the highest potential. For this, developing countries must design and implement modern industrial policies that are forward-looking and leverage the current industrial landscape.

The current industrial landscape is undergoing rapid and profound changes, which in turn compounds the abovementioned challenges. Structural shifts are causing industrial production to be more concentrated in specific regions and countries. These changes are driven by differences in competitive advantages, policy frameworks, and access to global markets. While regions like Asia-Pacific are experiencing significant growth in manufacturing value added led by China, other regions like Africa and Latin America and the Caribbean continue to lag behind, exacerbating current industrialization gaps (see Figure 1).

Acting in parallel to economic realignments, industries worldwide are being directly impacted by transformative global forces. Four critical megatrends have emerged:[4] the green energy transition, the rise of artificial intelligence (AI) and digitalization, global value chains (GVCs) reconfiguration, and demographic shifts.[5] These transformations present opportunities and challenges for developing countries to unlock their full industrial potential. The ability to harness these megatrends will be pivotal in determining whether industrialization can serve as a driver of sustainable and inclusive growth.

Figure 1. Industrial dynamics in the developing world



Note: Regional averages are calculated using population weights. The values for 2023 and 2024 are estimated and forecasted by UNIDO's Statistics department, and are available in the UNIDO Statistics Portal and International Yearbook of Industrial Statistics 2023. LICs = Low-income countries; LMICs = Lower-middle-income countries; UMICs = Upper-middle-income countries; HICs = High-income countries; NAC = Northern America; LAC = Latin America and the Caribbean.

Source: UNIDO (2024). "The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions". Multilateral Industrial Policy Forum (MIPF) Conference Paper.

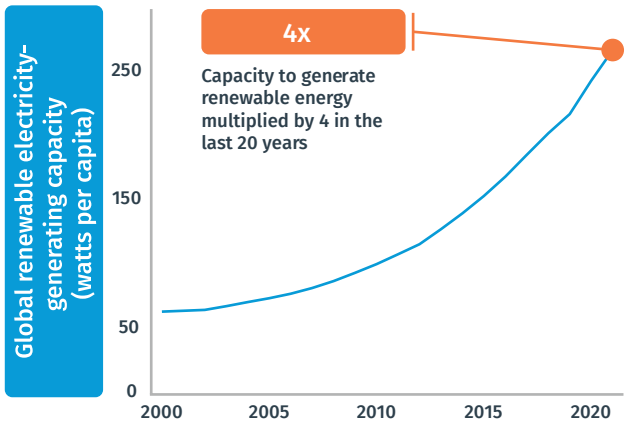
Megatrends reshaping industry: challenges and opportunities

Energy and the green transition

Transitioning from fossil fuels to renewable energy means altering industrial production systems. Industrialization plays a dual role in driving and mitigating ecological breakdown. While the manufacturing sector significantly contributes to greenhouse gas emissions, it is also key to cleaner energy solutions. In fact, the rise of renewable energy technologies such as solar, wind, and green hydrogen offers new avenues for industrial growth. This transition is gaining momentum, with renewable energy capacity expanding at a record pace, for the 22nd consecutive year in 2023, and was undeterred by the pandemic (see Figure 2).

The green transition presents a unique opportunity for developing countries, due to the abundant endowment of natural resources. The demand for critical minerals essential to the energy transition, such as copper, lithium, nickel, cobalt, and rare earth elements, is projected to grow by three and a half times by 2030.[6] These minerals are crucial components for renewable energy technologies and electric vehicles, providing developing countries with an opportunity to foster job creation, diversify their economies, and boost government revenues. Moreover, the rapid growth of clean energy sectors, coupled with advancements in energy efficiency, is creating new competitive advantages for countries that lead in these technologies.

Figure 2. The rise of renewables



Source: UNIDO (2024). "The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions". Multilateral Industrial Policy Forum (MIPF) Conference Paper.

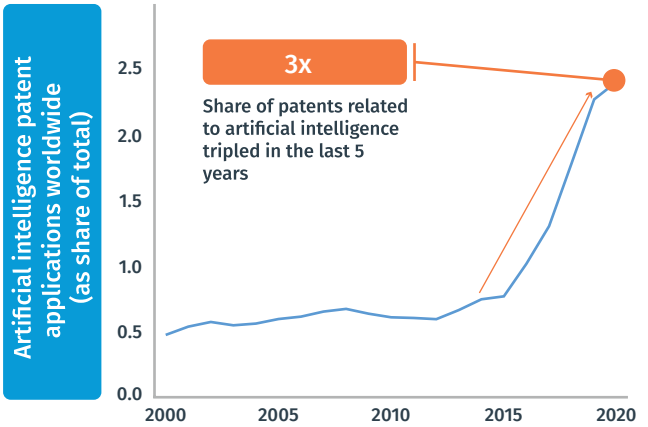
Global investments in clean energy reached USD 1.8 trillion in 2023 alone,[7] offering developing countries a pathway to attract investment and integrate into GVCs. Lastly, the expansion of green industries can catalyse broader economic development by creating demand for auxiliary services, such as battery recycling, logistics, and infrastructure development for charging stations and renewable energy installations.

Despite these opportunities, several challenges must be addressed to ensure the energy transition contributes to sustainable industrial development. First, the benefits of renewable energy may not be evenly distributed, with some regions benefitting more than others. Infrastructure deficits, particularly in energy transmission and distribution, can limit the ability of many developing countries to fully expand their renewable energy potential. Additionally, financing for clean energy projects remains inadequate. Without greater international support, many developing countries may struggle to mobilize the resources necessary to build the infrastructure required for green energy. Furthermore, concerns about resource overuse persist, as the production of renewable technologies still relies heavily on materials such as rare earth metals, which may lead to environmental degradation in some regions.

The rise of AI and digitalization of production

Technological breakthroughs like AI, cloud computing, big data analytics, the Internet of Things and advanced robotics are revolutionizing production processes and how industries operate. In particular, AI has evolved from a conceptual framework to a transformative force, capable of optimizing production processes and enabling intelligent automation.[8] The surge in AI-related patent applications worldwide highlights its growing relevance across industrial sectors, as the share of AI-related patent applications worldwide has tripled in just five years (see Figure 3).

Figure 3. The rise of AI



Source: UNIDO (2024). "The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions". Multilateral Industrial Policy Forum (MIPF) Conference Paper.

The rapid deployment of AI and digitalization presents a wealth of opportunities for industrial development, particularly in enhancing productivity and efficiency. AI-driven automation can optimize resource utilization, minimize waste, and streamline production processes, leading to significant cost savings and increased competitiveness. Early adopters of AI technologies can achieve higher levels of industrial sophistication by tapping into new markets and expanding value chains. For developing countries, AI offers the potential to leapfrog traditional development paths by integrating digital solutions into manufacturing and supply chain processes. This enables them to compete more effectively in global markets. The current AI revolution in China is a great example of this. Furthermore, digitalization facilitates the development of new business models and market opportunities, such as e-commerce platforms and digital supply chain management, which can boost small and medium enterprises' access to international markets.

Despite the promising potential of AI and digitalization, significant challenges remain, particularly for developing countries. One of the most pressing issues is the widening technology gap

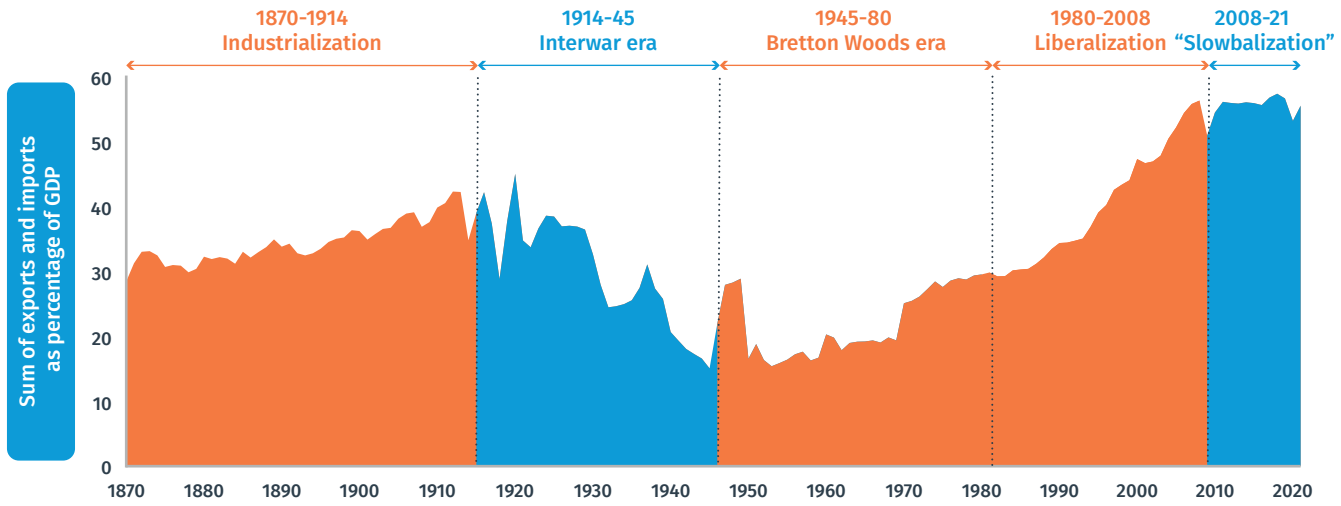
between advanced and developing economies. While industrialized nations rapidly adopt AI and digital tools, LICs and LMICs still rely primarily on analogue production methods. In many developing economies, the lack of adequate digital infrastructure, unreliable energy supply, and limited access to affordable financing hinder the adoption of AI-driven solutions. Moreover, there is a significant gap in skills, as the workforce in these countries often lacks the specialized training required to operate and maintain AI technologies.

Another critical challenge is the risk of job displacement due to automation. Technological advancements associated with digitalization can enhance productivity and job growth. At the same time, automation technologies, including those related to AI, have and will keep disrupting certain areas of the economy, leading to industry-specific job losses. The rise of AI will, therefore, undoubtedly change the future composition of the labour force. Concerns around data privacy, cybersecurity and the ethical use of AI further complicate efforts to harness its full potential. Addressing these challenges will require coordinated efforts between governments, industry, and educational institutions to build digital capabilities, as well as regulatory frameworks and infrastructure to ensure an inclusive and sustainable transition to AI-driven industrialization.

GVCs reconfiguration

Traditionally, integrating a country's production network into GVCs has been a pathway for industrial upgrading and has enabled countries to enhance their industrial capabilities, generate employment, and stimulate economic growth. However, disruptions such as the COVID-19 pandemic, geopolitical conflicts, climate change, and shifting trade policies have exposed vulnerabilities in global supply chains. These disruptions have prompted firms to reassess their production and sourcing strategies, and to accelerate trends such as reshoring, nearshoring, and diversification. A slowdown in global trade expansion, the so-called "slowbalization", has led to regionalization and a renewed focus on domestic production (see Figure 4). This transformation is altering traditional patterns of industrialization, compelling policymakers to adapt to a more fragmented and complex global trade landscape.

Figure 4. Slowbalization



Source: UNIDO (2024). "The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions". Multilateral Industrial Policy Forum (MIPF) Conference Paper.

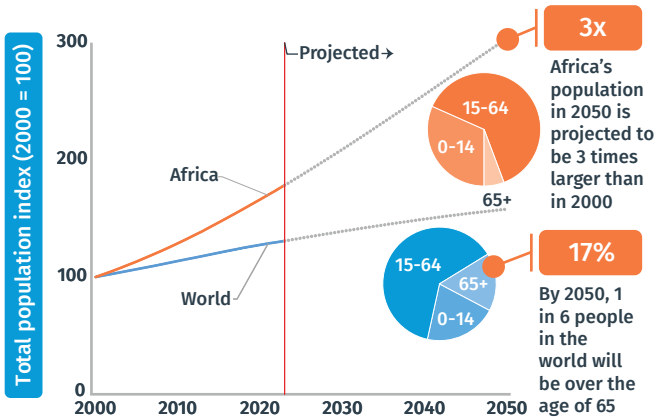
The reconfiguration of GVCs presents new opportunities for developing countries to enhance their industrial participation. As multinational firms aim to diversify and reduce risks in their supply chains, they are increasingly relocating production to new regions. This relocation creates opportunities for emerging economies to attract foreign direct investment (FDI) and integrate into global production networks. The rise of nearshoring presents further potential, especially for developing countries strategically located near major consumer markets, such as those in Latin America and Africa. Regional trade agreements, such as the African Continental Free Trade Area (AfCTA), can serve as a springboard for strengthening regional industrial capabilities and fostering deeper trade integration.[9] Additionally, the diversification of supply chains into new locations offers developing countries the opportunity to develop competitive industrial clusters and leverage their labour and resource advantages.

However, several challenges hinder developing countries from fully capitalizing on GVC reconfiguration. Mainly, this reconfiguration could limit opportunities for traditional export-led industrialization, a strategy that has driven economic growth in many developing regions. As developed countries focus on strengthening domestic and regional supply chains, developing nations may face a reduced demand for their exports and increased competition in attracting FDI. Furthermore, the technological intensity of modern supply chains requires robust infrastructure, digital capabilities, and skilled labour. Many developing economies may still face significant gaps in these areas. Weak logistical networks, high operational costs, and limited access to financing for infrastructure upgrades can deter multinational firms from investing in developing regions. Additionally, geopolitical uncertainties and shifting trade policies, such as rising protectionism and regulatory barriers, pose risks to the stability of global trade networks and may further marginalize developing countries.

Global demographic changes

While the majority of high-income economies across Europe, North America and East Asia are experiencing near-zero or negative population growth due to declining birth rates and aging populations, developing regions, particularly in Sub-Saharan Africa and parts of South Asia, are witnessing rapid population growth. By 2050, Africa's population is projected to triple compared to 2000 (see Figure 5). This surge presents opportunities and challenges. As millions of young people enter the labour market each year, there will be an amplified urgency for job creation and industrial expansion. Simultaneously, migration trends, both across and within borders, reshape labour dynamics and impact workforce availability and industrial productivity. Urbanization further accelerates these shifts, by driving the demand for housing, infrastructure, and consumer goods, and positioning cities as critical hubs for industrial activity.

Figure 5. A changing global demographic structure



Source: UNIDO (2024). "The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions". Multilateral Industrial Policy Forum (MIPF) Conference Paper.

Demographic shifts present considerable opportunities for industrial development, particularly in rapidly growing regions with expanding consumer markets. The rising population and

increasing urbanization rates drive the demand for food, consumer goods, healthcare, and construction materials, and offer opportunities for industries to expand and diversify their production. Africa and Asia, in particular, can leverage their growing populations to drive domestic demand-led industrialization to complement traditional export-led strategies. Urbanization, on the other hand, fosters economic agglomeration and economies of scale, and creates dynamic industrial clusters that can boost productivity and innovation. Furthermore, the rise in middle-class consumers in developing regions is opening new avenues for industrial expansion in sectors such as pharmaceuticals, agroprocessing, and consumer electronics.

The rapid pace of these changes presents significant challenges, particularly in low-income regions. The sheer scale of population growth in Sub-Saharan Africa and parts of Asia demands an urgent focus on job creation to avoid high levels of unemployment and underemployment, which could undermine social stability. In both regions, a high share of the workforce is already informally employed, which presents another set of development challenges. The transition from a predominantly rural to an urban economy also poses logistical and infrastructural challenges, as cities must accommodate growing populations while ensuring access to essential services such as energy, transportation, and sanitation. Moreover, as populations age, the demand for healthcare services and medical technologies will increase sharply, and requires investments in healthcare infrastructure and skilled labour. Without strategic planning and investment, these changes could lead to unplanned, congested cities with limited economic productivity, reinforcing patterns of inequality and economic exclusion.

Policy solutions for future-ready industries

As megatrends continue to reshape the global industrial landscape, developing countries must act decisively to navigate challenges and seize emerging opportunities. Six key areas for actions include:[10]

1. **Building future-ready infrastructure**: Developing reliable energy, transport and digital infrastructure is essential for industrial growth. Persistent deficits in electrification, transportation networks, and digitalization continue to pose significant hurdles for many developing economies. Strategic investments in modern infrastructure, such as smart manufacturing facilities, data centres, and renewable energy grids, are crucial to ensuring industrial competitiveness.

2. **Equipping the labour force**: To capitalize on the industrial transformations driven by AI and digitalization, countries must invest in upskilling and reskilling their workforce. Strengthening science, technology, engineering and mathematical education, along with vocational training programs, and industry-academia partnerships, will be key to preparing workers for high-tech and automated industries.

3. **Mastering new technologies**: Developing countries should align their national research and development ecosystems with industrial policies to harness global innovation ecosystems. Public-private collaborations demonstrate how coordinated efforts can enhance technological competitiveness and innovation capabilities.

4. **Advancing green industrialization**: Governments must adopt policies that incentivize renewable energy adoption, such as subsidies for green technologies, carbon pricing, and research and development support for clean energy innovations. Ensuring the sustainability of resource extraction and production is critical, and requires adherence to environmental standards and equitable benefit-sharing with local communities.

5. **Strengthening regional coordination:** Collaborating with neighbouring countries can enhance the effectiveness of industrial policies by creating economies of scale, improving resource allocation, boosting the competitiveness of regional value chains, and attracting investments. For this, policymakers must align industrial strategies across borders and leverage regional investment funds and multilateral development programs to support cross-border industrial initiatives.

6. **Building government capabilities**: Governments must invest in institutional capacity-building to manage complex policy interventions. Strong regulatory frameworks, transparent governance, and stakeholder engagement are crucial to building trust and ensuring policy continuity across political cycles. International organizations can support these efforts through technical assistance, knowledge sharing, and capacity-building programs.

Endnotes

1. This brief summarizes the main findings and messages of UNIDO (2024). The Future of Industrialization: Building future-ready industries to turn challenges into sustainable solutions. Multilateral Industrial Policy Forum (MIPF) Conference Paper.

2. Szirmai, A. (2012). Industrialisation as an engine of growth in developing countries, 1950–2005. Structural Change and Economic Dynamics, 23(4), 406–420 for a review of these arguments.

3. See UNIDO (2024), Section 1.

4. The concept of megatrends refers to deep (structural changes that i) affect social, economic and political spheres (ii) have a global impact, and iii) last several decades. See Altenburg, T. and Haraguchi, N. (2022). *COVID-19 and the megatrends shaping the future of industrial development*, UNIDO IAP; and Hauge. (2023). *The Future of the Factory: How Megatrends are Changing Industrialization*.

5. See UNIDO (2024), Section 2.

6. IRENA. (2022). *Renewable Energy Market Analysis: Africa and its Regions*. International Renewable Energy Agency.

7. International Energy Agency (IEA). (2024). *Clean Energy Market Monitor* – March 2024. IEA.

8. Hauge, J. (2021). Manufacturing-led development in the digital age: how power trumps technology. Third World Quarterly, 44(9), 1960–1980.

9. UNIDO (2024).

10. See UNIDO (2024), Section 3.

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