UNITED NATIONS
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INDUSTRIAL DEVELOPMENT REPORT 2024

TURNING CHALLENGES INTO SUSTAINABLE SOLUTIONS

The New Era of Industrial Policy

FULL REPORT

About UNIDO

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations with a unique mandate to promote, dynamize and accelerate sustainable economic and industrial development.

Our mandate is reflected in Sustainable Development Goal (SDG) 9: "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation", but UNIDO's activities contribute to all the SDGs.

UNIDO's vision is a world without poverty and hunger, where industry drives low-emission economies, improves living standards, and preserves the environment for present and future generations, leaving no one behind.

UNIDO provides support to its Member States through four mandated functions: technical cooperation; action-oriented research and policy-advisory services; normative standards-related activities; and fostering partnerships for knowledge and technology transfer.

Our work is concentrated on three focus areas: ending hunger by supporting sustainable food systems with modern agri-tech and agribusiness; tackling climate change by using renewable energy and energy efficiency to reduce industrial greenhouse gas emissions; and supporting sustainable supply chains so that developing country producers get a fair deal and scarce resources are preserved.

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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
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FOREWORD

Gerd Müller

Director General
United Nations Industrial Development Organization (UNIDO)

UNIDO is a specialized agency in the UN system with a unique mandate to promote and strengthen sustainable economic and industrial development. Considering the multiple global crises we are all facing today, this mandate is more important than ever.

Looking at the world around us, the challenges before us are all too clear. A world with many wars and conflicts - a world where a billion people go to bed hungry every day and struggle with poverty and malnutrition. A world where resources are scarce, where access to clean water is precarious. A world where especially the Global South is suffering the impacts of climate change, and the poorest of the poor are hit the hardest. And where developing countries are still struggling to fully recover from the impacts of the COVID-19 pandemic. Moreover, the gap between rich and developing countries continues to widen.

We live in an interdependent world, everything is interconnected. We must recognize that we share one planet and bear responsibility for global developments that ultimately impact us all.

If today 10 per cent of the most affluent people residing mainly in the industrialized countries own 90 per cent of the wealth, while 20 per cent of the world's population is responsible for 80 per cent of global emissions and environmental pollution, then something is not right with how we are cooperating as one world. Thus, I reiterate that industrialized countries have a special responsibility: a duty to solidarity. They must live up to their many development commitments. Together we should strongly demand that the industrialized countries achieve the 0.7 per cent of gross domestic product (GDP) development spending target.

What we need is a new global ethical code of responsibility and a rethinking of our models of growth, globalization and sustainable development. This in turn necessitates a fair balance of interests between rich and poor, between industrialized countries, developing countries and emerging economies. We have the technologies, the knowledge, and the investment resources to provide effective answers to growing global challenges. But knowledge alone is not enough. The countries of the Global South need a development perspective. A precondition for this is access to sustainable energy for all, because energy is the basis of development. Moreover, the growing population in developing countries will need decent jobs – industry can provide these! We need long-term investment in sustainable industrial development, skills training, and above all true global partnership and solidarity to give the hundreds of millions of young people worldwide a promising perspective for the future. The world must act now, and the world must act together for our common benefit and our shared future.

EXECUTIVE SUMMARY

Navigating the complexity of our modern era, marked by instability, resource scarcity, global warming and widening socioeconomic disparities, poses significant challenges. These trends disproportionately affect developing countries in particular. Yet, amidst these challenges, we are also witnessing remarkable technological breakthroughs that present unprecedented opportunities to accelerate inclusive and sustainable industrial development.

The Industrial Development Report 2024 (IDR24) emphasizes the pivotal role the industrial sector plays in delivering sustainable development solutions, given its profound impact on economic, societal and environmental goals. Sustainable industrialization entails fighting climate change, promoting economic growth and generating millions of decent jobs while harnessing cutting-edge technologies.

The report finds that every manufacturing job, on average, creates more than two jobs in other sectors of the economy. The manufacturing sector also significantly contributes to green innovation compared to other sectors, with 60 per cent of all green patents worldwide owned by industrial firms, despite representing a smaller share of the overall firm population. Accelerating sustainable industrial development is therefore crucial for achieving the Sustainable Development Goals (SDGs).

Industrialization does not happen on its own. It requires investments, skills, technologies, coordinated efforts and carefully designed policies. The industrial policies of the future cannot simply replicate those of the past. The IDR24 calls for a new era of modern industrial policies, which encompass four crucial elements.

First, modern industrial policies should be guided by the SDGs. Industrial policy initiatives should focus on critical industries that have the potential to accelerate the achievement of SDGs. Second, industrial policies should be future-ready and, right from their inception, consider the megatrends reshaping the world. These trends include the energy transition, the Fourth Industrial Revolution (4IR), the rebalancing of global production and trade, and the expansion of an ageing global population. Third, modern industrial policies should promote collaboration. Governments cannot solve today's challenges on their own. Industry and business must also jointly contribute to policy design and ensure effective implementation in private sector development. Finally, such policies should be regionally coordinated to mitigate tensions and unlock the full potential for cooperation among neighbours.

The IDR24 introduces a new approach to comprehensively assess progress on sustainable industrialization. This approach considers several indicators, including SDG 9 (industry, innovation and infrastructure), SDG 7 (affordable and clean energy) and SDG 8 (decent work and economic growth). The report analyses the latest available data from 2021. Pre-COVID-19 data from 2009 to 2019 were used to determine the speed of progress, assuming that most industrial sectors have or will soon revert to pre-COVID-19 trends after recovery. The analysis reveals that global progress towards industry-related SDGs is too slow and has been further derailed by the COVID-19 pandemic. Urgent attention, specifically in developing countries, is required in three critical areas: innovation, clean energy and decent jobs.

In 2021, developing countries lagged behind in achieving innovation-related targets for 2030 by 80 percentage points. Progress prior to the pre-COVID-19 pandemic was also disappointingly sluggish. The annual reduction in the gap towards the goal was only 0.33 percentage points, suggesting that at this rate, it will take over a century to reach the innovation targets. Thus, even if developing countries return to pre-COVID-19 trends, achieving the targets is beyond reach at this pace. A similar pattern is observed for employment and clean energy.

The report identifies eight areas of opportunity to accelerate SDG progress through modern industrial policies by harnessing four main megatrends: (i) the energy transition, (ii) the 4IR, (iii) the global rebalancing and (iv) the demographic transition. These opportunities include the generation of energy, materials and components needed for the energy transition; the use of 4IR technologies to accelerate competitiveness; attracting foreign direct investment (FDI) that is relocating, and the production of goods that are in high demand due to global demographic and technological trends.

Assessing regional progress reveals that investment and intervention priorities differ across regions. This fact must be considered when designing future industrial policies. Therefore, the IDR24 provides region-specific assessments of SDG progress for Africa, Asia-Pacific, Eastern Europe and Latin America and the Caribbean (LAC). These assessments are used to identify crucial areas for action and are accompanied by a discussion on opportunities to address these critical areas and concrete examples of industrial policies aimed at tackling these challenges.

In 2021, for example, 90 per cent of the population in developing countries, on average, had access to energy compared to only 60 per cent in Africa. This highlights the urgent need to channel targeted investments in

energy access in Africa, which can leverage its abundant natural resources while promoting industrialization through clean energy production. Meanwhile, the level of achievement of SDG 9 targets related to industry in LAC is similar to the average of developing countries. However, the region's progress in this area prior to the COVID-19 pandemic was negative, indicating a widening gap in realizing SDG 9. This trend is particularly concerning as it suggests a process of premature deindustrialization. Attracting FDI that is relocating due to the reconfiguration of global value chains and promoting industries with high expected demand, notably food processing, are some of the opportunities identified in the report to reverse this negative trend.

Despite strong growth in industry, Asia-Pacific faces challenges in employment, clean energy and innovation. Improvements over the past decade demonstrate the region's commitment to addressing these shortcomings. Strong industrial capabilities have positioned the region particularly well to develop new industrial clusters around electric mobility. On the other hand, Eastern Europe has experienced a sharp decline in economic growth, but the rapid adoption of 4IR technologies holds the potential to spur innovation and increase industrial competitiveness, presenting an opportunity to reignite economic growth.

For modern industrial policies to be effective, an entirely new level of international cooperation and solidarity is necessary. Collaboration entails the transfer of knowledge, expertise and technologies. Moreover, modern industrial policies hinge on investments with the long-term vision of creating genuine and comprehensive structural change. The international community must commit to providing increased and sustainable financing to meet developing countries' needs and ensure fairness. Lastly, there is a need to invest in the world's greatest asset: equipping youth with the necessary skills for a promising future.

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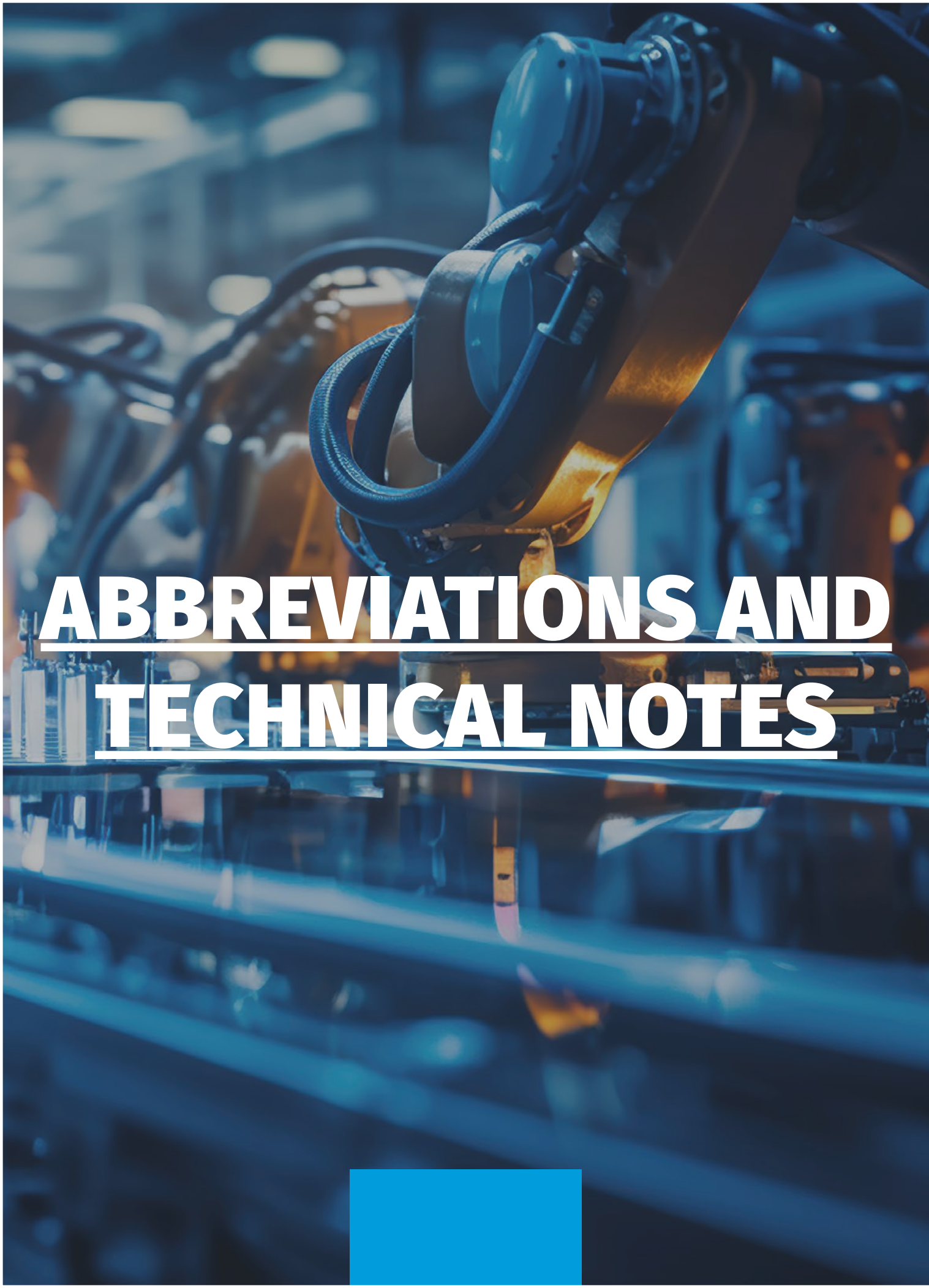


ABBREVIATIONS AND TECHNICAL NOTES

4IR:	Fourth Industrial Revolution
ADP:	Advanced digital production
AfCFTA:	African Continental Free Trade Area
AI:	Artificial intelligence
AIDA:	Accelerated Industrial Development of Africa
CIIT:	Isthmus of Tehuantepec Inter-Oceanic Corridor
CO_2:	Carbon dioxide
EU:	European Union
EVs:	Electric vehicles
FDI:	Foreign direct investment
FITs:	Feed-in-tariffs
GCC:	Gulf Cooperation Council
GDP:	Gross domestic product
GH2:	Green hydrogen
GHG:	Greenhouse gas
GVCs:	Global value chains
HICs:	Higher-income countries
ICTs:	Information and communication technologies
IDR:	Industrial Development Report
IoT:	Internet of Things
IPCEI:	Important Projects of Common European Interest
IT:	Information technology
IUU:	Illegal, unreported, and unregulated
KIBS:	Knowledge intensive business services
LAC:	Latin America and the Caribbean
LDCs:	Least developed countries
LICs:	Low-income countries
LMICs:	Lower-middle-income countries
MENA:	Middle East and North Africa
MNE:	Multinational enterprises
MSMEs:	Micro, small and medium enterprises
MVA:	Manufacturing value added
NIS:	National innovation system
PPP:	Purchasing power parity
PV:	Photovoltaic
R&D:	Research and development
RVCs:	Regional value chains
S3:	mart Specialisation Strategy
SAPZs:	Special agro-industrial processing zones
SDGs:	Sustainable Development Goals
SEZs:	Special economic zones
SIDS:	Small island developing states
SMEs:	Small and medium-sized enterprises
TVET:	Technical and vocational education training
UMICs:	Upper-middle-income countries
UNIDO:	United Nations Industrial Development Organization
VTI:	Vocational training institutions

- References to dollars ($) are to United States dollars, unless otherwise indicated.
- In-text values in non-$ currencies are generally followed by a $-approximation, which in all cases is based on the average exchange rate for the relevant year.
- Components in tables may not sum precisely to totals shown because of rounding.

PART A

Industrial policy: a solution to meet global challenges and accelerate progress on the SDGs

CHAPTER 1 GLOBAL CHALLENGES

The world has experienced a series of shocks in recent years, including the COVID-19 pandemic, a rising number of armed conflicts and natural catastrophes linked to climate change. These shocks have had far-reaching consequences around the world and have put the achievement of all SDGs at risk. Low-income countries have been hit the hardest, as they had limited resources to adequately respond to the challenges, thus resulting in a slower recovery. In addition to these shocks, four megatrends — the energy transition, the Fourth Industrial Revolution (4IR), the global rebalancing and the expansion of an ageing global population — are reshaping how we produce and consume goods, with important implications for industrial development. These megatrends introduce both new challenges and opportunities in terms of accelerating progress towards the Sustainable Development Goals (SDGs). This chapter sets the stage for the report by providing an overview of the current context in which modern industrial policy operates. It emphasizes the urgent need for course correction. To address the profound consequences of these shocks and reverse their negative impacts, bold actions are required to reignite investments and direct them towards inclusive and sustainable industrial policy solutions.

Jeffrey Sachs

“There are fundamental shifts taking place in the world which are very disruptive and difficult to handle. The energy transition, the technological revolution, demographic transitions and the global rebalancing are changing industry dramatically. Responding to these megatrends will imply enormous transformations across sectors and throughout supply chains. A new framework, constructed around these trends, and supported by industrial strategies that are embedded more broadly in overall economic and demographic strategies will be crucial to harness these challenging transformations towards the acceleration of the SDGs.”

Director of the Center for Sustainable Development at Columbia University

1.1 GLOBAL POLYCRISIS HITS THE DEVELOPING WORLD: SDG PROGRESS HAMPERED

The world is facing a polycrisis. In the past four years, the world has been hit by numerous shocks including the COVID-19 pandemic, a rising number of armed conflicts and several natural catastrophes, induced by climate change. The simultaneous impact of these shocks has been recognized as a global polycrisis. A distinguishing feature of this type of crisis is the way each shock interacts with the others, amplifying their individual impacts and leading to an overall result that exceeds by far the sum of each shock.[1]

The polycrisis has had dramatic dramatic economic consequences. The impacts of these shocks are well documented. During 2020 and 2021, the pandemic interrupted the global economic production for several months, leading to increased unemployment worldwide and, for the first time in decades, reversing the progress made in poverty alleviation and hunger eradication.[2] As the world was entering into the recovery phase from this global shock, the armed conflict in Ukraine introduced new disruptions in global value chains (GVC) and led to a rapid increase in commodity prices, including energy and food.[3] In parallel to these events, global temperatures continued to rise, making 2023 the hottest year on record and bringing the annual average temperature very close to the Paris Agreement's threshold of 1.5 °C above the pre-industrial levels[4] (Figure 1.1).

Economic shocks are affecting livelihoods worldwide. These shocks in the global economy have rapidly led to an unprecedented deterioration of social indicators. Massive unemployment and increased inflation have pushed an estimated number of 70 million people into extreme poverty compared to the pre-pandemic estimates.[5] In parallel, 122 million more people faced hunger in 2022 than in 2019.[6] Global warming is also rapidly increasing its devastating effects on populations around the world. Recent estimates indicate that the economic losses due to climate change-related catastrophes have increased sevenfold since 1970.[7]

Low-income countries have been hit hardest. The consequences of the polycrisis are even more severe in poorer countries. Low-income countries (LICs) have fewer financial resources and weaker government capabilities and infrastructure to respond to external shocks. Consequently, the impact tends to be stronger and the time to recover from these shocks longer. At the same time, LICs are more vulnerable to climate-related catastrophes, such as floods, storms, droughts and heat waves.

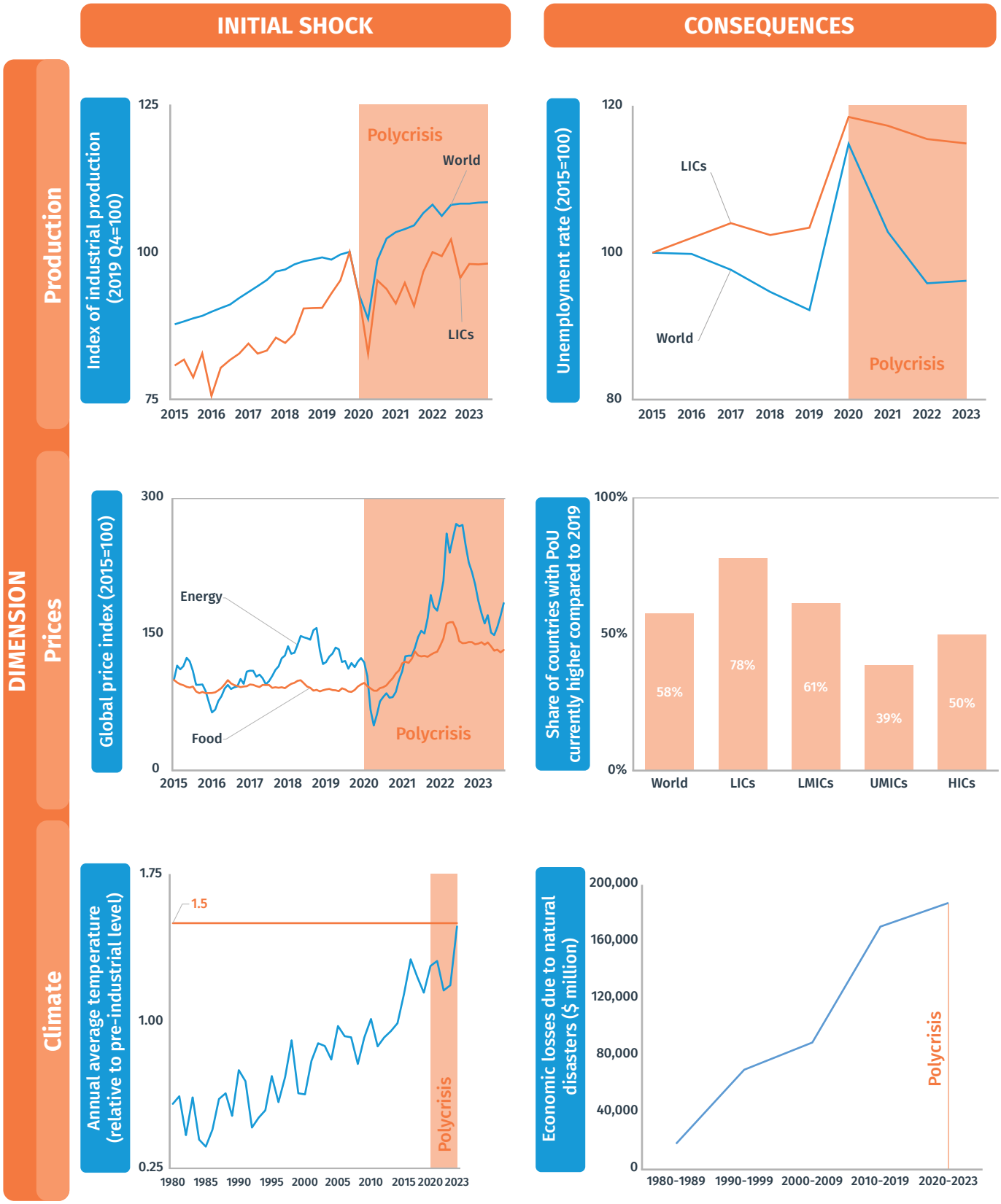
Industrial production and employment levels in LICs are still below pre-pandemic levels. The post-pandemic trends in production and unemployment clearly illustrate the differential impact of the polycrisis in LICs. Whereas the global economy has rapidly bounced back from the initial shock of the COVID-19 pandemic, LICs are still struggling to recover. The global level of industrial production was already above pre-pandemic levels by 2021, but it was still 5 points below by the end of 2023 in the case of LICs. Similarly, the world unemployment rate increased dramatically during 2020, then fell rapidly and by 2022, it was at a level comparable to 2019. In the case of LICs, the initial increase in 2020 had not been reversed, and the unemployment rate in 2023 was still 15 per cent higher than the rate before the pandemic (Figure 1.1).

Inflation in food prices has increased food insecurity, especially in LICs. At the same time, the surge in food prices has been particularly severe for the poorest segments of the world population, who spend a larger share of their incomes on food. Across the world, LICs have been severely impacted by these dynamics and by 2022, most of them faced higher levels of undernourishment than before the COVID-19 pandemic. Changes in the prevalence of undernourishment (PoU) index reported by the Food and Agriculture Organization (FAO) between 2019 and 2022 illustrate this trend. Whereas at the global level, about 40 per cent of countries managed to reduce this index to pre-pandemic levels, in the case of LICs, only one-third were able to do so.

The impact of climate change disproportionately affects poorer nations. LICs are suffering the most not only from low economic activity and increased prices but also from the severe consequences of global warming and climate change. Recent estimates show that LICs lose 1 per cent of their gross domestic product (GDP) per annum due to climate-attributed disasters, compared to 0.2 per cent in high-income countries.[8]

The polycrisis has put at risk the achievement of all SDGs. The detrimental effects of the polycrisis on the various dimensions reported above have had a clear impact on the progress made in achieving the SDGs worldwide. Indeed, the moderate progress achieved during the initial years following the adoption of the SDGs in 2015 has been halted or even reversed after 2020. At the midpoint year of the 2030 Agenda, it is unlikely that the goals will be achieved.[9] Recent estimates by the United Nations (UN) indicate that only 15 per cent of the 140 SDG indicators are on track to achieve the 2030 goals. The remaining 85 per cent is off-track (Figure 1.2).

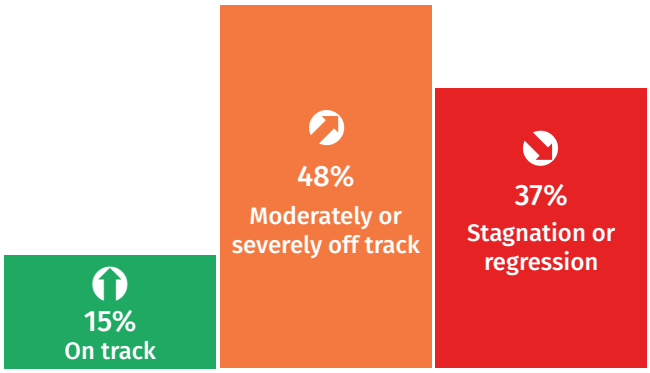
Figure 1.1 **The world hit by a polycrisis**



Note: PoU = Prevalence of undernourishment, defined as the percentage of the population whose habitual food consumption is insufficient to provide the dietary energy levels required to maintain a normal active and healthy life. LICs = Low-income countries; LMICs = Lower-middle-income countries; UMICs = Upper-middle-income countries; HICs = High-income countries.

Source: UNIDO elaboration based on UNIDO (2023a) (Industrial Production), ILO (2023) (Unemployment), World Bank (2023a) (Prices), FAO (2023) (Undernourishment), ERA5 (2023) (Global annual temperature) and EM-DAT (2023) (Natural disasters).

Figure 1.2 **SDG progress at risk**



Source: UNIDO elaboration based on UNDESA (2023a).

A course correction is urgently needed. Addressing the dramatic consequences of the polycrisis and reversing the negative impacts will require bold actions targeted at reigniting investments and direct them towards inclusive and sustainable solutions. As will be discussed in the next section of the report, the industrial sector should be at the core of these actions and investment decisions. Industrial policy can play a prime role in ensuring that those investments not only materialize but are also directed towards achieving the SDGs.

1.2 MEGATRENDS RESHAPING THE WORLD: DEVELOPING COUNTRIES AT RISK OF BEING SIDELINED

The world is rapidly changing. Acting in parallel with the polycrisis, deeper structural shifts, the so-called megatrends, are reshaping the way we produce and consume, and these changes have important implications for industrial development. These shifts are related to the process of technological change, socio-demographic transitions, global production restructuring and humanity's carbon footprint.

Four megatrends are particularly important for the analysis conducted in this report. From the several megatrends identified in relevant literature[10], this report will focus on four of them that have direct implications for industrial development and the acceleration of SDG progress through industrial policy:

- **Energy transition**: The urgent need to combat climate change is catalysing inclusive green economies. A key component of this transition is the decarbonization of energy systems.
- **Fourth Industrial Revolution**: advanced digital production technologies of the Fourth Industrial Revolution (4IR) are transforming the way we produce, consume and interact.
- **Global rebalancing**: An increase in global geo-political tensions is restructuring the way production is organized around the world, leading to cross-border relocation of multinational industrial firms.
- **Demographic transition**: Rapid population growth in developing countries (mainly in Africa) will put additional pressure on food and energy demand, while rapid ageing in advanced ones will put pressure on the financing of pensions, health and long-term care.[11]

These transformations not only pose new challenges but also open new opportunities. By transforming the world around us, these megatrends introduce new challenges for countries seeking to recover from the polycrisis and accelerate progress towards achieving the SDGs. They imply that countries cannot progress by simply replicating models from the past. At the same time, they open new opportunities, as will be discussed in the next chapters.

What is a megatrend?

Megatrends are broadly defined as profound transformations that: (1) last several decades; (2) deeply affect the social as well as the economic and political spheres of industrial development; and (3) have a global impact.

Source: UNIDO (2021a) based on Naisbitt (1982).

1.2.1 Energy transition

There is an urgent need for change. The threat posed by climate change calls for a sharp revision in production modes to reduce emissions and environmental degradation. During the period 2011-2020, the global surface temperature reached 1.1°C above the temperature observed during the period 1850-1900. The shifting precipitation patterns and more frequent extreme meteorological events have already produced significant losses.[12] Developing countries, which are both more affected and more vulnerable, face the paradox of having the lowest financial capacity for mitigation and adaptation to climate change.[13] In this context, rapid and major structural and technological changes in different sectors of the economy are more urgent than ever.

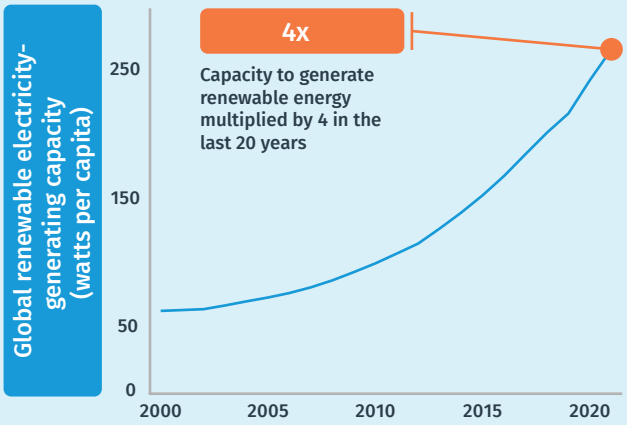
At the core of the transformation lies the energy transition. The switch from fossil fuels to renewable energies is the basis for the energy transition. This switch is accelerating rapidly (Figure 1.3). For the 22nd year in a row, renewable capacity additions set a record in 2023. Global annual renewable capacity additions increased by almost 50 per cent, registering the fastest growth rate in the past two decades. The positive trend is expected to continue. It is estimated that by 2028, renewable energy sources will account for over 42 per cent of global electricity generation, and the share of wind and solar photovoltaics (PV) will double to 25 per cent. While all global regions are participating in this trend, a few countries are driving the transition. China has an undisputed leading role, especially in solar PV, while Europe, the United States and Brazil also registered all-time highs in renewable capacity additions in 2023.[14]

The energy transition will transform the competitive advantages of countries and firms. Countries and firms that can master the technological and production capabilities of dynamic industries related to the energy transition will benefit from new forms of green competitive advantage. Both the energy sector and industrial sectors will be affected, especially energy and material-intensive industries (EMIIs), including steel, chemicals, and cement, and other key sectors such as agro-food industries. To remain competitive, countries and firms will have to undergo a dramatic restructuring, entailing changes both upstream and downstream along the various value chains that depend on them.[15] At the same time, as consumption patterns in key global markets shift and more stringent sustainability trade standards are implemented, firms from developing countries will have to adapt to gain or retain critical market access.[16]

Rapid diversification will become a must among fossil fuel exporters. Countries that heavily rely on fossil fuels for their export and government revenues are particularly vulnerable to the risks of stranded assets. They may face consequences in terms of political stability as the social contract depends on resource rents.[17] For example, fossil fuels currently represent around 40 per cent of African exports. In the context of a low-carbon future, these countries need to diversify their economies to build resilient and productive economies as the demand for fossil fuels decreases.[18]

New models based on zero-carbon emissions and circular production processes require new skills and capabilities. New jobs in sectors such as renewable energy, organic agriculture and recycling of waste products will be created, while many will be lost in emission-intensive industries. Even in existing occupations, skill needs will change and transversal skills, such as environmental awareness and sustainability will have to be incorporated. To minimize the personal cost for workers, investing in green skills development programmes as part of green industrial policies will be essential.

Figure 1.3 **The rise of renewables**



Source: UNIDO elaboration based on UNSD (2023a), indicator 12.a.1 "Installed renewable energy-generating capacity in developing countries (in watts per capita)".

1.2.2 The Fourth Industrial Revolution

Recent technological breakthroughs in digitalization are transforming industrial production. Industry 4.0 technologies, also known as the 4IR technologies, constitute the current frontier of production technologies. They include artificial intelligence (AI), cloud computing, big data analytics, Internet of Things (IoT), and advanced robotics, among other technologies. These technologies are built on the inventions of the digital revolution that emerged in the 1980s and represent the latest evolution of technical progress in information and communication technologies (ICTs).[19] Recent technological advances have brought these inventions beyond the previous realm of possibility to exert disruptive effects on all domains of the economy and society.

4IR technologies have different impacts on production processes and different industries. Digital technologies, such as IoT, cloud and big data analytics are likely to impact all industries and lead to a boost in intangible services and manufacturing servicification. Automation and robotics are mainly impacting manufacturing and low-value services, while 3D printing is currently applied to niche manufacturing products, such as rubber and plastics and specific components.[20] Overall, they enable the more efficient use of resources and information, unlocking new opportunities in the optimization of production processes and leading to productivity increases in manufacturing.

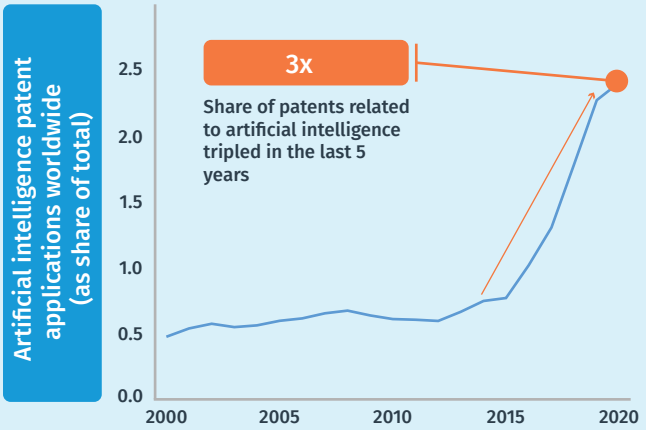
Advances in AI and machine learning are leading the way in the new revolution. While the concept of AI was formally launched in 1956, technology limitations hampered its diffusion until recently. Since the early 2010s, the increasing availability of large quantities of digital data and advancements in the field of deep neural networks have led to unprecedented results in algorithmic accuracy. Those advancements led to major breakthroughs in ML techniques, causing significant improvements in AI capability.[21] Today, AI is evolving at an exponential pace, with new breakthroughs and applications emerging every year (Figure 1.4).

Reaping the benefits from these innovations requires solid absorptive capacities. In all previous technological revolutions, countries with the necessary capabilities to adopt and use the new technologies in their production processes benefited the most from the changes. Yet, in the case of 4IR technologies,

this "capability threshold" may be even higher. In fact, their effective deployment relies on particularly high requirements in terms of enabling basic and digital infrastructure. This renders their adaptation extremely demanding for productive organizations, especially in developing countries.[22]

Countries and firms that fail to join this revolution risk being sidelined in the global production landscape. Given the scale of ongoing technological disruptions, the stakes are high and there is a risk of winner-take-all dynamics.[23] In fact, the diffusion of these technologies is expected to alter the sources of competitiveness for firms and countries, and early adopters will secure the greatest returns.[24] Advanced economies hold the lead in the production of these innovations. In order to avoid widening the capability gap, it is essential for all countries to seize this technological upgrading opportunity.[25]

Figure 1.4 **The rise of 4IR technologies**



Note: 4IR = Fourth Industrial Revolution

Source: UNIDO elaboration based on WIPO (2022).

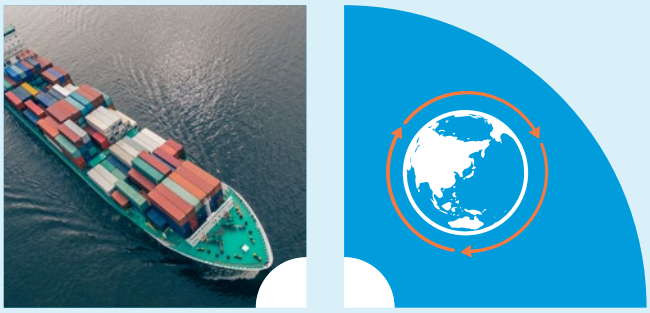
1.2.3 Global rebalancing

A substantial shift in economic power between countries and regions has taken place over the last two decades. During this period, Asia became a major pole of the global economy. The share of developing Asia in world GDP has increased threefold in the last 20 years to around 30 per cent (Figure 1.5). This exponential increase was made possible by structural transformation, particularly in East Asian economies. The rapid and sustained growth in Asian countries was driven by an industrial export-led strategy pursued through aggressive, well-designed and successful industrial policy packages. These policies achieved the development of local manufacturing for export and combined local industrial development and increasing openness to trade.[26] These developments occurred in the context of expanding globalization.

However, globalization has been decelerating in recent years.. After the global financial crisis, global trade openness,[27] which had been increasing steadily until the 1970s, plateaued. This has led many to refer to the last decade as "slowbalization".[28] In parallel, other metrics, such as the ratio of value added of world goods exports to the value of world GDP and real goods exports as a share of real GDP, have also plateaued or even declined since 2008.[29]

Multiple factors are pushing a reconfiguration of GVCs towards regional or domestic value chains. A host of factors is pushing the relocation of previously offshored manufacturing activities (reshoring). This tends to shorten GVCs either through backshoring (relocation to the home country of the lead firm) or nearshoring (relocation to countries close to the lead firm's headquarters). These factors include domestic tensions due to de-industrialization in advanced economies, automation, and other technological advances, strategic considerations, and the attempt to increase the resilience of supply chains. Increasing geopolitical tensions and industrial policy packages aimed at strategic autonomy are further pushing these trends.[30]

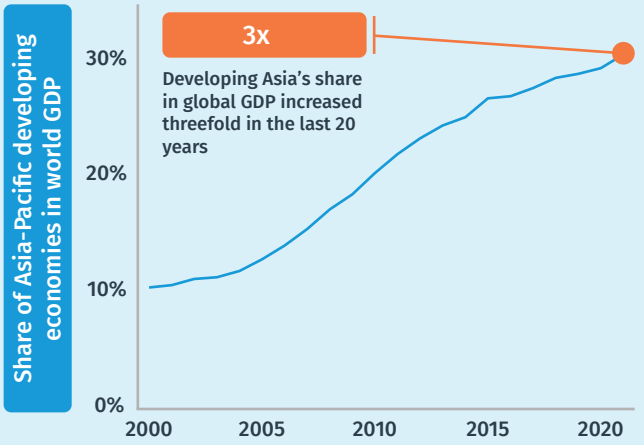
Changes in the global production structure might have negative impacts on sustainable development. The potential impacts are substantial. Backshoring, for instance, might negatively impact economic and social dimensions (SDGs 1, 4, 5, 8 and 9) in developing countries now hosting relocating firms.[31] While evidence confirming the extent of the phenomenon is



still scarce, the reshaping geography of foreign direct investment (FDI) suggests that Asia is losing market share compared to all other regions. The evidence is not yet clear whether other developing economies can benefit from these relocations. So far, only Europe has registered an increase in inflows.[32]

Export-led industrialization might become more difficult for developing countries. In a world where globalization is at least partially receding, the global geopolitical landscape becomes more tense and new labour-saving technologies make reshoring an appealing alternative, it might be more difficult to grow through trade. The export-oriented industrialization strategy that drove the rise of Asia, depicted in Figure 1.5, is less likely to succeed in the current scenario. Without clear, successful models to emulate in the new context, policymakers need to build greater capacity to learn about new opportunities, constraints and what works.[33]

Figure 1.5 **The rise of Asia-Pacific**



Note: Asia-Pacific economies classified as high-income industrial economies by UNIDO are excluded.

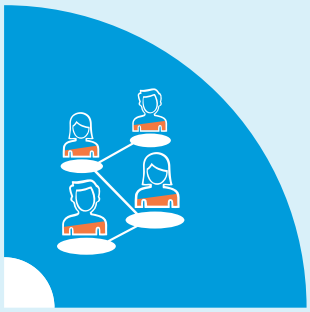
Source: UNIDO elaboration based on UNSD (2023b).

1.2.4 Demographic transitions

The global structure of the population is changing, both within and across regions. More than half of the projected increase in global population up to 2050 will be concentrated in just eight countries across Africa and Asia.[34] In 2022, the combined population of Europe and Northern America exceeded 1.1 billion people, a number comparable to that of sub-Saharan Africa, which is 1.2 billion. Since the mid-1960s, Europe and Northern America have been experiencing slow population growth and have reached a growth rate close to zero in recent years. On the other hand, the annual population growth rate of sub-Saharan Africa peaked at 3 per cent in 1978 and remained above 2.8 per cent during the 1980s. Since the 1980s, sub-Saharan Africa has been the region with the fastest growing population.[35] Population structure also differs significantly across regions. While the proportion of persons aged 65 or over is projected to increase globally between 2022 and 2050 (Figure 1.6), the largest proportion of older population in 2022 was in Europe, Northern America, Australia and New Zealand. Ageing in these regions will continue to rise. The population in Latin America and the Caribbean (LAC) and Eastern and South-Eastern Asia is also ageing relatively fast, while sub-Saharan Africa has the youngest age distribution.

By 2050, Africa's population will be three times larger than in 2000. Projections show that countries in Africa will contribute to more than half of the global population increase anticipated through 2050, and are expected to continue growing through 2100. Due to persistent high fertility rates in the region, the population growth will be accompanied by an increase in working-age population, which is expected to increase by 740 million by 2050, more than doubling from its current level of 630 million people.[36]

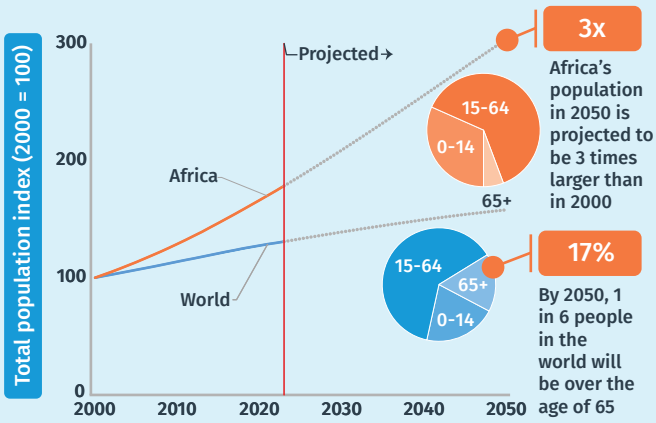
Demand for food and energy will continue to grow as world population increases. This will put additional pressure on resources and create challenges for achieving the SDGs. Indeed, rapid population growth is a major underlying force of environmental degradation. It threatens the sustainable use of natural resources, often leading to overexploitation, intensive farming, and land fragmentation.[37] Moreover, rapid population growth tends to be coupled with



urbanization, causing an overwhelming increase in energy demand that has historically imposed substantial pressure on the environment.[38]

The need to create productive jobs will be even more acute in Africa and developing Asia-Pacific. With many countries in these regions experiencing the highest average annual population growth, and adding working-age populations for the next decades, there is a potential opportunity for development known as the "demographic dividend".[39] However, to maximize the potential benefits, productive employment and decent work are key. This is a substantial challenge as these countries already struggle to transition vast amounts of labour from agriculture and informal sectors into modern productive sectors.

Figure 1.6 **A changing global demographic structure**



Source: UNIDO elaboration based on UNDESA (2023b).

1.3 RESPONDING TO THE GLOBAL CHALLENGES

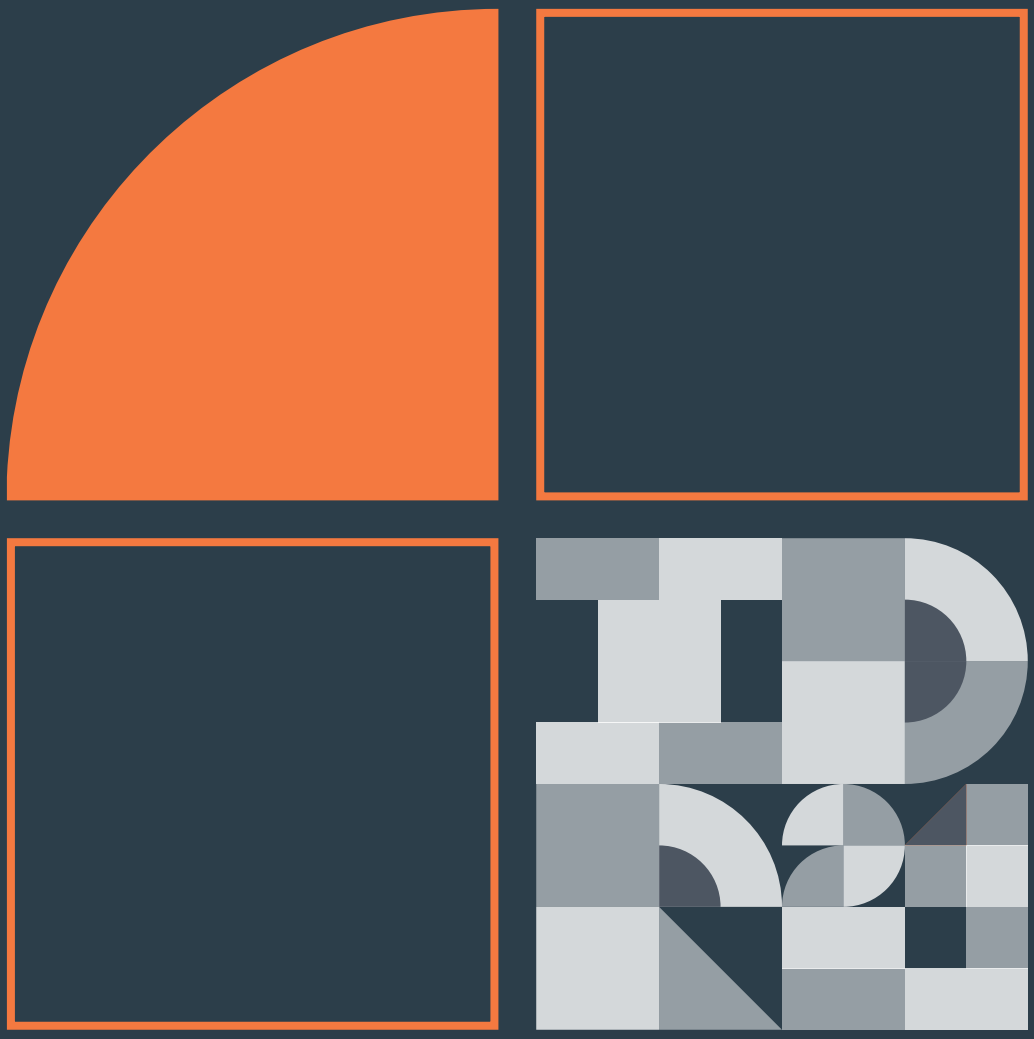
Government actions are needed to ensure a rapid recovery from the polycrisis and accelerate progress toward sustainable development. Challenges continue to increase, and the slow progress achieved so far shows that solutions are not appearing spontaneously. Massive investments and suitable policies will be key in reversing this situation. In developing countries in particular, the challenges posed by climate change require the scaling up of investments for mitigation and adaptation. Moreover, the recent massive policy packages launched in many advanced economies mean that developing countries must take action to avoid being sidelined.

An effective response to the world's challenges must focus on industry. As the next sections of this report will demonstrate, the industrial sector is one of the most powerful engines of progress and recovery due to its ability to absorb work, create linkages with the rest of the economy and provide learning opportunities. These and other characteristics make achieving SDG 9 crucial. The industrial sector also contributes to the achievement of other SDGs due to the spillover effects it generates.


WALTON

ENDNOTES

[1] Allouche et al. (2023) and WEF (2023a).
[2] UNIDO (2019a).
[3] UN Global Crisis Response Group (2022a, 2022b, 2022c).
[4] WMO (2024).
[5] World Bank (2022a).
[6] FAO et al. (2023).
[7] WMO (2021).
[8] Newman and Noy (2023).
[9] Independent Group of Scientists appointed by the Secretary-General (2023).
[10] See Altenburg et al. (2022) and UN (2020) for a more exhaustive analysis of the megatrends that are reshaping the world.
[11] Rouzet et al. (2019).
[12] IPCC (2023).
[13] Andreoni (2024).
[14] IEA (2024).
[15] Andreoni (2024).
[16] Lebdioui (2022).
[17] Eicke and Weko (2022).
[18] Lebdioui (2022).
[19] UNIDO (2019a).
[20] UNCTAD (2020).
[21] Gilli et al. (2020).
[22] UNIDO (2019a).
[23] Lee (2018).
[24] Rodrik (2018).
[25] Delera et al. (2022).
[26] Nayyar (2019).
[27] Global trade openness is defined as the sum of exports and imports of all economies relative to global GDP.
[28] Aiyar and Ilyina (2023).
[29] Baldwin et al. (2023) and Zhan (2021).
[30] Elia et al. (2021).
[31] Di Stefano et al. (2023).
[32] IMF (2023).
[33] Rodrik and Stiglitz (2024).
[34] The Democratic Republic of the Congo, Egypt, Ethiopia, India, Nigeria, Pakistan, the Philippines and the United Republic of Tanzania.
[35] UNDESA (2022).
[36] World Bank (2023b).
[37] Maja and Ayano (2021).
[38] Jiang and Hardee (2011).
[39] Hosan et al. (2022) and UNDESA (2022).



CHAPTER 2 INDUSTRY BRINGS SOLUTIONS

Investing resources into activities that produce the strongest multipliers is crucial for accelerating progress towards achieving the SDGs. This chapter argues that manufacturing industries are particularly well-suited for this purpose due to their significant direct and indirect effects on achieving several SDGs. These effects are driven by the manufacturing sector's high innovation capacity and strong linkages with other sectors of the economy. Data confirm that industry plays a key role in accelerating economic growth, fostering innovation, creating jobs, reducing poverty and hunger, promoting equality and fighting climate change. However, potential alone does not mean realization. The capacity for modernization, competitiveness and sustained progress in the industrial sector hinges on deliberate industrial policy actions. The chapter highlights a recent revival in the interest and application of industrial policy. It also raises concerns about the divergent scopes of industrial policy implementation between advanced and developing countries, which could increase existing global divides.

Ha-Joon Chang

"Throughout the history of capitalism, most countries that have transformed their economies from low to high income have achieved this through industrialization. This is because manufacturing remains the driver of productivity growth and technological development. Even for many non-manufacturing activities, manufacturing is the driver of productivity growth: the world's most productive agricultural economies are heavy users of agricultural chemicals and machinery. The world's most productive service economies rely on top-tier computer technology, transport equipment and mechanized warehouses. Developing countries should not be tricked into thinking that they can skip the industrialization phase. Factories have made the modern world, and they will continue to reshape it."

Research Professor at SOAS University of London and Co-Director of the Centre for Sustainable Structural Transformation

2.1 ACCELERATING THE SDGS THROUGH INDUSTRY

When resources are scarce, they should be allocated to activities with the strongest multipliers. The scenario depicted in Chapter 1 calls for an urgent course correction that should accelerate progress on the SDGs. How to achieve such a change is still a matter of debate. An important consideration in addressing this issue is that developing countries have limited resources. Appropriate actions should focus on the sectors and activities that have the largest potential to amplify impact across the various dimensions of sustainable development.

Industry is particularly well-suited for this purpose. Policies that strengthen productive and innovation capabilities in the industrial sector are particularly well-suited to permeate to other SDGs, considering industry's strong linkages and multiplier effects on the rest of the economy. This section reviews the role that industry can play in accelerating the SDGs. As will be shown, manufacturing industries are key to accelerating growth, fostering innovation, creating jobs, reducing poverty and hunger, creating more equal societies, and fighting climate change.[1]

There are two complementary channels of action. Industry drives sustainable development through direct and indirect channels. Industry directly contributes to achieving certain goals by providing goods, creating jobs and accelerating technological change and economic growth. On the other hand, industry also contributes indirectly to achieving certain goals through its direct impact on other related goals.

From general correlations to specific channels of impact. This chapter provides a simple framework to map the direct and indirect impacts of industry on sustainable development and presents fresh empirical evidence to support some of the key mechanisms at play.

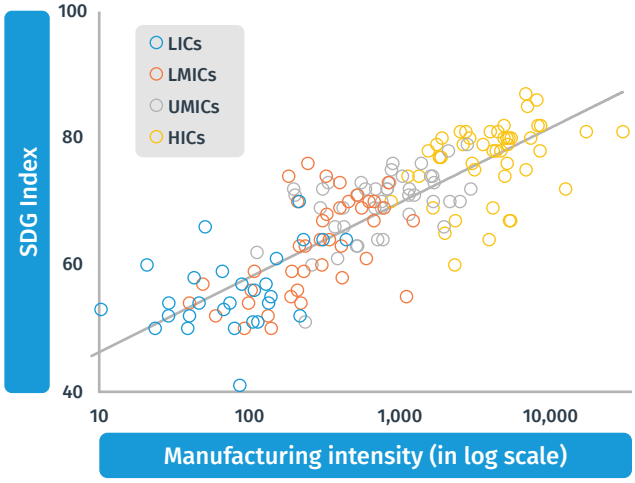
2.1.1 Connecting industry to the SDGs: the big picture

Industrialization goes hand in hand with the achievement of sustainable development. Cross-country evidence indicates a positive relationship between industrialization and SDG progress, suggesting that SDG 9 (i.e. industry-related targets) is fundamental to achieving other SDGs (Figure 2.1).

Industry shows direct positive correlations with most of the socioeconomic SDGs and some of the environmental SDGs. The overall positive correlation between manufacturing and sustainable development is observed when analysing the correlation between SDG 9 and other individual SDGs. Following a growing literature on this matter,[2] this report conducts a correlation analysis to identify the level of association between the achievement of all possible pairs of SDGs (Figure 2.2).[3]

SDG 9 is the one that most often ranks in the top three highest correlated SDGs. Data show evidence of the important direct links between SDG 9 and other SDGs. The results reported in Figure 2.2 (see right panel) indicate that SDG 9 has the highest correlation to clean energy (SDG 7). It ranks second for gender equality (SDG 5), decent work and economic growth (SDG 8), reduced inequalities (SDG 10), responsible production (SDG 12), and partnerships (SDG 17). SDG 9 ranks third for good health (SDG 3) and sanitation (SDG 6). In total, SDG 9 ranks amongst the top three SDGs in terms of correlation to the other eight SDGs. As discussed in the following sections, the direct links are complemented by indirect links, which may be even more important than the direct ones.

Figure 2.1 **Industrialization and SDG progress**

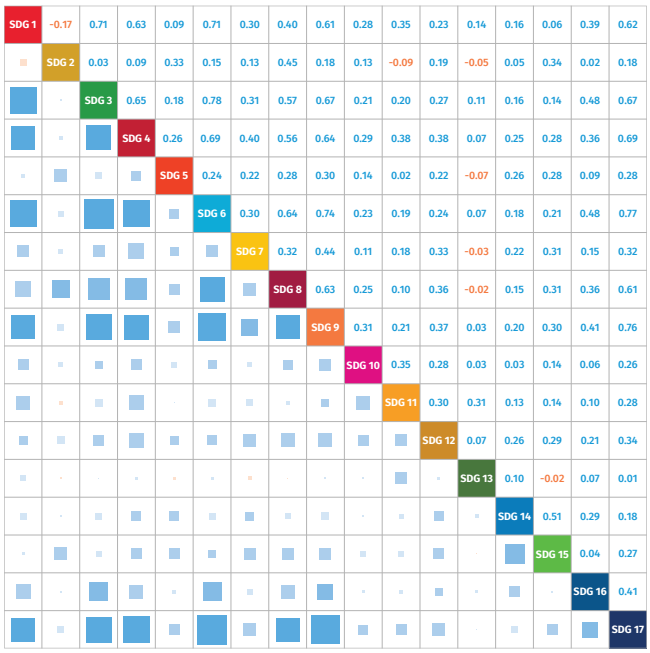


Note: Manufacturing intensity refers to each country's manufacturing value added (MVA) per capita. The line represents the coefficient of linear regression, and is based on 163 countries with available data. The SDG index is taken from Sachs et al. (2022). These indicators are aligned with but are not identical to the official SDG indicators. LICs = Low-income countries; LMICs = Lower-middle-income countries; UMICs = Upper-middle-income countries; HICs = High-income countries.

Source: UNIDO elaboration based on Sachs et al. (2022) and UNIDO (2023b).

From correlation to causality. A simple association between variables does not mean causality. Whether progress towards SDG 9 leads to progress towards other SDGs or vice versa, depends on the specific channels at play. The next subsections describe the specific channels linking industry to the achievement of other SDGs and presents fresh empirical data that substantiates some of these channels.

Figure 2.2 **Spearman's global SDG correlations**



	Top 3 SDGs in terms of correlations		
SDG	1st	2nd	3rd
SDG 1	SDG 6	SDG 3	SDG 4
SDG 2	SDG 8	SDG 15	SDG 5
SDG 3	SDG 6	SDG 1	SDG 9
SDG 4	SDG 6	SDG 17	SDG 3
SDG 5	SDG 2	SDG 9	SDG 15
SDG 6	SDG 3	SDG 17	SDG 9
SDG 7	SDG 9	SDG 4	SDG 12
SDG 8	SDG 6	SDG 9	SDG 17
SDG 9	SDG 17	SDG 6	SDG 3
SDG 10	SDG 11	SDG 9	SDG 4
SDG 11	SDG 4	SDG 10	SDG 1
SDG 12	SDG 4	SDG 9	SDG 8
SDG 13	SDG 11	SDG 1	SDG 3
SDG 14	SDG 15	SDG 16	SDG 12
SDG 15	SDG 14	SDG 2	SDG 7
SDG 16	SDG 6	SDG 3	SDG 17
SDG 17	SDG 6	SDG 9	SDG 4

Note: The left panel displays the correlation values between each pair of SDGs (above the diagonal). These values are represented by the size and colour intensity of the squares (below the diagonal). The right panel shows the three SDGs that have the highest correlation with the SDG of each row (i.e. the highest value on the corresponding row of the matrix).

Source: Background note prepared by Haraguchi et al. (2024), based on UNSD (2023a).

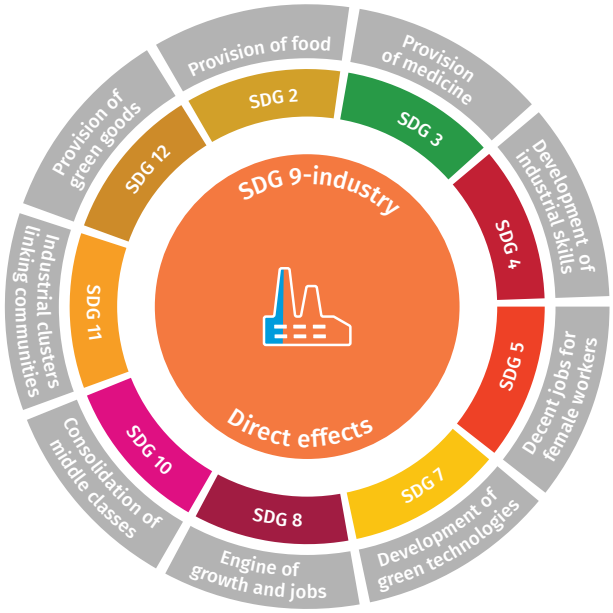
2.1.2 Direct effects

Direct effects derive from the provision of goods, creation of jobs and development of technologies. From a conceptual perspective, it is possible to establish several direct channels connecting the development of industry and the achievement of other SDGs beyond SDG 9 (see Figure 2.3). These links are primarily related to the direct outcomes of industry in terms of: a) providing goods that are at the core of meeting the needs underlying some SDGs (i.e. SDG 2, SDG 3, SDG 12); b) creating job opportunities of higher quality than the existing ones (relevant for SDG 5, SDG 8 and SDG 10); c) creating the technological innovations needed for achieving the targets of other SDGs (i.e. SDG 7, SDG 8 and SDG 9); and d) creating enabling conditions that have significant ramifications on other dimensions of development (i.e. SDG 4 and SDG 11). This section provides selected empirical evidence to show the direction of causality in the most relevant links.

Innovation (SDG 9)

Manufacturing industries are the hub of new technologies and innovation. A long tradition of economic thinking puts the industrial sector at the forefront of development due to its higher potential to drive innovation and technological change when compared to other sectors of the economy.[4] Industrialization is a major avenue for countries to strengthen their innovation capabilities and the domestic development of new technologies. In terms of the SDGs, this channel takes place with SDG 9 related to industry and innovation.

Figure 2.3 **Direct effects of industry on other SDGs**



Source: UNIDO elaboration.

Data show that research and development (R&D) expenditures are driven by manufacturing. The importance of the manufacturing sector in driving technological change becomes visible when looking at the distribution of R&D expenditures across major sectors of the economy (Figure 2.4). Internationally comparable data indicate that on average, manufacturing is the largest sector in terms of R&D expenditures, accounting for more than half of total expenditure. This share is disproportionately large when compared

to the relative size of manufacturing in the sample of countries considered (which stands at *only* 16.7 per cent of GDP for the same period). The R&D intensity of manufacturing, known as the share of R&D investments over the sector's total value added, is almost five per cent, an outstanding mark compared to other sectors and the economy-wide total.

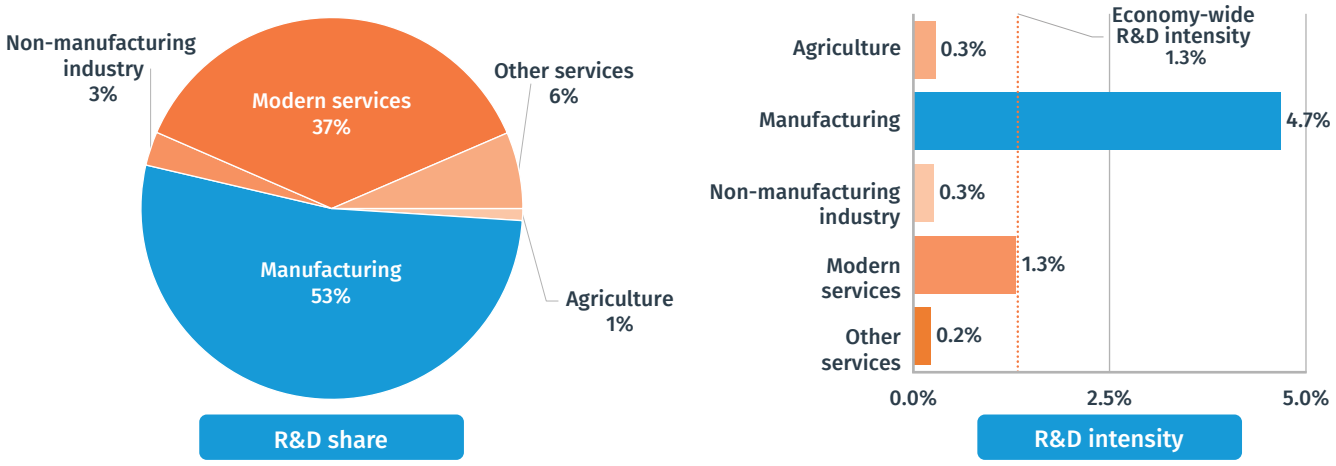
Manufacturing firms lead patenting activity in frontier technologies. The leading role of manufacturing industries in R&D investments is translated into higher levels of innovativeness compared to other sectors of the economy. Recent empirical evidence shows that the lion's share of new patents in some of the core activities of the digital and green technological revolutions is registered by manufacturing firms. This is the case, for instance, in the patent applications for robotics (about 60 per cent), AI (40 per cent) and green technologies (60 per cent).[5] The significance of manufacturing holding the majority share of new technological patents is noteworthy because this sector contributes only 21 per cent[6] to all global GDP. This demonstrates the higher innovativeness and potential of industry, compared to other sectors.

Economic growth and jobs (SDG 8)

Manufacturing is the engine of economic growth. Economic growth and development are positively correlated with industrialization.[7] This empirical regularity is supplemented by a large body of literature emphasizing the role of manufacturing as the key "progressive sector". Several reasons explain this unique role. Manufacturing has a higher potential to benefit from static and dynamic economies of scale than other sectors of the economy. At the same time, the expansion of manufacturing tends to increase the productivity level of the economy, raise the level of savings necessary to fund investment, foster technological innovation, and create foreign exchange. Moreover, manufacturing has the strongest potential to stimulate the rest of the economy through productive linkages and technological spillovers.[8]

A focus on growth episodes. The research prepared for this report provides new evidence on the manufacturing-growth nexus by looking into so-called "growth episodes" and the role that manufacturing has played in recent history. A growth episode is a period of at least eight consecutive years during which GDP per capita grows by more than 2 per cent per year.[9] Focusing on growth episodes provides a more comprehensive framework for understanding a country's development path compared to traditional approaches centred on long-term growth averages.[10] Using data from the United Nations National Accounts, which include more than 200 economies, the analysis identified all growth episodes that took place in the last half-century and characterized them along several dimensions, including their length, speed, cumulative growth in per capita income and achievements of income graduation (i.e. transitions across income categories). Moreover, the analysis also puts forward an approach to distinguish growth episodes led by manufacturing industries from other types of growth episodes. Manufacturing-led episodes are defined as those in which manufacturing industries were growing faster than the overall economy during the first quarter of the episode.[11]

Figure 2.4 **Manufacturing is the hub of R&D worldwide**



Note: The figure shows the average values for the period 2015-2019. The sample includes 38 countries with available and comparable data. Research and development (R&D) intensity is defined as the ratio between sectoral R&D expenditures and value added. All values are in current prices. Data only include the R&D conducted by business enterprises. The aggregate of non-manufacturing industry includes mining, utilities and construction (ISIC codes B, D and E); and the aggregate of modern services includes transport, communication, finance and business services (ISIC codes H, J, K, L, M and N).

Source: UNIDO elaboration based on OECD (2023a) and Kruse et al. (2023).

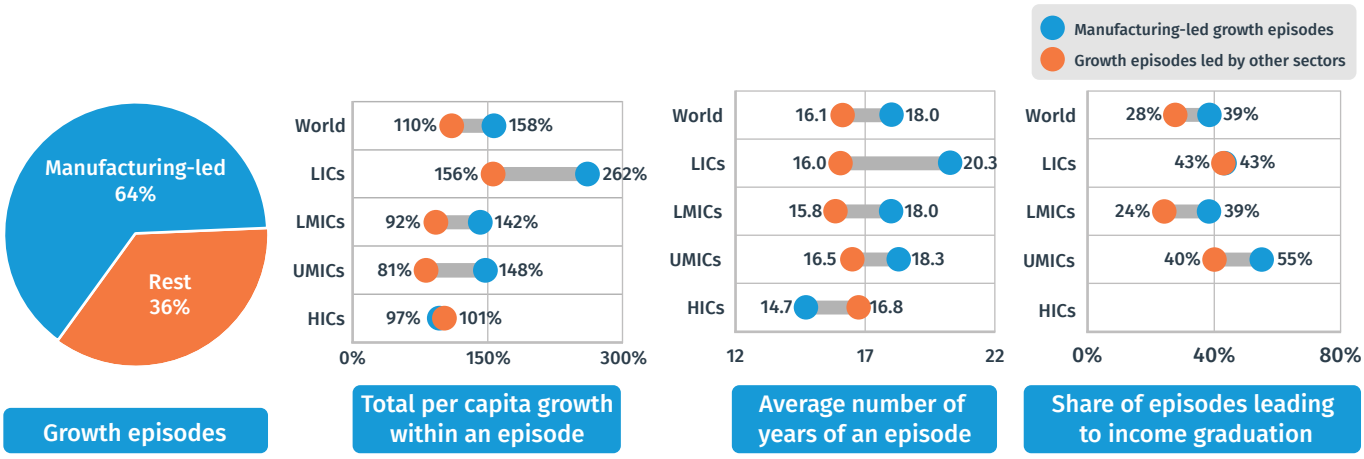
Two-thirds of the growth episodes recorded in the last 50 years were led by manufacturing. The results from the analysis are telling. Of the 213 growth episodes identified between 1970 and 2020, 137 (64 per cent) can be classified as manufacturing-led (Figure 2.5). Besides being more frequent, manufacturing-led episodes also tend to be qualitatively better than the rest. As shown in the right-hand panels of Figure 2.5, the total income generated has been, on average, higher in manufacturing-led episodes than in others (158 per cent versus 110 per cent), typically because these episodes tend to last longer over time (18 years instead of 16, on average). More importantly, income graduations are more common during manufacturing-led episodes. Manufacturing-led episodes are particularly important for developing countries. The widest positive differences are observed in the low, lower-middle and upper-middle-income level categories. For high-income countries, manufacturing-led episodes tend to be shorter and create less overall income.

Evidence highlighting manufacturing as an engine of growth. Backed by datasets from different countries and using various methodological approaches, several studies have confirmed that manufacturing is the main engine of economic growth. Some of these contributions look into the relationship between manufacturing size and long-term economic growth and find a positive and significant relationship.[12] Other contributions highlight the role of manufacturing in driving aggregate productivity,[13] while additional studies focus on the importance of manufacturing in terms of inter-sectoral linkages and effects.[14] The results obtained by these contributions show that manufacturing directly contributes to economic growth by increasing productivity, and indirectly through structural transformation. These positive spillovers spread to other economic sectors through learning and knowledge diffusion. By contrast, such direct and indirect effects are not observed for non-manufacturing sectors.

Industry and job creation. Besides the direct industrialization-growth nexus, the industrial sector also stabilizes the economy by providing well-paid and high-quality jobs.[15] Industry's potential to provide a large and growing number of stable and well-paid jobs varies considerably across countries and regions, owing to historical heritage and institutional factors. However, a common feature remains: informality rates are lower in this sector than in the rest of the economy. With an estimated 67 per cent of informal employment in emerging economies and 89 per cent in low-income developing economies, informal employment is a ubiquitous phenomenon.[16] This is highly relevant for the expansion of decent jobs because informal employment is strongly associated with vulnerable employment. Recent estimates show that the industrial sector is a key contributor to reducing vulnerable employment.[17]

Moving beyond the factory. Growth in manufacturing output also creates new jobs in other sectors of the economy through indirect input-output linkages. Given the manufacturing sector's strong backward and forward linkages with the rest of the economy, its employment generation potential is much higher than the jobs it directly creates. A full assessment of the jobs created by manufacturing industries should

Figure 2.5 **Growth episodes are mostly fuelled by manufacturing industries**



Note: Growth episodes are defined as a period of at least eight years in which GDP per capita grew more than 2 per cent a year. The average income-level results are based on each country's income category at the beginning of the growth episode. The income categories are taken from Lavopa and Szirmai (2018). Income graduation refers to transitioning to a higher income category during the growth episode. LICs = Low-income countries; LMICs = Lower-middle-income countries; UMICs = Upper-middle-income countries; HICs = High-income countries.

Source: Background policy brief prepared by Lavopa and Riccio (2024a), based on Lavopa and Szirmai (2018) and UNSD (2023b).

account for the whole industrial ecosystem, including all providers. The research conducted in this report estimates sectoral employment multipliers by using the best available data on inter-country input-output relations.[18]

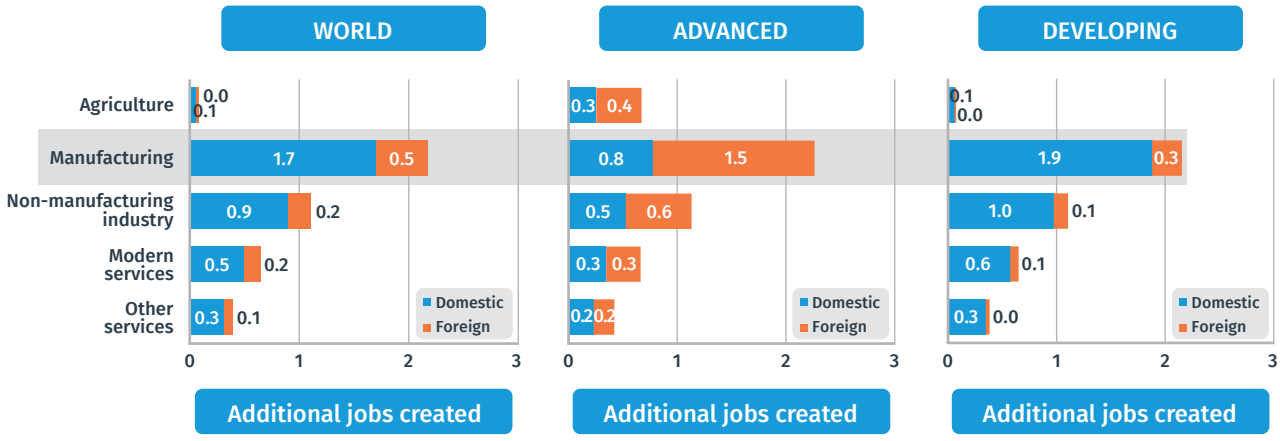
Looking into cross-border input-output multipliers. The analysis combines data from the OECD Inter-Country Input-Output tables, the OECD Trade in Employment database and ILO Modelled Estimates data. Based on the combined data, the analysis estimates the number of jobs needed to produce the goods and services delivered by different sectors of the economy in a total of 76 economies (33 advanced, 43 developing). These estimates differentiate the jobs created in the same country from those generated in other countries that produce key inputs and materials which are later imported.

Every job in manufacturing creates more than two jobs in other sectors of the economy. The results clearly demonstrate that the manufacturing sector has the largest potential to generate jobs compared to other economic sectors (Figure 2.6). The analysis focuses on five macro-sectors of the economy, and reports on the average multipliers for each sector at the world level and distinguishes between advanced and developing countries. Globally, the analysis shows that for every job directly created in manufacturing, 2.2 jobs are created in other sectors. On average, 1.7 jobs are generated domestically, while 0.5 are created outside the country. These multipliers double those of non-manufacturing industry and are three times higher than the average multiplier of modern services. The same is true when looking at the subsets of advanced and developing countries. In these cases, large differences emerge between domestic and foreign multipliers. In advanced countries, most of the multiplying effect tends to create jobs internationally, while in developing countries, most jobs are created domestically. In this case, every direct job created in manufacturing generates almost two jobs in other sectors of the same economy.

New technologies may challenge the potential of job generation in industry. Achieving high and sustained productivity growth in the industrial sector is essential for stimulating economic growth and generating well-paid and decent jobs. But new technologies could pose challenges to industrial jobs. Accelerating technological progress in robotics, artificial intelligence, and other advanced digital production (ADP) technologies may put many traditional manufacturing occupations (e.g. "blue-collar workers") at risk. So far, empirical evidence suggests that disappearing jobs are compensated by the emergence of new jobs.[19] For this process of creative destruction to function properly, countries must build strong industrial skills and ecosystems that gain positive social and economic impacts from emerging digital technologies.

Strengthening local industrial ecosystems is key to creating jobs and accelerating economic growth (SDG 8). Irrespective of a county's initial position, active engagement with ADP technologies requires support from computer and related services, R&D services, and other knowledge-intensive business services (KIBS). This underlines the strong links between

Figure 2.6 **Manufacturing has the largest potential to create jobs**



Note: The bars in the graphs show the size of total employment multipliers defined as the number of jobs created outside one sector for each direct job created within that sector. The colours distinguish between the jobs created in the same economy (blue) and those created in other economies (orange). The multipliers cover 76 countries in 2020, and are estimated by using input-output techniques. Advanced countries are defined as those classified as high-income industrial economies by UNIDO. Developing countries include all other economies. The aggregate of non-manufacturing industry includes mining, utilities and construction (ISIC codes B, D and E); and the aggregate of modern services includes transport, communication, finance and business services (ISIC codes H, J, K, L, M and N).

Source: Background policy brief prepared by Lavopa and Riccio (2024b) based on ILO (2023) and OECD (2023b, 2023c).

manufacturing and other parts of the economy, as reflected in the multipliers presented above. At the same time, these KIBS rely strongly on new products from the manufacturing sector, such as semiconductors, optical fibres, robotics systems or intelligent sensors. The growing interconnection of business services and industrial production gives rise to considering it as an industrial ecosystem.[20]

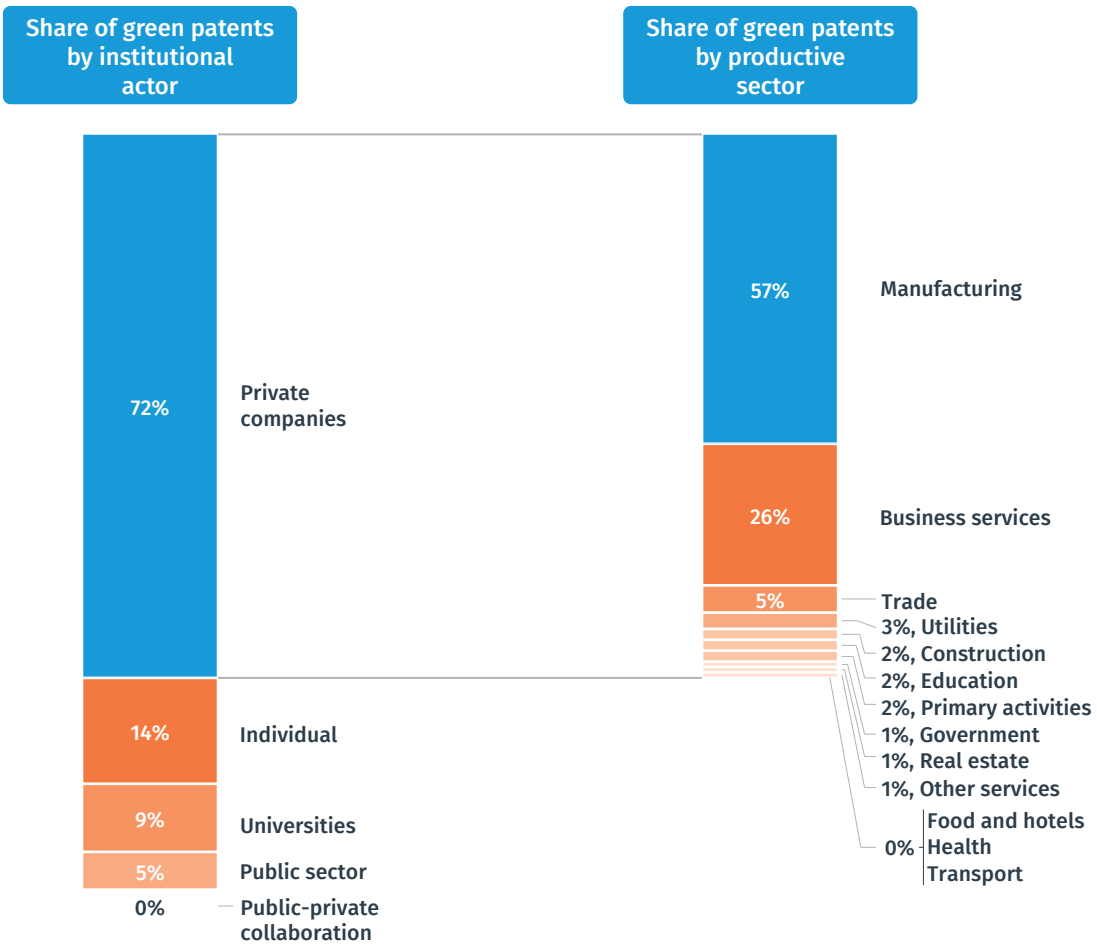
Green technologies and the energy transition (SDG 7)

Industry and green technologies. Developing green technologies is a precondition for achieving the energy transition as it ensures affordable and clean energy for all while effectively addressing climate change. As discussed, manufacturing plays a prime role in creating and diffusing green technologies to achieve SDG 7 and other SDGs related to environmental sustainability.

Using patents to explore sectoral innovation. The research conducted for this report provides fresh evidence of the role of manufacturing in pushing the world's frontier in green technologies.[21] The analysis focuses on the sectoral origins of green patents, defined as patents for technologies that control, reduce or prevent greenhouse gas emissions, or allow for the adaptation of the adverse effects of climate change.

Almost 60 per cent of green patents worldwide are owned by industrial firms. The analysis results indicate that in 2022, manufacturing firms owned 57 per cent of green patents from private sector companies (Figure 2.7). Green innovation activity was the second highest in business services, which held 26 per cent of green patents. The significance of manufacturing in driving green innovation becomes clearer when we consider proportionality. Whereas manufacturing firms hold almost 60 per cent of all green patents, they only represent 10 per cent of the total population of firms in the dataset. This disproportionate participation in green innovation underscores the greater potential that the manufacturing industry has in driving technological change compared to other sectors of the economy.

Figure 2.7 **Green patents by institutional actor and production sector in 2022: the role of manufacturing**



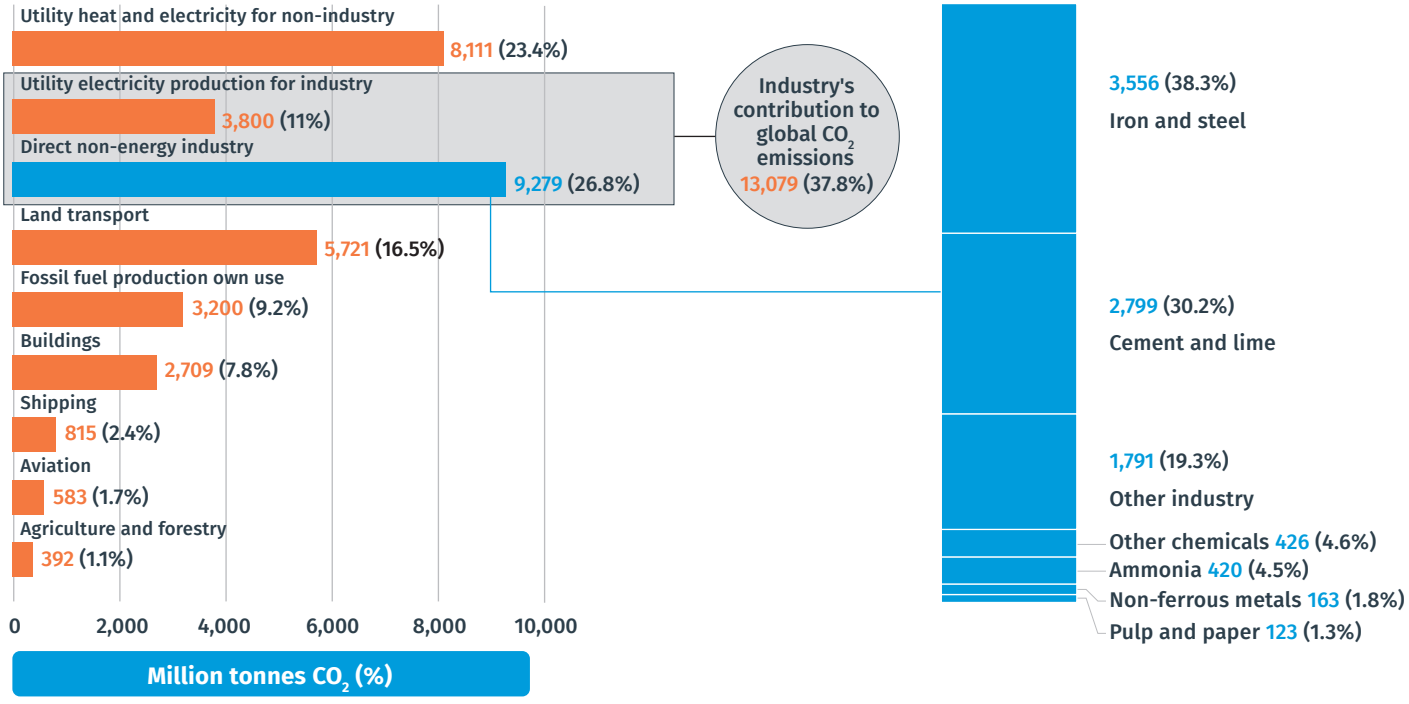
Source: Background policy brief prepared by Lavopa and Menéndez (2023) based on BvD (2023) and EPO (2023).

Once a core problem, manufacturing is becoming part of the solution to climate change. This finding highlights an important aspect of industry in driving sustainable development, which is often overlooked. Besides being the main engine of economic growth and productive job creation, the industrial sector is also the prime hub of global innovation and the leading engine of green technology creation. Once the source of the problem, industry is now becoming a key contributor to finding solutions for climate change.

Industrial decarbonization is key to achieving SDG 7. Beyond contributing to the creation of green technologies, manufacturing can also make a direct contribution to the achievement of SDG 7 by increasingly relying on clean energy sources to ensure a transition towards net-zero carbon dioxide (CO_2) emissions.

One-third of global CO_2 emissions can be reduced by industrial decarbonization. About one-third of global combustion and CO_2 emissions originate from non-energy production industries, with 70 per cent stemming from industries commonly referred to as "heavy", "hard-to-abate" or "hard-to-transition", such as steel, cement and chemicals (see Figure 2.8). These emissions can be significantly reduced through tailored approaches at the sectoral and regional levels, including improved material efficiency, enhanced recycling in both quantity and quality (i.e. transparent circularity), and the decarbonization of production processes while maximizing energy efficiency. Reducing emissions requires the electrification of existing processes, transitions to ultra-low greenhouse gas (GHG)-emitting fuels and feedstock, and adopting carbon management strategies such as carbon capture and storage. These strategies can also significantly contribute to improved local air quality.[22]

Figure 2.8 **Industry's contribution to global emissions in 2020**



Source: Background policy brief prepared by Bataille and Alfare (2023) based on IEA (2023a).

Other SDGs

Industry and food security (SDG 2). From a conceptual perspective, there are reasons to expect a direct positive link between SDG 9 and SDG 2, which focus on ending hunger and achieving food security. Broadly speaking, five elements define food security: the availability of food in local markets; access to food by all households in urban and rural areas; effective utilization of food in the household; the stability of the domestic food supply; and the sustainability of the food system on which all these components depend.[23] The industrial sector plays a crucial role in most of these elements. The availability of food depends on the quality and capabilities of domestic food processing industries. Access to food, in turn, depends on agricultural prices, which have historically been shaped by industrialization.[24] A major force behind price reduction in agricultural products are the productivity gains related to new technologies

developed in the industrial sector, such as tractors,[25] fertilizers[26] and agricultural drones.[27] Industrialization improves food security and rural livelihoods through innovations from farm to fork.

Industry and health (SDG 3). As seen in Figure 2.2, SDG 3 is highly correlated with SDG 9. The prime role of industry in providing affordable medicines and supporting the health sector suggests a direction of causality from SDG 9 to SDG 3. In many low- and middle-income countries, millions of people do not have access to essential medicines, vaccines and medical treatment in case of illness. From an organizational perspective, this depends first and foremost on national public health systems, but it is also a question of providing pharmaceuticals and medical equipment at a reasonably low cost. Technological progress in the manufacturing sector, notably in the pharmaceutical, medical and optical equipment industries, is decisive for improving the healthcare situation of people around the world. The COVID-19 pandemic has exposed the global interdependences, and the fact that protection for humans – in this case, in the form of vaccine, can be developed in record time with appropriate financial support and political determination.

Industry and education (SDG 4). The correlation matrix indicates a high association between SDG 9 and SDG 4, though the value was slightly below the third-highest position. In this case, the direction of causality is less straightforward. Most likely, there is cross-fertilization between the two goals. On the one hand, the productivity and wage premiums in manufacturing vis-à-vis other sectors of the economy reflect its higher capital and skill requirements. A high demand for industrial skills, in turn, supports educational objectives (SDG 4), including raising the participation rate in education and training, whether formal or informal. Additionally, high levels of human capital are important determinants of industrial development, especially at advanced stages when high-tech industries take the lead in structural change.[28]

Industry and gender equality (SDG 5). According to the correlation analysis conducted earlier, SDG 9 ranks second when associated with SDG 5. This underscores the crucial role that industrialization can play in promoting gender equality, primarily by creating decent job opportunities for women. Industrial development plays an important role in creating jobs and fostering the higher educational attainment of women, especially in countries pursuing export-led, labour-intensive industrial strategies.[29] According to some authors, the relationship between industrialization and gender equality follows a U-shape, with women's labour force participation declining during the initial stages of industrialization but rising beyond a certain level of development.[30] The empirical evidence of this relationship is mixed because other important factors, notably women's empowerment in society at large, led to more complex and varied trajectories of gender equality across countries and regions. Moreover, the extent of employment opportunities for women varies greatly across industries due to the "industry gender gap". Consequently this relationship depends heavily on each country's sectoral specialization in manufacturing. The absence of universal patterns emphasizes the important role of policies in ensuring an industrial development conducive to gender equality. For example, this can be achieved by increasing gender awareness in employment challenges related to increasing technological intensity and automation in industry.[31]

Industry and equality (SDG 10). SDG 9 also ranks among the highest goals correlated with SDG 10. Historical records suggest a direction of causality linking industry to the reduction of inequalities. The expansion of industrial workers and related unions is historically linked to the emergence and expansion of the domestic middle class.[32] Middle-class households, especially in countries with low-income levels, allocate larger shares of their disposable income to consume manufactured products, providing further impetus to the sector's development. Furthermore, middle-class households have a higher propensity to save, which supports a country's investment needs. Given these peculiar manufacturing-related characteristics, the sector has great potential to reduce country inequalities. Empirical evidence on global income distribution, which combines the between and within country distributions, suggests that the middle classes in emerging markets have experienced comparatively high real income growth from 2008-2018, contributing to an overall decline in global inequality.[33]

Industry and the environment (SDGs 12). The correlation analysis points towards a high association between the achievement of SDG 9 and SDG 12. Notably, the type of industrialization advocated in SDG 9 should be inclusive and sustainable. Sustainable industrialization plays a crucial role in achieving sustainable consumption and production. It is key in providing the goods and technologies required for the green transition.[34] At the same time, process innovations in production are leading towards more sustainable production practices which are compatible with the targets integrated in SDG 12. Sustainable industrialization implies a radical transformation from past industrialization trajectories. A transformation that significantly curtails emissions and environmental hazards while continuing to provide environmental technologies can help mitigate environmental degradation and reduce emissions in other sectors.

2.1.3 Indirect effects

Production linkages and technological spillovers amplify industry's direct impacts. As seen before, beyond the direct provision of goods and the creation of jobs in factories, industry also plays a vital role in stimulating the development of other sectors of the economy and fostering technological innovations. These characteristics are key to accelerating economic growth and job creation (SDG 8) and the energy transition (SDG 7).

Indirect effects materialize mostly through SDG 7 and SDG 8. Economic growth acceleration and the creation of decent jobs are two primary drivers for achieving socioeconomic goals such as poverty alleviation, zero hunger and gender equality. Industrial innovations for the energy transition are fundamental to achieving environmental goals such as responsible consumption, production and climate action (Figure 2.9).

Industry and poverty eradication. The reduction of poverty provides a clear example of the indirect effects of manufacturing. The direct impact of industry might be small (at least in the short term), as direct jobs on the factory floor are limited and not necessarily accessible for workers from low-income households. However, the strong production linkages of manufacturing with other sectors of the economy and its ability to accelerate economic growth have been two successful factors for countries to reduce poverty in recent global history.

Industry and climate action. The fundamental role of manufacturing in driving green technologies lies at the core of a successful energy transition and the fight against climate change. Manufacturing is crucial for the development of technologies through R&D investments. It is also essential in terms of its capacity to process the inputs and materials required (e.g. rare

Figure 2.9 **Indirect effects of industry on other SDGs**

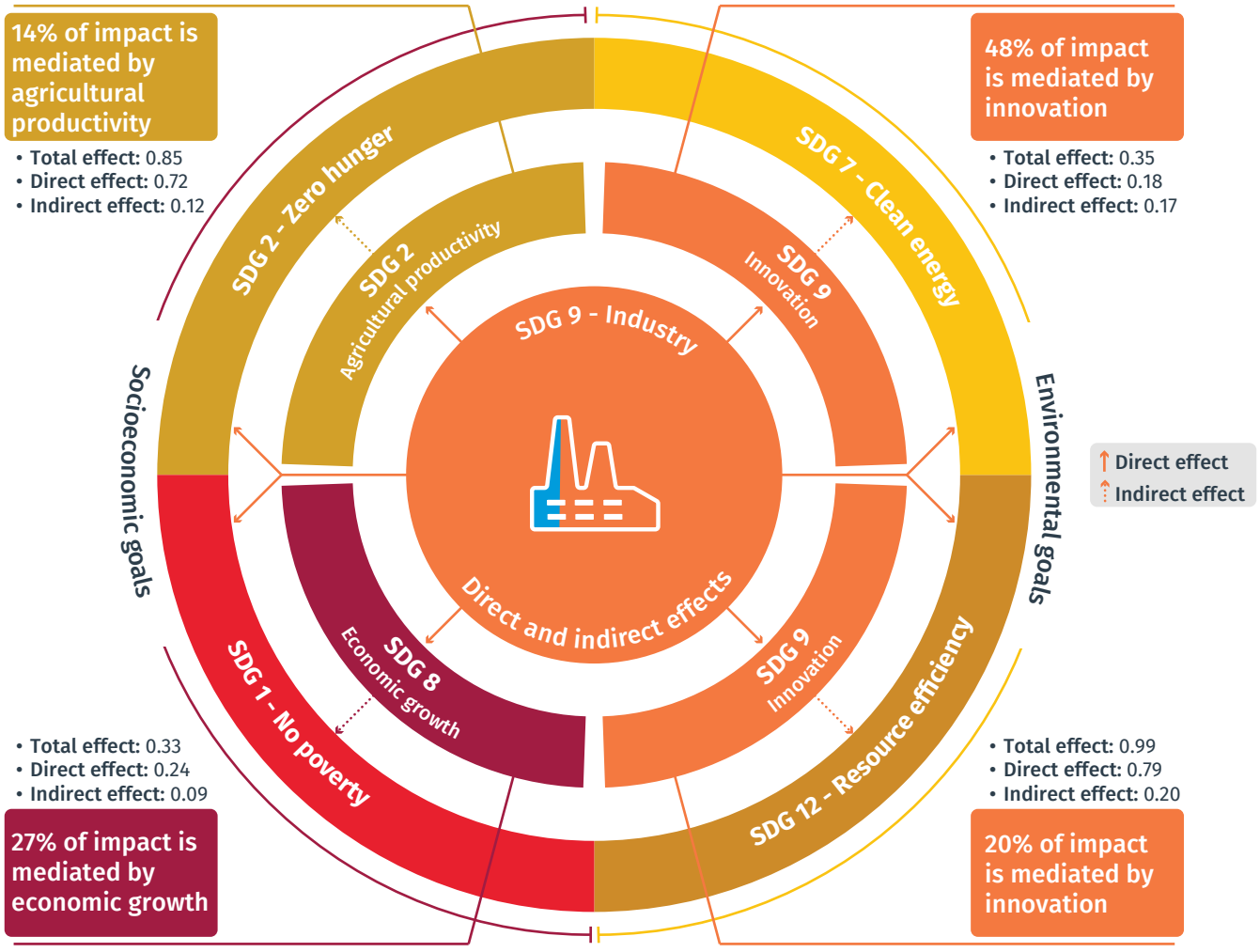
Source: UNIDO elaboration.

minerals), produce components (e.g. batteries) and assemble them into finished equipment (e.g. electric vehicles, wind turbines and solar panels). In short, producing, generating, transporting and storing any clean energy requires technologies that must be manufactured and brought into service.[35]

New empirical evidence shows that indirect effects can be as large as direct ones. The research conducted for this report provides interesting evidence on the relative importance of direct and indirect channels when assessing the developmental impact of industry. Following the approach put forth by Karahasan (2023), the analysis examines the total impact of industrial expansion on selected socioeconomic and environmental dimensions of the SDGs. It also measures the extent to which this impact is mediated by other variables. The main goal is to assess how much of the industry's total impact on certain SDGs is influenced by its impact on other SDGs (Figure 2.10).

Indirect effects are empirically measured using causal mediating analysis. The empirical approach uses econometric techniques in two steps. First, it estimates the impact of industrialization on the SDG dimension that is expected to have an indirect effect on the variable of interest. One example is, for instance, the impact on economic growth when the variable of interest is no poverty. Second, it estimates the impact of industrialization on the variable of interest (e.g. no poverty) alongside the mediating variable (e.g. economic growth), and other variables that could have an impact (e.g. education, urbanization, trade openness, etc.). The total impact of industrialization on the variable of interest is then obtained adding up the direct effect observed in the second step and the impact of the mediated variable that can be attributed to industrial development from the first step. The analysis is implemented based on two key socioeconomic dimensions of the SDGs (no poverty and zero hunger) and two key environmental dimensions (clean energy and resource efficiency).

Figure 2.10 **Direct and indirect effects of industry on selected social and environmental SDG dimensions**



Note: Estimates done using causal mediating analysis techniques on yearly data for 177 developing countries between 2000 and 2021. The SDG 9 related to industry is proxied by the manufacturing share on GDP. Other SDG dimensions are calculated using the approach described in the Annexes.

Source: Background note prepared by Donnelly and Lavopa (2024), based on ILO (2023), UNSD (2023a, 2023b) and World Bank (2023c).

The capacity of industrialization to lift people out of poverty is amplified by its ability to enhance economic growth. The results from the analysis indicate that industrialization has a positive and significant effect on poverty alleviation. This effect operates along two channels. The direct channel (the arrow connecting SDG 9-industry to SDG 1-no poverty) reflects the capacity of the industrial sector to create jobs, increase wages, and thus lift people out of poverty. Additionally, the analysis highlights an indirect effect that operates through the manufacturing sector's impact on economic growth (the arrow connecting SDG 9-industry to SDG 8-economic growth and then SDG 1-no poverty). The results indicate that almost one-third of the total effect (27 per cent) of industrialization on poverty alleviation operates through this indirect channel. This mediating pathway, represented by SDG 8, illustrates how industrialization boosts economic growth and contributes to poverty alleviation.

Industry's direct role in fighting hunger is complemented by its capacity to improve agricultural productivity. The analysis also indicates a positive and significant effect of industrialization on reducing undernourishment and food insecurity. This effect stems from industry's ability to enhance food security through direct channels, such as food production and processing capabilities. It is also complemented by its key role in fostering productivity in other sectors of the economy. According to the results, 14 per cent of the total impact of industrialization on fighting hunger results from its ability to increase agricultural productivity. This boost in productivity, generated by technological innovations and improvements in the agricultural sector and facilitated by industrial advancements, ultimately contributes to the broader goal of eradicating hunger.

Industry has the potential to drive innovation and plays a crucial role in supporting clean energy and resource efficiency. When it comes to environmental goals, the analysis also finds that industrial development has a positive and significant effect on the transition towards clean energy use and the implementation of more sustainable production practices. In these cases, the indirect effect can be as strong as the direct effect. In the case of clean energy, for instance, the results indicate that almost half of the positive effect is due to industry-driven innovation. Indirect effects through innovation also play an important role in resource efficiency, though they account for only 20 per cent of the total effect of industrial development. The significant importance of the indirect effect emphasizes industrial innovation's transformative power in fostering clean energy solutions and circular economy processes. This underscores the sector's instrumental role in transitioning towards sustainable practices through green technologies.

Industry has the potential to accelerate progress in all dimensions of the SDGs. The empirical results described above not only corroborate the direct effect of SDG 9 on other socioeconomic and environmental goals, but also highlight the critical role played by indirect effects in this process. Indirect effects are often hidden in standard approaches to assess industry's developmental impact, but their contribution can be significant. Industrial policy can help accelerate progress towards all SDGs if it can successfully put in motion the direct and indirect effects of manufacturing industries.

What is industrial policy?

Industrial policy (IP) refers to interventions that seek to change the structure of the domestic economy towards sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare. These interventions can include financial incentives, R&D support and regulations to foster specific industries or technological advancements. The essence of industrial policy lies in its strategic approach to economic transformation, which is associated with the increase in domestically owned enterprises. It creates a vision of how the economy should be structured to realize long-term goals such as economic growth, modernization and industrialization.

Source: UNIDO elaboration based on Juhász et al. (2023), Lee (2024), Pack and Saggi (2006) and Warwick (2013).

2.2 NEW INDUSTRIAL POLICIES ARE URGENTLY NEEDED

Potential does not mean realization. The industrial sector's capacity for modernization, competitiveness and sustained progress is not automatic, as it hinges on deliberate industrial policy actions. The shift towards a more dynamic landscape of global economics underpins the need for strategic interventions to guide structural changes in the economy towards targeted activities with the highest potential.

Interest in industrial policy is on the rise. Recent years have witnessed a renascence of industrial policy, placing it prominently on the global political agenda. This revival is rooted in recognizing the industrial sector's crucial role in economic resilience and growth, spurred by contemporary challenges and recent global events. Countries have increasingly sought to adopt policies that bolster their industrial base and address broader economic vulnerabilities and strategic dependencies. Industrial policy has not only been "reborn" but also "reloaded". There is a considerable willingness of policymakers to engage in industrial policies, with unprecedented funding being made available.[36]

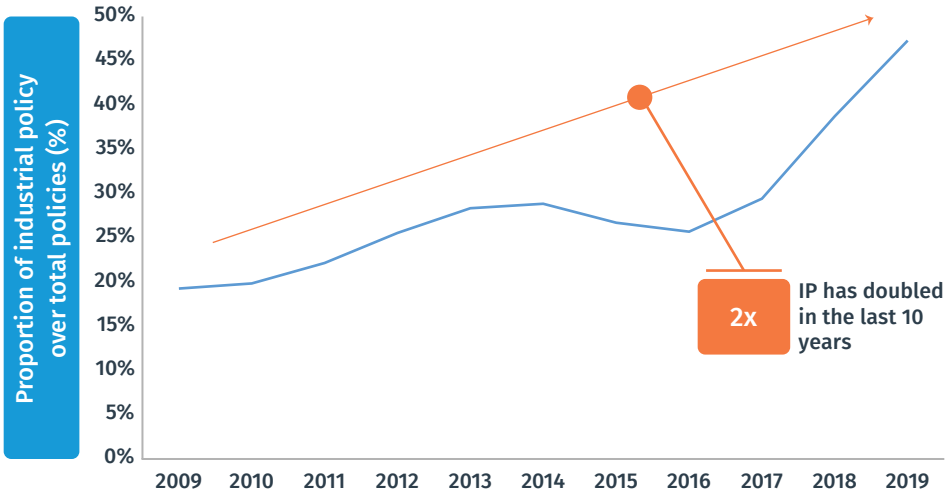
The resurgence of industrial policy is driven by a host of factors. The global financial crisis, rapid technological advancement, the COVID-19 pandemic, the urgency of achieving a green transition, and escalating geopolitical tensions have collectively underscored the need for strategic government intervention in the economy.[37] These developments have emphasized the importance of adapting industrial sectors to foster innovation, environmental sustainability and technological adaptation to ensure a resilient future.

Increased interest in industrial policy is reflected in real data. Empirical evidence supports this renewed focus on industrial policy. A novel approach put forward by Juhász et al. (2023) that utilizes machine-learning techniques to automatically classify industrial policies based on common policy descriptions over a large dataset of policy documents, shows that industrial policy measures have doubled globally between 2009 and 2019 (Figure 2.11).

At the global level, the rise of industrial policy is driven by highly industrialized countries. The resurgence of industrial policy is predominantly propelled by the most industrialized countries in the world. This reflects a strategic emphasis on reinforcing domestic industrial capabilities and securing technological leadership. Notably, the trend is not aimed at nurturing nascent industries in less developed countries, but rather at consolidating the industrial and technological prowess of already developed nations.

Billion-dollar industrial packages were recently launched by the most advanced industrial hubs. The launch of recent initiatives, such as the US's CHIPS Act, the European Union's (EU) Green Deal, and China's Made in China 2025, exemplify the scale and ambition of contemporary industrial policies. These packages, involving the investment of billions of dollars in cutting-edge manufacturing, are directly aimed at revitalizing the industrial sector of these countries.

Figure 2.11 **Industrial policy is on the rise**



Source: Background policy brief prepared by Juhász et al. (2023), based on SGEPT (2023).

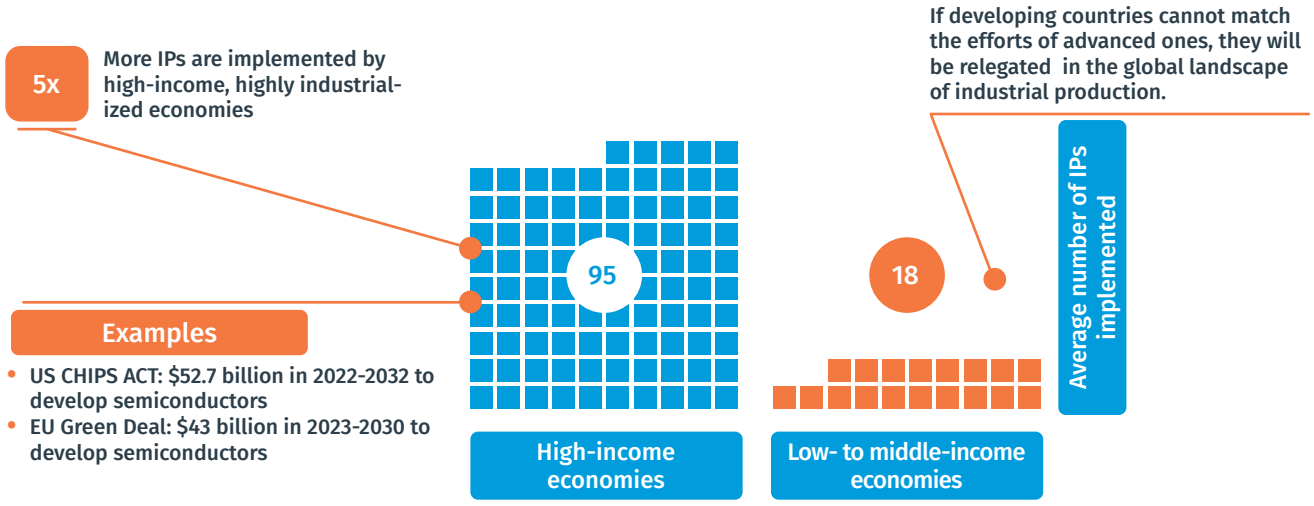
High-income economies are using industrial policy more intensively than the rest. Data from the last decade reaffirm that this trend is not new: high-income economies implemented five times more industrial policies than developing countries (Figure 2.12). Wider fiscal space in high-income countries seems to explain to a significant extent the intensive use of industrial policies. Compared to developing countries, richer countries deploy a larger set of tools involving financial assistance in foreign markets, public procurement, capital injection and equity stakes.[38]

Industrial policy is particularly important in less developed countries, where they are lacking. Low- and middle-income countries, with their comparatively less productive and competitive manufacturing sectors, are already at a disadvantage compared to advanced economies. Without strategic industrial policies, these countries risk falling further behind in the global production landscape.

Current global trends in terms of industrial policy will increase existing divides. While highly industrialized countries continue to invest vast amounts of resources to support their industrial sectors, developing countries struggle to keep their financing afloat in a context of high indebtedness and inflation. The lack of equal support plays against industrial firms from developing countries by making competition with their peers from developed countries increasingly more difficult. Such trends will only widen existing divides and make it even more challenging for developing countries to ignite and upgrade their industrial ecosystems.

New industrial policies are needed. Now more than ever, developing countries need innovative industrial policies. However, these policies cannot simply replicate those of the past. A new mindset is necessary, one with a forward-looking approach that puts the achievement of the SDGs at the centre and harnesses the opportunities of the megatrends that are reshaping the world. This new era of industrial policy must embrace mission-oriented goals, public-private collaborations, and global coordination to navigate the complexities of the modern world, ensuring that industrial development contributes to a fair and sustainable future for all.

Figure 2.12 **The increase in industrial policy is primarily driven by high-income economies**



Note: Data refer to the period 2009-2019. EU = European Union; IP = Industrial policy; US = United States.

Source: UNIDO elaboration based on Juhász et al. (2023).

ENDNOTES

[1] Other sectors of the economy also have large multiplier effects, such as modern services in high-income countries and education in developing countries. But, on average, the multiplier effects of the manufacturing industry tend to be the largest.
[2] See for instance, Anderson et al. (2021), Kroll et al. (2019), Messerli et al. (2020), Miola et al. (2019) and Wu et al. (2022).
[3] The methodological details of the approach are reported in Haraguchi et al. (2024).
[4] Szirmai and Verspagen (2015) and UNIDO (2015, 2019a).
[5] See Santarelli et al. (2023) for the patents of the digital revolution and Lavopa and Menéndez (2023) for the patents of the green revolution.
[6] UNIDO (2023c).
[7] UNIDO (2017a, 2020).
[8] See Lavopa and Donnelly (2023) for a recent review on the arguments and the empirical literature that have tested them.
[9] Kar et al. (2013).
[10] Jerzmanowski (2006).
[11] Lavopa and Riccio (2024a).
[12] Cantore et al. (2017) and Jia et al. (2020).
[13] Marconi et al. (2016).
[14] Gabriel and De Santana Ribeiro (2019).
[15] Helper et al. (2012).
[16] Estimates are taken from ILO (2018). Employees are considered informally employed if their employer does not contribute to social security on their behalf. Employers and own-account workers are in informal employment if they run enterprises (or economic units) in the informal sector.
[17] Chacaltana et al. (2022) find that the industrial sector is the second-most significant sector for reducing the intensity of informal employment with a contribution of 22.6 per cent. It is only topped by the large sector "other activities" (with a contribution of 27.7 per cent), which comprises numerous services including health, education and public administration (which should be considered to include only formal employment).
[18] Lavopa and Riccio (2024b).
[19] UNIDO (2019a).
[20] Lin and Wang (2020).
[21] See Lavopa and Menéndez (2023) for details of the approach used. To match patents with industries, the analysis combines two globally recognized sources: EPO PATSTAS (to identify green patents) and the Bureau Van Dijk (BvD) ORBIS-IP dataset (to establish the main sector of activity from the firms that hold these patents).
[22] Bataille and Alfare (2023).
[23] Timmer (2017).
[24] UNIDO (2017a).
[25] Steckel and White (2012).
[26] Stewart and Roberts (2012).
[27] UNIDO (2021b).
[28] Haraguchi et al. (2019).
[29] Heath and Mobarak (2015).
[30] See Sorgner (2021) for a recent review of the literature on this topic.
[31] Braunstein et al. (2023).
[32] UNIDO (2017a).
[33] Global inequality is defined as inequality in real incomes between citizens of the world, with inequality being measured by the Gini index. See Milanovic (2013) for details on the concept and Milanovic (2022) for the most recent empirical results.
[34] Examples include advanced building materials and electric cars which are necessary to reduce emissions in the household and transport sector, respectively.
[35] IEA (2023b).
[36] Aiginger and Ketels (2024).
[37] Santiago et al. (2024).
[38] Juhász et al. (2023).

CHAPTER 3 SHAPING THE FUTURE: THE NEXT GENERATION OF INDUSTRIAL POLICY

A new approach to industrial policy is needed to address today's grand challenges. Building on past experiences, this chapter argues that modern industrial policy should be Sustainable Development Goals (SDG) - oriented, future-ready, collaborative and regionally coordinated. Adopting a new approach to assess progress on sustainable industrialization, which integrates SDG 9 targets with those of SDGs 7 and 8, the chapter emphasizes the urgency for action in three crucial areas: clean energy, decent work and innovation. The chapter builds on this assessment and proposes specific industrial policy instruments that can accelerate progress in these three areas. Given the transformative megatrends shaping our world, the chapter identifies eight areas of opportunity to accelerate SDG progress through modern industrial policies. These opportunities include the generation of energy, materials and components needed for the energy transition; utilization of Fourth Industrial Revolution (4IR) technologies to enhance competitiveness; attraction of relocating foreign direct investment (FDI); and the production of goods in high demand due to global demographic and technological trends.

Mariana Mazzucato

"One of the reasons why we have not been able to achieve the SDGs is that they are not embedded in our industrial strategies and innovation policies. A mission-oriented approach to an industrial strategy that uses the SDGs as challenges can start changing this. By placing the SDGs at the centre of our industrial, technological and innovation policies, we can direct our economies towards more inclusive and sustainable models. We need industrial strategies that are ambitious and introduce conditionalities to ensure that government support is directed to achieving the SDGs."

© Mariana Mazzucato

Professor at University College London and Author of *Mission Economy*

A long history of industrial policy experience. Industrial policy is by no means a novelty. It has long been argued that today's richest nations achieved their success through the implementation of effective industrial policies, which supported the structural transformation of their economies.[1] Industrial policy success, however, is far from guaranteed. Most of today's middle-income countries have also implemented industrial policies to varying degrees over the past 50 to 70 years. Despite this, some of them have remained "trapped" in their current income category for a long time.[2]

Broad lessons from the past. Past experiences with industrial policy offer a rich body of knowledge that can support renewed industrial policy efforts. Countries can draw on the experiences of peer countries facing similar development challenges to replicate good practices and avoid shortcomings. Figure 3.1 summarizes ten key lessons that can be learnt from past experiences with industrial policy.

Four important elements for modern industrial policies. The lessons summarized in Figure 3.1 pave the way to identify four common elements that should be integrated into the design of modern industrial policy to increase the chances of success. Modern industrial policy should be designed based on a mission-oriented approach using the achievement of the SDGs as the main guide. It should be ready for the future and consider the broad trends that will reshape the global industrial landscape. Collaboration is essential to ensure success among all stakeholders, as governments cannot solve the challenges of today's world alone. Additionally, modern industrial policy should be coordinated at the regional and global levels to avoid tensions and maximize the full potential of all neighbours.

The capacity to implement policies is key to success. Designing an industrial policy that covers all these elements is just one part of the industrial policy cycle. The actual implementation of the policy is as important as the design. Successful implementation requires strong government capabilities, proper financing and societal consensus, among other factors. The next chapter will briefly examine the success factors for implementing modern industrial policy.

Figure 3.1 **Ten lessons from past industrial policy experiences**

1 Ensure adequate physical infrastructure

Industries are heavily dependent on general infrastructures, such as transport, electricity and telecommunication. Many industries also require specific infrastructure. For example, in addition to general port infrastructure, many products, from fresh fruits to cars, require specific storage and loading facilities. Quality infrastructure is a prerequisite for successful industrial policy.

2 Combine framework-type policies with targeted interventions

'Framework-type' policies (such as reliable basic infrastructure, political stability and government efficiency) are important, but alone are not sufficient for successful development. "Framework" policies should be combined with targeted interventions. Horizontal policies spreading government support across the entire economy are unlikely to spur the structural transformation needed to accelerate sustainable development.

3 Address societal challenges

Policies should have clear objectives. These objectives must be directly linked to societal challenges such as those reflected in the SDGs. Focusing industrial policy efforts on critical industries that have the potential to accelerate the SDGs would help enhance their effectiveness. Green industrial policies targeting the transition towards an emission-free, circular economy are a case in point.

4 Leverage opportunities offered by the global economy

Export-promotion policies with built-in import-substitution targets in priority industries have been more successful than "pure" import-substitution-industrialization strategies. The global economy also offers market discipline that can improve comparative advantages when combined with tariff protection.[3] FDI can accelerate industrial development, but its impact may be limited without the simultaneous development of skills and technologies in domestic firms. FDI attraction policies should be implemented along with industrial policies.

5 Adapt to megatrends

Digitalization, decarbonization and the restructuring of global supply chains are global trends that will determine whether firms, industries and countries succeed or fail. Digitalization has also increased competition, making the race for technical leadership even more crucial. This race involves large multinational companies and countries. An effective NIS, which includes direct support for research and innovation, can help countries enhance their competitive advantage and adapt to these megatrends.

6 Collaborate with stakeholders

Bottom-up policies tend to lead to better outcomes than industrial policies that are 'imposed' in a top-down manner. This results from the principle of being deeply interconnected and the lack of information from governments. Governments and involved state agencies should consistently collaborate with the private sector, the technology community, civil society organizations and other stakeholders throughout the industrial policy design stages.

7 Cooperate regionally

Countries in the same geographic region often face the same challenges in industrial development. Regional cooperation and joint regional investment projects and integrated solutions can provide a boost to industrialization. Such cooperation makes industrial policies more effective. Good relations with neighbouring countries also increase the success of export-oriented industrial policies because firms usually begin their export operations in nearby countries.

8 Strengthen skills and capabilities

Training and the skill base of the economy are both essential prerequisites and drivers of industrial development. The importance of skills is likely to increase further due to technological advancements that require certain skills. Policy support for the development of skills is essential to meet these challenges. Dual vocational training systems, where apprentices are trained in companies and study labour market policies and practices can be important elements in a skill-oriented industrial policy.

9 Keep the consistency of policy orientation

Inconsistency and a short-term focus of industrial policy undermine the success of any industrial policy strategy, which requires long-term planning horizons. Industry-specific development programmes might require 20 to 30 years to take effect. Creating a widespread societal consensus on the implementation of industrial policy might help ensure the necessary continuity.

10 Provide adequate finance

Public funding is required for investment, financial incentives for R&D, training provision and industrial policies. The most ingenious and well-designed industrial policy will fail if the financial means to implement the policy are not provided. It is crucial to align industrial policy programmes with available budget resources.

Note: FDI = Foreign direct investment; NIS = National innovation system; R&D = Research and development; SDG = Sustainable Development Goals.
Source: UNIDO elaboration.

3.1 PUTTING THE SDGS AT THE FOREFRONT

A new mindset. A new approach to industrial policy is necessary to tackle today's grand challenges. This approach should acknowledge that economic growth has a specific pace and direction. Policymakers need to consider both factors to ensure that investments are directed towards an inclusive and sustainable future. The challenges reflected in the SDGs can guide the overall direction of economic growth.[4]

Using the SDGs as a guide for the course of action. An SDG-oriented industrial policy should begin with a comprehensive country or regional assessment of the progress towards achieving the 2030 targets. This approach also requires understanding the delicate balance between various policy objectives, recognizing potential trade-offs and identifying synergies.

Three SDGs are immediate priorities for industrial policy action. As discussed in the previous chapter, the developmental impact of industrialization primarily takes place through the achievement of SDGs 7, 8 and 9. The importance of SDG 9 cannot be overstated, as industrialization, innovation and infrastructure are pivotal for creating jobs, generating new technologies and fostering inclusive economic growth. The transition towards clean and affordable energy advocated in SDG 7 is essential for achieving the green transition and fighting climate change. Finally, SDG 8 underscores the social justice aspect of industrial development, as industry contributes to accelerating economic growth and creating jobs, with concomitant positive effects on all other socioeconomic SDGs.

IDR 2024 introduces a novel approach to effectively assess progress towards SDGs 7, 8 and 9. The methodology proposed goes beyond traditional analyses, offering a refined and detailed examination of the distance to the 2030 targets in developing regions in 2021, and the speed of convergence towards these targets during the decade preceding the COVID-19 pandemic.

3.1.1 Assessing SDG progress: indicators and benchmarks

The approach proposed distinguishes three dimensions in each SDG assessed. The three SDGs under analysis combine multiple indicators associated with different targets. To carry out the assessment, these indicators were grouped into three analytical dimensions for each SDG. Only the indicators with significant country coverage per region and relevance to the analytical dimensions were included in the analysis.[5]

Composite indices are used to measure the distance to the SDG targets. For each analytical dimension (i.e. "clean energy"), the calculation includes a composite index measuring the average distance to the SDG targets of all indicators included in that dimension. The starting point was to set the targets at the indicator level. Whenever possible, these targets were defined using the ideal target implicit in the 2030 Agenda.[6] When there was no ideal value, targets were defined based on the best performance observed for that indicator in all countries with available data between 2000 and 2021, once outliers were excluded.[7] After defining the targets and imputing data gaps using standard statistical techniques, the indicators were normalized between zero and one (the latter representing optimal target achievement) and aggregated to obtain results at country and regional levels. The obtained values reflect the percentage of target achievement for each dimension.

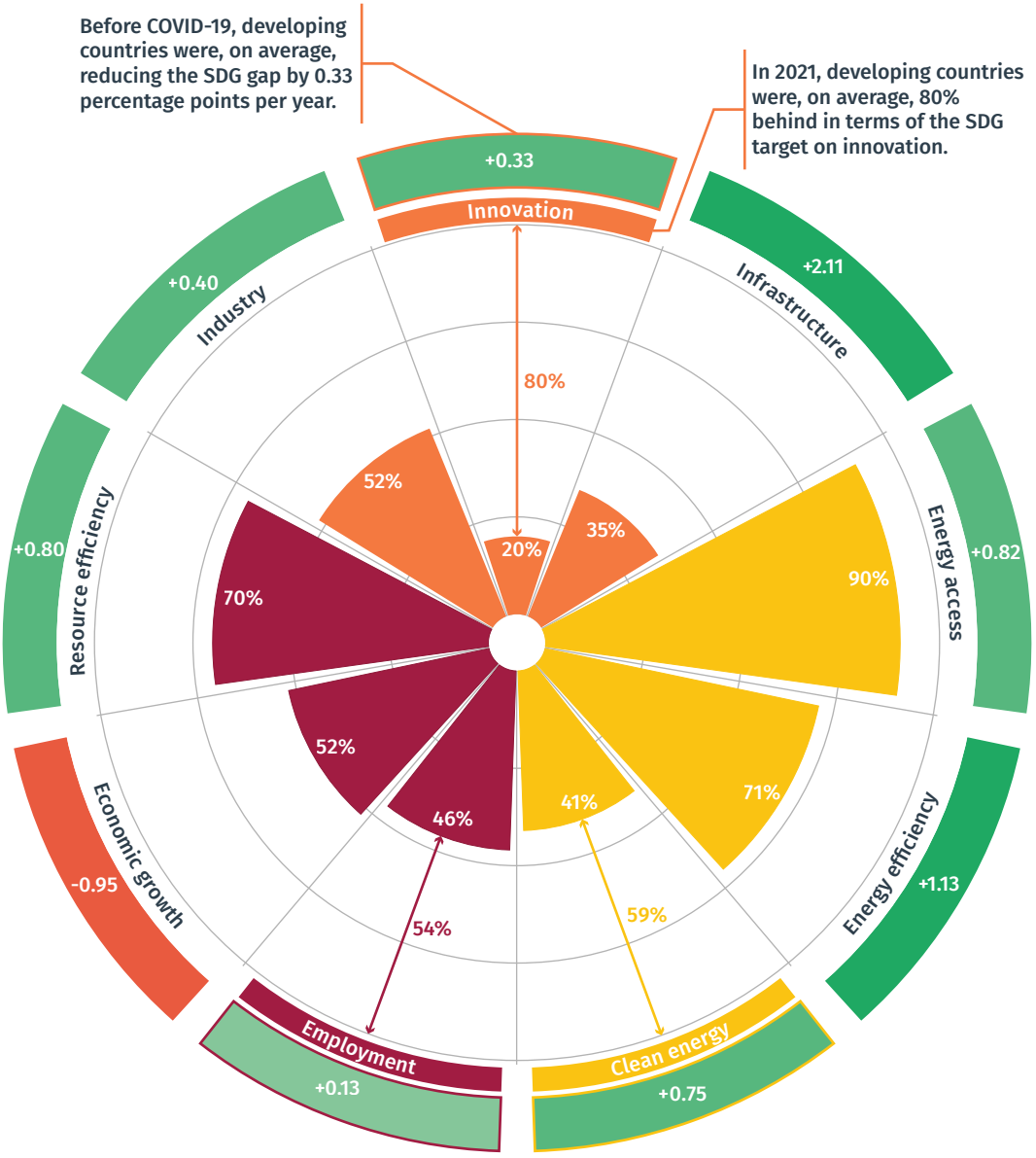
The analysis looks at both the current situation and the speed of progress so far. The results for 2021 were analysed to assess the situation from the most recent year of available data, and critical areas where the gap towards the target was particularly large were identified. Additionally, the average annual speed of convergence towards the target in the decade before the COVID-19 pandemic was evaluated.[8] Looking at the speed of convergence allows for simple projections to 2030, assuming that pre-COVID-19 trends are restored.

A focus on developing countries and regions. The analysis focused on the developing world, which includes all economies not classified by UNIDO as high-income industrial economies.[9] This section presents the aggregate results, and Part B introduces region-specific analyses, focusing on four regions: Africa, Asia-Pacific, Eastern Europe and Latin America and the Caribbean (LAC). The regional approach conducted in Part B acknowledges the diverse economic contexts and development stages in the developing world. It provides a more detailed understanding of the challenges and opportunities in each area.

3.1.2 Where does the developing world stand in terms of SDGs 7, 8 and 9?

The developing world still has a long way to go to achieve the targets of SDGs 7, 8 and 9. The analysis in Figure 3.2 provides a detailed assessment of the performance in terms of achieving the targets in 2021, including pre-COVID-19 trends, for all developing countries. The analysis depicts an alarming picture. While there has been some progress, developing countries have not reached the halfway point to achieving the 2030 targets in certain dimensions. Among these dimensions are: clean energy, employment, innovation and infrastructure. Other dimensions, such as energy access and resource efficiency perform better but fall short of the targets.

Figure 3.2 **Assessment of SDGs 7, 8 and 9: how far is the developing world from the 2030 targets?**



Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the global level using population weights. Only economies not classified by UNIDO as high-income industrial economies are considered. The shaded rectangles on the outer side of the figure reflect the average annual speed of convergence towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from those in 2009, and then dividing the result by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

Global progress towards industry-related SDGs is too slow and has been further derailed by the polycrisis. Urgent attention is required in three critical areas: innovation, clean energy and decent jobs.

Mixed progress is observed in SDG 7. Developing countries have made significant progress in energy access (90 per cent) and energy efficiency (71 per cent), indicating strong advancements in sustainable energy practices. However, the transition to clean energy remains a significant challenge for these countries, with a target achievement of only 41 per cent. This area has seen the slowest progress towards the target over the last decade, highlighting the need for intensified efforts in adopting and accelerating sustainable energy sources.

Developing countries are not meeting the targets set by SDG 8 in terms of economic growth and employment. Economic growth in developing countries shows moderate performance at 52 per cent of the ideal target, but the negative pre-COVID-19 trend indicates a deceleration in economic growth and raises concerns about sustained growth. The employment situation in developing countries is also challenging, with a target achievement of 46 per cent and a modest speed of convergence of only a 0,13 percentage point gap reduction per year during the past decade. This scenario suggests the need for strategic interventions to boost growth, create quality jobs and improve labour market conditions.

Progress needs to be accelerated in all dimensions of SDG 9. Only achieving 20 per cent of its target, innovation is the area with the most significant gap among all dimensions assessed. It also presents the slowest speed of convergence before the pandemic among the three SDG 9 dimensions (0.33 percentage point gap reduction per year). This highlights a critical need for enhanced efforts in developing regions towards innovation deployment to keep pace with global technological advancements. A significant gap is also observed in infrastructure, where developing countries only achieved 35 per cent of the target. The speed of convergence, however, is the fastest of the nine dimensions assessed (2 points per year). With 52 per cent target achievement, industry shows a balanced performance but still requires ongoing attention to meet the targets as the speed of convergence is one of the slowest.

Not all regions of the developing world have reached the same place. The assessment at the regional level reveals significant differences in achieving SDGs 7, 8 and 9. These differences are discussed in detail in Part B of the report, which highlights the challenges and opportunities each region faces and the need for region-specific strategies to accelerate progress towards these goals. For instance, in 2021, access to energy in Africa was only 58 per cent (30 percentage points below the developing world's average), demonstrating critical gaps in energy access on the continent. Similarly, in LAC, the pre-COVID-19 trend for industry was negative, indicating alarming signs of premature deindustrialization. Eastern Europe shows a remarkable lead in employment but faces challenges in economic growth, in contrast to Asia-Pacific's strong economic performance but slower progress in employment. Understanding these nuances is crucial for developing effective industrial policies that consider each region's specific needs and strengths.

The SDG assessment points to three areas that need special attention. Despite some regional nuances, the analysis depicted in Figure 3.2 shows the need for urgent action in three dimensions: innovation under SDG 9, clean energy under SDG 7, and employment under SDG 8. These dimensions show the largest target achievement gaps and only a moderate speed of convergence. Accelerating progress in these areas through industrial policy means supporting industrial digitalization, decarbonization and job creation. Addressing these elements can spur overall progress towards sustainable development in the developing world.

Progress can be accelerated through well-crafted industrial policy. The subsequent parts of this section delve deeper into these three priority areas, and outline the challenges and potential policy instruments governments in developing countries can use to foster innovation, promote decarbonization and create jobs. This strategic approach is essential to bridge the gaps in achieving the SDGs and steering the developing world towards a sustainable and prosperous future.

3.1.3 Policies for industrial decarbonization (SDG 7)

Decarbonization of the energy system is at the core of green industrial policies. Decarbonization requires the transformation of the current fossil fuel-based energy system into an environmentally sustainable one that relies on renewable energy sources such as wind power, hydropower, solar power, tidal energy or biowaste energy. Green industrial policy aims at supporting this process by gearing structural transformation towards a net zero emission, energy and resource-efficient economy in ways that enhance the social welfare of current and future generations.[10] A special feature of green industrial policy is that decarbonization implies abandoning technologies which are often profitable for private producers, but impose considerable costs on society and the environment due to their greenhouse gas (GHG) emissions.

The policy tasks are formidable but not impossible. Achieving the objective of net zero emissions[11] is indispensable for keeping global warming within the internationally agreed bounds of +1.5 degrees celsius, in accordance with the Paris Agreement. Given the urgency of the situation and the long time it takes

to change habits, technological solutions are crucial. Decarbonizing industry is technically possible but hinges on bold policy actions and transformative innovation.[12] There are three major areas of decarbonization action in industrial policies: first, scaling up investment in renewable energies; second, fostering efficiency improvements to reduce energy consumption; and third, finding technological solutions for industrial processes where emission-free production does not yet exist, such as steel production, and creating new markets that make polluting products obsolete (Table 3.1). Achieving these tasks requires an entrepreneurial state that nurtures innovation in areas of great societal relevance.

Large-scale deployment of clean energies requires targeted investment policies. Phasing out fossil fuels inevitably increases global electricity demand. Renewable energy must be expanded to replace carbon-based energy supplies and meet the additional demand from major energy-consuming industrial sectors. On the positive side, the costs of electricity generated from renewable energy sources have declined in the past decades. Renewable energy sources such as onshore wind and solar photovoltaic (PV) have become cost-competitive vis-à-vis carbon-based alternatives. In this context, public interventions can support the expansion of renewable energy sources through investment policies. Preferential interest rates for renewable energy projects and negative lists for fossil-fuel-based ones are good examples of policy instruments that can be used to achieve this goal.

Financial incentives can help improve energy and resource efficiency and promote circularity. While many developing regions have improved energy and material efficiency over the past 20 years, there is still an urgent need to accelerate efforts in the upcoming years to meet the SDGs. Financial incentives for energy-saving measures in the form of subsidies, coupled with carbon pricing systems and regulation, are major instruments that can be employed for this purpose. Industrial decarbonization also requires moving towards a circular production process where materials are continuously reused rather than thrown away, and where substances harmful to ecosystems are prevented from entering them. Policies can support this process by promoting ecodesign, defined as the process of assessing and then reducing the environmental impact of a product throughout its life cycle whilst ensuring its longevity. [13]

Table 3.1 **Industrial decarbonization: from challenges to solutions**

	Priorities	Challenges	Policy Instruments
DECARBONIZATION	Deployment of renewable energy	Capital constraints	Global climate funds and international development assistance
			Public investment and long-term loans in renewable energy
			Preferential interest rates for renewable energy
		Sunk costs	Just transition programmes
			Phasing out of subsidies for carbon-based facilities
		Lack of technical expertise	Consultancy services
	Greening of existing production	Production is still linear	Regulation and technical standardization
			Plastic taxes
			Awareness-raising tools
		Lack of green skills	Apprenticeships for the greening industry
			Tax credits for “environmental occupation”
	Development of green technologies	Lack of emission-free technologies	Setup of environmental research agencies
			Support for green technology transfer
		Low research capabilities	Public funding for basic research on green technologies
			Development of research networks

Source: UNIDO elaboration.

The development of net zero technologies is key for industrial decarbonization. Production greening starts with energy supply. Technologies that enable emission-free industrial production are vital. In many energy-intensive industries, promising technologies have emerged or have reached a near-commercial stage.[14] These technologies are often already being applied in production processes (e.g. electric boilers and heat pumps), but their use is limited due to relatively high market prices for electricity or because they are subject to regulation. Supply-side support for commercialization and demand-side industrial policies in the form of strategic public procurement can be implemented to support the diffusion of these technologies. These efforts should be coupled with targeted support for emerging technologies that rely on low GHG electricity, hydrogen, biomass or carbon capture and storage or utilization but are still in the research and development (R&D) stage.

3.1.4 Policies to foster job creation in industrial ecosystems (SDG 8)

Manufacturing can provide stable and well-paid jobs if the necessary policies are in place. As discussed in Chapter 2, manufacturing has the potential to generate a large number of stable and well-paid jobs. Realizing this potential requires well-functioning industrial ecosystems. However, the same characteristics that allow for economic rents in manufacturing industries all too often act as barriers to the development of industrial ecosystems. Some examples of such barriers are the lack of capital and skilled labour, high initial unit costs due to lack of experience, and an underdeveloped supply base. This is where industrial policy comes into play. Overcoming these barriers and creating manufacturing capacities and jobs is at the core of industrial policy. The relevant policy toolkit comprises traditional industrial policy instruments that support the emergence of industrial activities together with other instruments stemming from innovation, trade and labour-market policies.[15] To succeed, these instruments should be implemented while focusing on the manufacturing ecosystems rather than individual industries or firms in isolation.

There are three areas of intervention for job creation. There are three priority areas of interventions for supporting the creation of manufacturing-led employment (Table 3.2). First, there is industrial policy support for industrial ecosystems. This is a very broad domain that encompasses measures in goods markets which create demand for manufacturing workers, as well as measures in the labour market. The second intervention area of relevance in developing countries is the shift of manufacturing activities from the informal sector to the formal economy (formalization). Third, there are possible interventions in the technological realm, which is often characterized by an anti-labour bias. This is not about halting technological progress but about steering the technological trajectory in a way that is labour-creating rather than labour-replacing.[16]

Table 3.2 **Industrial jobs: from challenges to solutions**

	Priorities	Challenges	Policy Instruments
JOB CREATION	Industrial ecosystems development	Limited linkages to local suppliers	Temporary tariff protection for infant industries
			Clusters creation around infrastructure development
			Establishment of thematic industrial parks or zones
		Difficulties in meeting quality standards	Consultancy services for quality management and certification
			Business angels
		Lack of skills	Technical and vocational education training
			Retraining programmes for skills mismatch
	Formalization	Small-scale of production	Grants and loans for small and medium-sized enterprises (SMEs)
			Transition vouchers
		Difficulties accessing markets	Consolidated public procurement
			Grants for market studies
	Technology bias mitigation	Development of appropriate technologies	Directed innovation programmes
			Support for indigenous technologies

Source: UNIDO elaboration.

The development and strengthening of industrial ecosystems is a pre-condition for job creation. Several industrial policy instruments can be used to develop and strengthen industrial ecosystems. They range from traditional instruments, such as tariff protection, to more sophisticated instruments, such as the establishment of thematic industrial parks or export-processing zones. In the latter case, a key consideration is the extent to which these parks create production linkages to other domestic producers. When these linkages are limited, industrial parks risk becoming enclaves isolated from the rest of the economy. If domestic suppliers become part of the park's industrial ecosystem, the technology transfer may be substantial, and job creation may be magnified. Direct interventions in the labour market are equally important for job creation. As an intermediary between jobseekers and employers, public employment services can have a huge impact. With appropriate training programmes, they can facilitate the adaptation of jobseekers' skills to the needs of the local labour market and enhance the productivity of local firms. These programmes should be tailored to the local labour market and bring local firms into the process.[17] Close collaboration between the public and private sectors reduces the risk of the training beneficiaries ending up with useless skills.

Government interventions can also support the transition from informal to formal sector activities. While informality rates are considerably lower in industry than in other sectors of the economy, they are still widespread in many developing countries. Informal workers belong to the most vulnerable part of the labour force. Any initiative to make these workers migrate to the formal economy has the potential to improve their working conditions, including their income, access to social insurance, and safety at the workplace. Incentives such as transition vouchers or investment support for "transition firms" entering formal manufacturing activities and covering social contributions for their workers can support this process. Addressing informal workers and firms in this way helps ensure that industrial policies are socially inclusive.[18]

Policies can shape technological trajectories closer to a country's reality. A major concern with regard to technological progress in general and digital transformation, in particular, is job displacement. The effect of technology on jobs varies depending on the time frame considered (short versus long term) and the type of innovation.[19] Product innovations tend to positively affect job creation more than process innovation. In some cases, labour-saving technologies may be needed to achieve international competitiveness. Nevertheless, even when technologies replace one type of worker, they may generate more jobs for other tasks. Technological change is not deterministic and can be influenced by policy choices.[20] Governments can shift the innovation path towards a more inclusive trajectory using appropriate technologies.[21] These technologies better reflect their factors, skills and endowments.[22]

3.1.5 Policies to accelerate industrialization through new technologies (SDG 9)

The opportunities of advanced digital production (ADP) technologies are significant, but they are not equally available across countries and firms. The gains from the ADP technologies of the 4IR naturally accrue to firms which are ready to develop and embrace them. Technological readiness depends on the industrial capabilities of firms, the wider economic environment, and the quality of public infrastructure and national innovation systems. These factors are not evenly available in different countries and enterprises. As a result, the creation of ADP technologies is highly concentrated in high-income countries.[23] This concentration is also observed in the adoption of such technologies in developing countries, where large firms linked to global value chains (GVCs) are already making use of the latest digital technologies, whereas the vast majority of smaller firms are still using analogue systems or outdated digital technologies. Improving access to and the use of ADP technologies is a priority in developing countries.

Countries and firms unable to digitalize will be relegated further in the future industrial landscape. The absorption of ADP technologies in manufacturing processes, such as sensors, cyber-physical production systems or machine learning, is a key component of future industrial competitiveness. Countries and firms that cannot use these new technologies run the risk of being relegated further in the global industrial landscape or may be driven out of the market altogether. Accelerating industrialization and progress towards SDG 9 requires modernizing and digitalizing the industrial sector. This does not happen automatically, especially in countries that have strong capital constraints and limited capabilities. Consequently, industrial policy is set to play a key role. A wide range of industrial policy tools can support firms' adoption of such technologies (Table 3.3).

Industrial policy in support of digitalization is part of the wider set of innovation and technology-oriented policies. Digital industrial policy is a subset of innovation and technology-oriented industrial policies. Hence, to a large extent, industrial policy support for ADP technologies can rely on established institutions and the national innovation system (NIS). The underdevelopment of NIS in developing countries explains their low contribution to the creation of 4IR technologies. Developing countries can strengthen their NIS by drawing on foreign technologies, for instance, by introducing requirements for multinational enterprises (MNEs) to enter joint ventures or local content requirements.

There are many facets of industrial policy for advanced digitalization. Digital industrial policy is a vast field encompassing the entire industrial policy toolkit. The specific instruments range from financial support, including tax incentives, to specialized agencies and demand-side policies that make use of public procurement.[24] Policies for industrial digitalization are not limited to R&Dand innovation support. They also comprise a wider range of specific policies to strengthen industrial ecosystems, including investment subsidies for adopting new technologies and the numerous tools to foster technology transfers.[25]

Table 3.3 **Industrial digitalization: from challenges to solutions**

	Priorities	Challenges	Policy Instruments
DIGITALIZATION	Adoption of ADP technologies	Lack of awareness	Awareness-raising tools
			Public demonstration and testing of ADP technologies
		Capital constraints	Adopting grants (match funding)
			Subsidized loans
		Low absorptive capabilities	Expert advice and technical assistance
			Digital skills development programmes
			Attraction of foreign qualified workers
		Supplier gaps	Supplier development programmes
	Creation of ADP technologies	Specialization in low value added segments	Technology transfer conditionality on production
			Joint ventures
			Local content requirements
		Low research capabilities	Public funding for basic research on digital technologies
			Development of research networks

Note: ADP = Advanced digital production.

Source: UNIDO elaboration based on background note prepared by CIIP (2024).

3.2 LOOKING INTO THE FUTURE

Modern industrial policy should be forward-looking. At the very least, it should consider the four megatrends introduced earlier in this report, as these are expected to continue transforming the world around us. It is essential to implement well-designed policies that consider each country's specificities, including their weaknesses and areas of comparative advantage.

The megatrends can offer opportunities for industrial policy. The megatrends shaping the world present significant challenges for developing countries, but at the same time open new opportunities. Building on a series of regional consultations and specific inputs commissioned from regional research institutions, this report identifies eight areas of opportunity to accelerate SDG progress through the next generation of industrial policy (Figure 3.3).

Not all opportunities are applicable to every country. This section further details the main opportunities arising from the megatrends for countries seeking to accelerate SDG progress towards industrial policy. The discussion in this section considers a global perspective, acknowledging that not all opportunities are equally applicable to all regions across the world. Regional specificities concerning these opportunities and concrete examples of policies related to them are presented in Part B of the report.

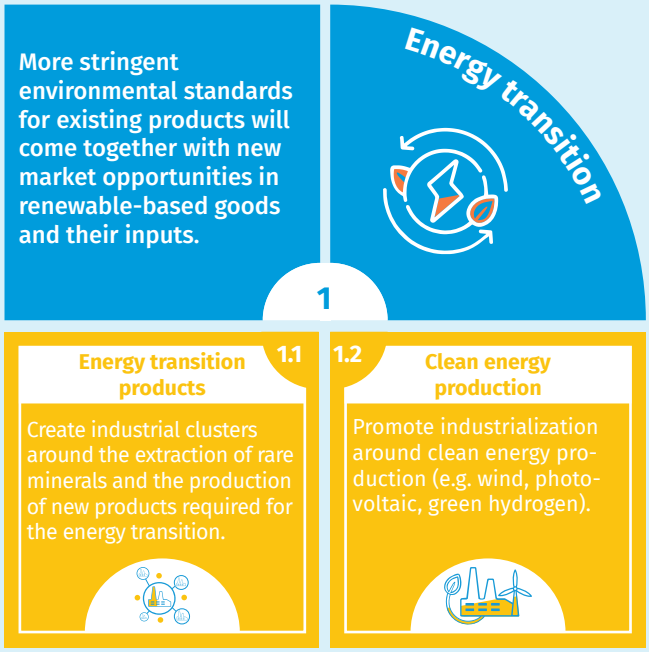
3.2.1 Opportunities opened by the energy transition

The global push towards decarbonization brings opportunities along the energy supply chain. Besides renewable energy generation, opportunities are emerging in the energy-industrial nexus, not only in finding solutions to reduce emissions from energy-intensive industries but also in securing access to critical materials. Furthermore, opportunities for increasing energy efficiency, adopting circular economy models, and investing in new diversification pathways have also gained more centrality.[26]

Rare minerals and new products are required for the energy transition. The transformation of the energy sector requires a reliable supply of critical minerals. Solar, wind energy, and electric vehicles (EVs) have already created new demand for the extraction and processing of minerals. Lithium, nickel, cobalt, manganese and graphite are crucial for battery performance, longevity and energy density. Rare earth elements are essential for permanent magnets that are vital for wind turbines and EV motors. Electricity networks need a huge amount of copper and aluminium, with copper being a cornerstone for all electricity-related technologies.[27] The production of lithium and cobalt may increase by 500 per cent by 2050 to meet clean energy demands.[28]

Creating industrial clusters around the extraction of rare minerals requires active policies. Various countries in Africa, Asia and LAC have large endowments of these minerals, and demand for them is rapidly increasing. These countries have the opportunity to leverage these endowments to create industrial clusters around them. However, the potential developmental outcomes of the critical minerals industry in these countries will require active policies. Recognizing the strategic value of these critical minerals for development, industrialization and production linkages involves two crucial factors. Firstly, the ability to negotiate the rights and conditions of minerals as part of a domestic industrial policy, and secondly, to ensure strategic global alliances that support domestic productive developments. These factors will determine the actual developmental outcomes of the critical minerals in industry's development.[29]

Upgrading within natural resource value chains helps avoid enclaves. Industrial policies that achieved the emergence of locally-controlled firms, avoiding the creation of extractive enclaves and promoting the embeddedness of resource-based sectors with the local productive ecosystem have been crucial in the success stories of resource-based growth.[30] Some of these concerns related to the rare minerals needed



for the energy transition are addressed in the UniLiB project, recently launched in Argentina (see Box 8.2 in Chapter 8). Harnessing the country's vast lithium reserves, this joint initiative by publicly owned research entities and ministries seeks to locally master the technology required to produce cells and batteries to partake in the rapidly developing ion-lithium battery industry.

The new products needed for the energy transition also create opportunities for developing countries. The global manufacturing capacity of clean energy technologies and related products will be key in meeting the demand for clean energy, which is crucial for achieving climate targets. These products include consumer durables (e.g. EVs) and capital goods and components (e.g. wind turbines, solar PV, batteries, electrolysers, heat pumps and fuel cell trucks). It is estimated that a cumulative investment of around $640 billion will be needed by 2030. In the next few decades, the deployment of most mass-manufactured technologies will continue to increase, but more slowly, due to market saturation.[31] Therefore, securing a space in the production of these expanding manufacturing sectors provides substantial opportunities. However, supporting policies and investments must be implemented in a timely manner to tap into emerging markets that are not yet saturated. The case of China in relation to EVs illustrates how active policies can support a latecomer's entry into a new market. A solid policy package made up of subsidies and other tools and sustained over a long period of time has pushed China's EV manufacturing to the world's technology frontier. Today, the country is home to two of the five biggest EV companies (see Box 6.2 in Chapter 6).

Clean energy production also brings industrialization opportunities. Many developing and emerging economies have ideal resources for developing a competitive advantage for clean energy and promoting industrialization. For example, in solar PV, the fastest-growing source of renewable energy,[32] the Andes region[33] in South America shows the highest PV power potential. Furthermore, many countries in the Middle East and North Africa (MENA) region and sub-Saharan Africa also boast excellent conditions for renewable energy.[34] These countries have the opportunity of using these abundant and clean energy sources not only to decarbonize electricity generation, but also as feedstock to develop competitive value added low-carbon services and industries.[35]

Natural resources alone are not sufficient to create competitive advantages in the field of clean energy production. Technological and organizational capabilities are needed to produce and sustain renewable technologies. Industrial policy can be used to overcome such constraints and start building stages of these industrial value chains.[36] A virtuous example of this can be found in Montenegro, where active state support led the country to be a successful energy exporter, with almost 80 per cent of total electricity generation capacity coming from renewables (see Box 7.2 in Chapter 7).

Green hydrogen is an industrialization opportunity. Green hydrogen, which is derived from the electrolysis of water using renewable power, plays a crucial role in substituting fossil fuels in hard-to-abate activities that cannot be easily electrified. Its market is very incipient, but is expanding rapidly, and production could reach 27 megatons by 2030.[37] As pressure to decarbonize increases, the availability of green hydrogen is becoming an important pull factor for relocating industries. Countries that can generate abundant renewable energy and produce green hydrogen might be able to attract energy-intensive industries, such as steel and chemicals. These industries also create industrial linkages to downstream sectors, such as automotive and fertilizers. In parallel, a growing market for hydrogen-based technology exports is also developing, including the production of fuel cell technology, hydrogen-based steelmaking technologies and synthetic fuels. These developments provide opportunities to increase the exports of green hydrogen and act as a stepping stone towards a diversified and knowledge-based economy.[38] Seeking to leverage this opportunity, the NEOM Green Hydrogen Project (NGHC) in Saudi Arabia aims to turn the country into a leading centre for green hydrogen production, which will serve to decarbonize heavy industries and transportation (see Box 6.1 in Chapter 6).

The threat of climate change is an opportunity for a new industrialization pathway. Countries aiming to seize this green window of opportunity[39] must be able to integrate into higher value added segments of renewable energy value chains, rather than stick to the provision of raw materials. The lack of domestic productive, technological and organizational capabilities, as well as the lack of state capacity to implement and enforce industrial policy, are all factors that need to be considered. It is crucial to avoid the creation of new economic enclaves in developing countries that serve the needs of energy- and material-intensive industries in advanced economies. Instead, the opportunity should be used to follow a new industrialization pathway that supports economic diversification away from the traditional pattern of trade based exclusively on resource and material exports.

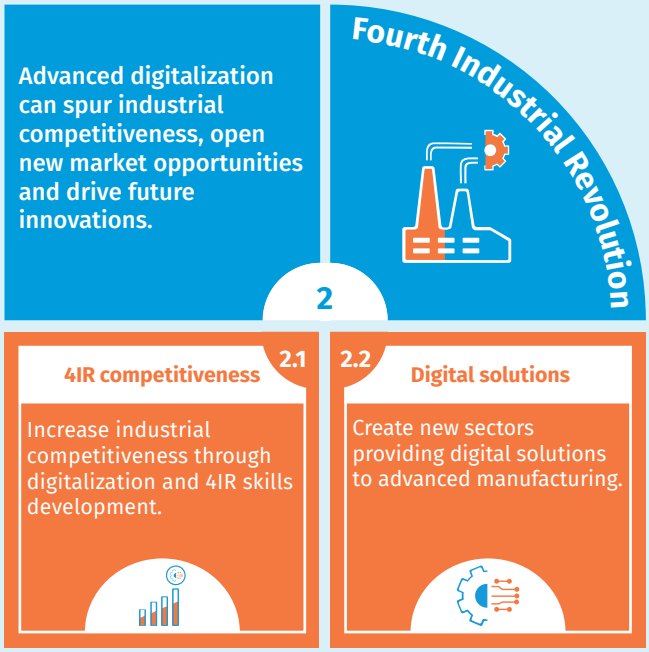
3.2.2 Opportunities opened by the 4IR

4IR technologies are disrupting current production models. Such disruption will inevitably give rise to both winners and losers. While advanced economies are currently leading in digital technology production and adoption, there are significant opportunities for developing countries to upgrade their production as well.[40] As reported in the IDR (2020), adopting the ADP technologies of the 4IR in industrial processes leads to efficiency gains and increased productivity, both at the level of individual firms and for national economies. This, in turn, improves countries' competitiveness and helps sustain economic growth.

Advanced digitalization can boost industrial competitiveness, but requires new skills and capabilities. The efficient use of new technologies hinges on enabling infrastructure and capabilities.[41] Furthermore, the mere adoption of these technologies is insufficient for increased productivity if transformations in firms' organization, jobs markets and available skills do not follow suit.[42] In fact, integrating these technologies without transforming the labour force and re-skilling workers hinders this opportunity and creates the risks of labour market polarization. For this reason, it is essential to provide workers with the skills required at different stages of technological development to realize the competitive advantages of digital technologies.

Vocational training institutions play a pivotal role in creating the skills of the future. Institutions can respond to the increased demand for new skills by providing qualification and requalification training, counselling, technical services to firms, and occupational certifications. The example of the Dominican Republic's INFOTEP (see Box 8.4 in Chapter 8) demonstrates that holding regular consultations with relevant stakeholders can help build a bottom-up approach to understand the continuous request for new skills resulting from technological transformations, while at the same time aligning its strategy with national priorities.

Advanced manufacturing needs digital solutions. Another major transformation that 4IR technologies entail for production systems is the greater integration between manufacturing and services. The servicification of manufacturing fostered by digitalization promotes the creation of new sectors, and provides knowledge-intensive services to advanced manufacturing. This, in turn, opens opportunities for developing countries to tap into new sectors, diversify and upgrade.[43] Rwanda's ICT Hub Strategy (see Box 5.4 in Chapter 5) illustrates how developing countries can use this opportunity. One of the key strategic themes of Rwanda's strategy is the development of advanced



technological capabilities to provide local digital solutions in selected niche areas, such as data-driven farming and health informatics.

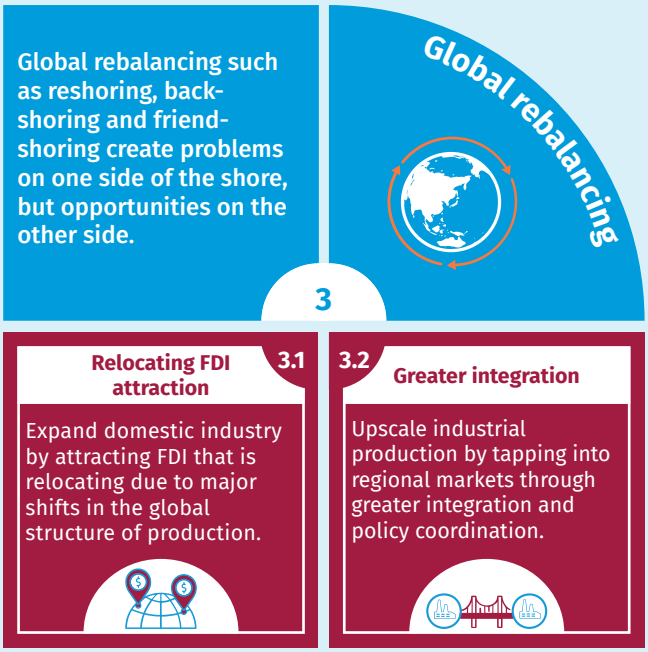
Making the most from 4IR technologies. The impacts of the 4IR on production are still, in many cases, at an early stage. It is therefore crucial to keep up with the revolution and avoid increasing productivity gaps. To this end, bold yet realistic policies that consider relative resources and capability levels have a major role to play.

3.2.3 Opportunities opened by the global rebalancing

The reconfiguration of GVCs is making room for new countries to take different roles in the global arena. In the last decades of hyper-globalization, FDI flows have been heavily concentrated towards East-Asian countries, but more recently, this trend is partially receding and giving way for other countries and regions to play a new role. On the other hand, some countries, especially China, are now at more advanced stages of development. They constitute the new poles of the global economy, which has important implications for other developing and emerging regions.

Attracting FDI that is relocating might constitute a major engine of industrialization in some areas of the world. FDI inflows are a major source of financing for developing countries and contribute to easing capital constraints.[44] Available evidence also indicates that under certain conditions, especially when establishing connections with domestic producers, FDI inflows can positively impact job creation, productivity and economic growth through spillover effects and technology transfers.[45] When complemented with targeted industrial policies to establish a large number of domestic firms that learn and expand by working with foreign firms, attracting FDI can serve as an engine of industrialization.[46] Technological changes, increased geopolitical tensions and the quest for more resilient supply chains are pushing towards a reshoring and reconfiguration of GVCs. In this context, some countries are already looking to capitalize on these changes and attract more foreign investments.

Geographical proximity to major global markets can become an asset if complemented with other important factors. Countries that are geographically close to major global markets are attractive to relocating firms because they offer the benefits of offshore locations, such as market proximity and lower labour costs compared to production at home. However, geographical proximity is not the only factor that makes a country an attractive nearshoring destination. Available infrastructure, quality of logistics, levels of human capital and production capabilities also play a key role. These factors are also crucial to ensure that attracting FDI does not result in industrial enclaves but offers opportunities for production upgrading.[47] The recently launched Isthmus of Tehuantepec Inter-Oceanic Corridor (CIIT) in Mexico (see Box 8.5 in Chapter 8) illustrates how governments are trying to improve these factors. The project takes advantage of the country's strategic position by constructing a railway connecting strategic ports and ten industrial parks that will host critical productions.



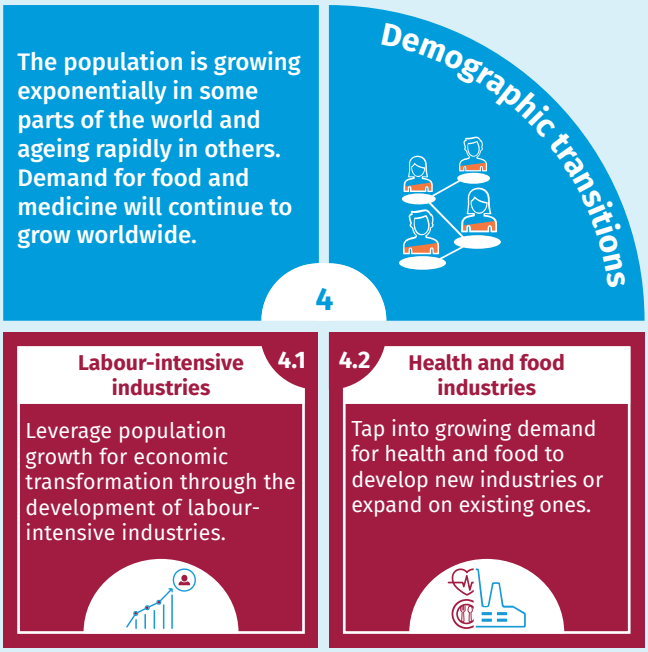
The regionalization of value chains offers new opportunities. Nearshoring is a sign of a broader phenomenon: the growing regionalization of GVCs or the practice of shortening supply chains to obtain inputs and components from countries of the same region. The phenomenon provides an opportunity for some developing countries to upscale their industrial production by tapping into regional markets. For example, the abundant natural resources in some African countries, combined with the manufacturing capacity and proximity to important trade routes of other African countries, could constitute the basis for an advantageous regional integration and cooperation.[48] Promoting South-South trade agreements and platforms can play a crucial role in fostering this opportunity. The African Continental Free Trade Area (AfCFTA) constitutes a prominent example. As the largest free-trade area worldwide, this regional agreement is expected to increase trade in Africa while strengthening industrial capabilities and promoting domestic production in line with the industrial specialization of the participating countries (see Box 5.5 in Chapter 5).

3.2.4 Opportunities opened by demographic transitions

Some areas of the world can benefit from a "demographic dividend". Rapid population growth poses the challenge of creating enough productive jobs to absorb the new cohorts of workers entering the labour market every year. If the economic system can generate these jobs, population growth can bring a demographic dividend.[49] Having a larger share of young workers leads to higher savings rates, boosting domestic resource mobilization and facilitating further investment-led growth and development.[50] Additionally, a youthful and dynamic population brings fresh ideas to the economy and fosters innovation and entrepreneurship. Finally, a growing working-age population stimulates consumer demand and fuels domestic production and new job opportunities. To harness the demographic dividend, a country must ensure that the rise in its working population is accompanied by significantly higher rates of economic growth.[51]

The development of labour-intensive industries can benefit from the demographic dividend. The experience of many Asian countries, and more recently some African countries, shows how labour-intensive industries such as textiles, apparel and furniture can serve as an entry point to kick-start industrialization and foster economic development.[52] As mentioned in the previous section, several industrial policy instruments can be used to support this process. One that stands out is the development of industrial parks. Ethiopia's Industrial Parks Development Programme provides a good example. The programme aims to establish industrial parks to attract FDI and promote job creation in manufacturing industries. So far, the strategy has been successful, as industrial hubs built between 2015 and 2021 have created over 100,000 direct manufacturing jobs and around 150,000 indirect jobs, thus positioning the country to become a leading manufacturing hub in Africa (see Box 5.6 in Chapter 5).

Shifting population patterns have important implications for demand in the healthcare and food industry. With the prospect of a growing and ageing population, certain demands, such as food and healthcare are expected to continue rising worldwide. Higher projected demand for food and health-related goods will create opportunities to develop new industries and expand existing ones through targeted policies. Brazil's Araucária Foundation initiative provides an interesting example in the case of the food industry (see Box 8.6 in Chapter 8). Given the new developments in this industry and the paramount role it plays in the country's economic structure, the Foundation launched a project seeking to strengthen innovation in the food ecosystem for the development of alternative proteins, especially cultivated meats. This project is a natural continuation of the country's protagonist role in the production of animal proteins.



Demographic transitions across the world are opening development opportunities, but challenges persist. While many opportunities are opening, especially for countries with projected younger populations in the coming decades, it is crucial to create productive jobs to reap the benefits. This remains a struggle in many cases as the share of unemployed youth not participating in education or training (NEET) is still high and has been increasing in recent years in poorer countries.[53] Providing quality education will be even more important, as these trends interact with the development of new technologies that require relevant skills.

3.3 WORKING IN COLLABORATION

Markets or governments alone cannot address today's challenges. The interconnectedness and complexity of modern challenges go beyond the capacity of either the private or public sector to act on their own. The market, while dynamic, falls short of fostering knowledge sharing. Conversely, governments can fail at picking winners in a rapidly evolving industrial environment and might lack the ability to identify and support emerging technological areas. A forward-thinking approach to address these challenges requires the continuous exchange of knowledge and resources between stakeholders, which can only happen through a collaborative approach.

Solution-driven industrial policy requires close public-private collaboration. The process of identifying viable solutions, making informed decisions on technological investments, and setting overarching directions for economic growth must stem from collaborative efforts between governments and businesses. Such partnerships ensure that the private sector's technical expertise and innovative capabilities are integrated into the strategic and regulatory frameworks provided by the government.

Collaboration is a necessary condition for successful implementation. Modern industrial policy is less about top-down incentives and more about establishing sustained collaboration between the public and private sectors.[54] Consultations with the relevant stakeholders are crucial to achieve a higher level of policy implementation. Without sufficient consultation with the private sector, some policies might come as a surprise, leading to strong resistance to their implementation. In such cases, years of effort to design and produce an industrial policy document could be wasted, and the industrial policies could remain only on paper.[55]

Working in partnership means being equally invested. For modern industrial policies, public-private collaboration is a foundational element. It is crucial for these partnerships to have a shared sense of responsibility, risk and reward.[56] The public sector must lead by providing bold and visionary strategies, while the private sector must complement this with innovation, flexibility and adaptability. Such a mutual investment ensures that both sectors work towards a common goal of sustainable and inclusive industrial development.

Adapting to the megatrends requires stronger partnerships. The significance of these partnerships becomes even more important when addressing the major global megatrends identified in Chapter 1. Each of these megatrends implies certain priority areas for industrial strategies, and these priority areas can be addressed through innovative public-private partnerships. The following paragraphs summarize each megatrend's main takeaways and provide concrete examples of partnerships in action.[57]

1 **Energy transition**: Public-private partnerships are crucial in addressing the energy transition to achieve environmental sustainability. Collaborative efforts in this area can help overcome infrastructure development barriers, champion sustainable innovations and enhance energy efficiency. Identified public sector priorities include promoting data standardization and transparency, harmonizing environmental regulations, and offsetting risks associated with transitioning to greener energies and sustainable practices. On the other hand, private sector priorities include increasing resource efficiency and material substitution, selecting sustainable supply chain partners, and fostering in-house innovation for climate-friendly technologies.

2 **Fourth Industrial Revolution**: Collaborative efforts are essential to accelerate technology adoption, especially with smaller firms in the context of the 4IR. Public sector initiatives include establishing consultative bodies, pooling diverse expertise for industrial collaboration, data gathering and benchmarking to inform policies, and creating experimental spaces for technology testing. The private sector's focus concerns establishing research linkages and liaising with academia to co-develop relevant technologies, investing in enabling infrastructure, and sharing experiences, best practices and innovative approaches to successfully upgrade existing and new technologies (see Box 3.1 and Box 3.2).

3 **Global rebalancing:** An open collaboration between the private and public sectors can enhance supply chain resilience, which is crucial for global rebalancing. Here, the public sector can strengthen international coordination and collaboration, restructure essential supply chains through diversification and support business continuity planning. The private sector, instead, can improve supply chain visibility by sharing information, adopting resilience-enhancing technology, and embracing new profit models that reward collective resilience efforts.

4 **Demographic transitions:** Public-private collaboration is essential to create future skills and ensure future generations' employability. The public sector's role in encompassing early-stage skills development, integrating technology and skills in education, and establishing training requirements for large firms, complements the private sector's efforts to proactively partner on training curricula, promoting lifelong learning, ensuring on-the-job training and retraining, and diversifying the workforce to include a broader demographic spectrum (see Box 3.3 and Box 3.4).

Box 3.1 **Brazil: digitalizing industrial SMEs through public-private collaboration in Sao Paulo**

São Paulo, the economic powerhouse of Brazil, embarked on the ambitious Digital Transformation Journey programme in May 2022. The initiative was driven by the urgent need to accelerate the digitalization of industry in São Paulo, where two-thirds of the industrial sector lagged in adopting digital technologies. The transformation is spearheaded by the Federation of Industries of the State of São Paulo (FIESP), the Centre of Industries of the State of São Paulo (CIESP), the São Paulo branches of the National Service of Industrial Learning (SENAI) and the National SME Support Service (SEBRAE-SP).

The programme entails a long learning process structured into eight comprehensive stages, with each stage designed to progressively build the digital capabilities of the participating companies. One of the significant challenges faced was the heterogeneity of equipment among SMEs and the need for significant capital investment for advanced technologies such as machine learning. To address this, the programme provided assisted digitalization to enable SMEs to understand and engage in the digital transformation process.

The programme is supported by a collaborative ecosystem, including 1,900 engaged engineers and

consultants, and leveraged various sources of finance like Finep, FAPESP, BNDES and Desenvolve SP, which offered low-interest rates to expand capital expenditures. A critical aspect of the programme was the concerted effort in training and educating labour in digital technologies, mobilizing engineering and business schools for short-term executive training programmes, and engaging large companies capable of inducing transformation, such as Siemens.

Targeting 40,000 SMEs over four years, the programme encapsulates the power of public-private collaboration and the transformative impact of digitalization on the industrial sector, particularly in emerging economies.

Source: UNIDO elaboration based on CIIP-UNIDO-WEF (2024) and "Climbing the Ladder of Digital Transformation" session of the 2023 edition of the UNIDO Multilateral Industrial Policy Forum (MIPF).

Box 3.2 **Saudi Arabia: creating the factories of the future in close collaboration with the private sector**

The Future Factory Programme (FFP) in Saudi Arabia, a pioneering initiative by the Ministry of Industry and Mineral Resources, represents a significant stride in the nation's journey towards industrial modernization. Launched with the ambitious goal of transforming 4,000 factories, the FFP exemplifies how digital technology adoption can revolutionize an industrial landscape. This programme is strategically positioned in Riyadh, in the broader MENA region, to enhance the competitiveness and efficiency of Saudi industries.

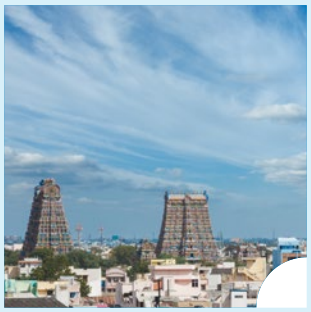
The FFP is centred around adopting the Internet of Things and 4IR technologies. It aims to build an advanced industrial ecosystem, raise the productivity of Saudi SMEs, and create quality job opportunities in manufacturing. The key objectives of the FFP include establishing technological infrastructure in new factories, conducting audited evaluations of SMEs to identify specific needs, and offering incentives and financing to support digital transformation. This comprehensive approach incorporates financial incentives for implementing transformation roadmaps, financing capital-intensive digital projects and supporting the piloting of emerging technologies.

The public sector's contribution to the FFP includes funding digital capability centres for manufacturers, SMEs, and academic institutes, collaborating with technology providers, offering international certification training programmes and funding a SIRI training programme to train local assessors. The private sector launched programmes to support SME transformation, shared standards and best practices and conducted pilots and proofs of value for emerging technologies.

So far, the programme has registered 96 technology companies to support factory transformation, trained 55 individuals as certified SIRI assessors, and established two capability centres.

Source: UNIDO elaboration based on CIIP-UNIDO-WEF (2024).

Box 3.3 India: updating the educational curricula in Tamil Nadu to match the skills demand of modern industry



Guidance, the investment promotion agency of the Indian state of Tamil Nadu, together with India's Directorate of Technical Education and a consortium of industries, is working to update curricula at the polytechnic colleges. Launched in June 2022, the project seeks to ensure the development of a workforce that can bolster Tamil Nadu's transition to high-technology and knowledge-based industries.

The key objectives of the project include the implementation of outcome-based education in 450 polytechnic colleges, impacting 180,000 students across various engineering disciplines. The aim is to align diploma programmes with the National Skills Qualification Framework and introduce a choice-based credit system, thus increasing student employability by making programmes more industry-relevant.

The government's role in this massive undertaking includes funding and coordinating the project. In addition, a comprehensive team structure has been established, comprising academic leaders, programme managers, faculty anchors, programme managers, and industry subject matter experts. The collaborative activities are structured into five phases: Ideate, Design, Create, Curate and Implement.

Success is measured by the increased employability of graduates and their ability to secure employment aligned with their skills. This reform exemplifies how public-private collaboration can effectively address the skill demands of modern industries, making students more industry-ready and boosting employment prospects.

Source: UNIDO elaboration based on CIIP-UNIDO-WEF (2024).

Box 3.4 El Salvador: integrating youth into the industrial workforce through public-private collaboration

The Empresa Centro Programme was launched in 2002 in San Salvador, El Salvador, and will continue until 2024. This initiative represents a pioneering collaboration between the Instituto Salvadoreño de Formación Profesional (INSAFORP) and the Asociación Salvadoreña de Industriales (ASI). It focuses on integrating young people into the Salvadoran industrial workforce through a blend of theoretical and practical training in various industrial production areas, closely aligned with the sector's needs. The programme's primary goal is to train qualified workers, thereby enhancing the productivity and competitiveness of local companies.

Participants, aged 18 to 35, receive theoretical training from ASI, while the practical aspects are managed by participating companies, all under the expert supervision of INSAFORP. The training begins with an intensive basic training phase at ASI, where young people engage in full-time learning. This is followed by a combined theoretical-practical phase, where participants split their time between working in industrial companies and attending ASI for further education. The collaboration is managed through regular meetings and reports, ensuring effective oversight and progress tracking. The training is 100 per cent financed by INSAFORP, ensuring no cost to participants.

To date, Empresa Centro has successfully developed six specialized career paths, including roles like Industrial Electrician and Production Supervisor, and has over 1,000 young graduates. These graduates are now equipped with relevant skills and experience, significantly contributing to the Salvadoran industrial sector's growth and efficiency. The initiative stands as a testament to the effectiveness of public-private partnerships in fostering workforce development and aligning education with industry needs.

Source: UNIDO elaboration based on CIIP-UNIDO-WEF (2024).

Andrea Illy

“The world might lose half of suitable land for coffee production in the next three decades as a result of climate change. This would put at risk the virtuous circle that exists between the well-being that coffee brings to consuming countries and its contribution to the development of the countries which produce it. This virtuous circle must be nurtured in order to improve the sustainability of the sector. The most urgent action needed to achieve this goal is to foster public-private partnerships aimed at boosting investments in climate change adaptation and mitigation, particularly related to smallholders’ coffee plantations in low-income countries.”

Chairman of illycaffè

3.4 COORDINATING WITH NEIGHBOURS

National policies can have implications outside national borders. Industrial policies implemented by large and influential countries can have major regional and global implications. Careful implementation of national policies is crucial because they can impact trade patterns, influence regional and GVC, shape technological innovations and affect the overall economic development of neighbouring countries.

A rise in industrial policy may raise tensions among countries. Industrial policy initiatives can raise tensions among countries, particularly when they involve measures perceived as protectionist, distortive, or unfairly favouring certain industries or regions. However, industrial policy is not necessarily protectionist. As a matter of fact, contemporary industrial policy often focuses on promoting outward-oriented economic activity either by promoting exports or by strategically using FDI to develop specific sectors of the domestic economy.[58] Moreover, implementing SDG-oriented industrial policies may imply introducing global agenda perspectives into national decision-making by addressing social and environmental issues such as poverty, inequalities, inclusion and greenhouse gas emissions.[59]

Coordination is needed for achieving benefits. Cross-border policy coordination within regions is paramount to ensure that common benefits are maximized and the unintended negative impacts of harmful competition are avoided. The long-term success of any policy depends on the success of neighbouring countries and the overall development of the region. Regional development creates larger markets for intra-regional trade and promotes economic interdependence. Economic spillover and knowledge sharing are key factors in extending the success of national policy to a regional level. By working together to foster regional development, countries within a region can unlock greater economic potential, enhance competitiveness, and improve the well-being of their populations.

Regional complementarity should be at the top of the new industrial policy agenda. The implementation of industrial policy might, in some cases, work against the objective of regional integration. This is particularly the case when domestic industrial policies take the form of import bans, import tariffs, import quotas or restrictive import licenses. The domestic actors that enjoy such advantages will attempt to retain them, but they will have to be forgone to ensure regional integration.[60] The regional coordination of industrial policy can make objectives, industrialization and integration compatible by stressing the areas of complementarity among countries, and by supporting the creation of regional value chains. Under certain institutional settings, it may be possible to develop a regional industrial policy where the region is viewed as a single unit. Industrial policies can be made based on trade policies or by establishing a negotiated regional division of labour.[61] They can also support asset pooling, such as the public procurement for medicines and health suppliers.[62]

Institutional settings can be upgraded to support regional coordination. Institutional settings are crucial in facilitating effective collaboration and cooperation among regions. These settings can take different forms. Supranational policies and programmes can set the general framework conditions for national-level industrial policies. Such frameworks provide guidance, coordination and flexibility for each country to integrate them into existing national priorities and strategies, and to capitalize on their comparative advantages. One example is the development of a regional information-sharing platform, with participation from the private sector, government, researchers and development partners to advance industrialization at both the regional and national levels. Another example is the establishment of regional institutions to support capacity development programmes.

Existing initiatives in different regions illustrate the positive dynamics of coordination. Positive impacts of regional coordination are observed in different regions of the world. The Gulf Cooperation Council (GCC), for instance, has shown the potential of regional coordination for achieving sustainable industrial development.[63] A similar case of successful regional cooperation is observed in the Pacific Islands with the introduction of the Vessel Day Scheme (VDS) for tuna fishing. The VDS encouraged downstream processing and canning, discouraged illegal fishing and harmful fishing methods and became a critical revenue source for Pacific Island economies. The success of such initiatives has contributed to improving the competitiveness of fishing and conservation activities, enhanced climate resilience and promoted sustainability in the region.[64] Another example is the Central American Integration System, an effective supranational regulation endorsed by all participating countries, with the objective to strengthen the regional economic block, increase integration into GVC, and preserve the environment through the sustainable use of natural resources, amongst others.[65]

Cross-border coordination is paramount to address today's challenges. The most pressing challenges confronting the world are global in nature, but the policy solutions to address them are designed and implemented by individual countries. In such cases, a piecemeal, country-by-country approach is likely to be suboptimal.[66] Addressing challenges such as climate change requires cross-border coordination and cooperation to develop and implement effective policy solutions. By working together, countries can strengthen their resilience to climate change while protecting vulnerable communities and ecosystems.

International partnerships can help address common challenges. Countries in a region can develop and implement regional action plans that address common challenges, such as climate change, the energy transition or rapid technological change. Regional collaborations and partnerships on research and innovation, for instance, can accelerate the development of climate-friendly technologies and solutions. Research and development cooperation, training and technology transfers to local researchers can help diversify exports based on a country's biodiversity. Stronger regulations and better implementation of legal mining and environmental licenses can help reduce environmental damage. By the same token, technological transfers and targeted support in waste management can reduce adverse effects on human health and the environment.[67] Cross-border collaboration is also key in anticipating risks, planning responses, and building resilience at the regional level.[68]

ENDNOTES

[1] Chang (2002).
[2] Lee (2013).
[3] Kastelli et al. (2023).
[4] Mazzucato and Kattel (2023).
[5] See Annex A for further details on the approach followed and the indicators used in the SDG assessment.
[6] This is the case, for instance, in indicator 7.1.1, "Proportion of population with access to electricity", where the target was set to 100%.
[7] For instance, the indicator 7.b.1, "Installed renewable electricity-generating capacity (watts per capita)", has a target of 1,260 watts per capita, which was the observed value for Denmark in 2015.
[8] The speed of convergence is defined as the difference between the index values in 2019 and 2009 divided by the number of years (ten years in this case).
[9] See Annexes for the list of countries included in each category.
[10] Altenburg and Rodrik (2017).
[11] Net zero means that an economy may maintain some GHG emitting activities but that they are neutralized by activities that absorb GHG from the atmosphere (so-called sinks) in equal amounts.
[12] Bataille and Alfare (2023).
[13] Ibid.
[14] Ibid.
[15] Rodrik and Stantcheva (2021).
[16] Aiginger and Rodrik (2020).
[17] Rodrik and Stantcheva (2021).
[18] UNIDO (2021a).
[19] Lim and Lee (2023).
[20] Rodrik and Stantcheva (2021).
[21] UNIDO (2017b).
[22] Ernst et al. (2023) illustrate this type of technologies with the case of 3D printing in South Africa, where companies are using the technology to produce aerospace components, automotive parts and medical equipment; universities have integrated 3D printing into their curricula, providing students with hands-on experience and training in this emerging technology; and the country has also established 3D printing hubs and innovation centres which provide resources and support for entrepreneurs and start-ups looking to leverage 3D printing for their businesses.
[23] UNIDO (2019a).
[24] State and public agencies act as lead users and prime movers with respect to buying and applying new digital products, technologies and services from domestic providers (Edler and Georghiou (2007)).
[25] The 2020 edition of the IDR provides a detailed discussion on the different policies that governments around the world can use to accelerate industrial digitalization.
[26] Andreoni (2024).
[27] IEA (2021a)
[28] Andreoni and Avenyo (2023) and Hund et al. (2020).
[29] Andreoni (2024).
[30] Lebdioui et al. (2021)
[31] IEA (2023b).
[32] IEA (2024).
[33] Particularly areas in in northwest Argentina, Bolivia, northern Chile and southern Peru.
[34] ESMAP (2020).
[35] Lebdioui (2022).
[36] Andreoni (2024).
[37] IEA (2023c).
[38] Albaladejo et al. (2022).
[39] Lema et al. (2021).
[40] Lee (2019).
[41] Andreoni and Anzolin (2019).
[42] Brynjolfsson et al. (2017).
[43] Matthess and Kunkel (2020) and Pattnayak and Chadha (2022).
[44] UNCTAD (2023a).
[45] See Saurav et al. (2020) for a recent review on the effects of FDI on jobs, productivity and wages in developing countries.
[46] Lee (2024).
[47] Pietrobelli and Seri (2023).
[48] Lebdioui (2022).
[49] Bloom et al. (2000, 2010).
[50] Bloom and Williamson (1998) and Mody and Aiyar (2011).
[51] Hosan et al. (2022).
[52] UNIDO (2017b).
[53] ILO (2022).
[54] Aiginger and Rodrik (2020).
[55] See section 4.1.
[56] Laplane and Mazzucato (2020).
[57] CIIP-UNIDO-WEF (2023).
[58] Juhász et al. (2023).
[59] Barbieri et al. (2021), Haraguchi et al. (2024) and Kastelli et al. (2023).
[60] Odijie (2019).
[61] Odijie (2023).
[62] See, ECLAC (2021) for the case of LAC, and UNECA (2023) for the case of Africa.
[63] See Box 6.6 in Chapter 6.
[64] See Box 6.7 in Chapter 6.
[65] Martinez Piva (2019).
[66] Naudé (2011).
[67] OECD et al. (2019).
[68] López-Gómez and Santiago (2022).

CHAPTER 4 TURNING CHALLENGES INTO OPPORTUNITIES: A NEW DEAL FOR FAIR GLOBALIZATION AND SOLIDARITY

Well-crafted industrial policies that may appear impressive on paper might fall short during implementation unless certain conditions are met. This chapter concludes Part A of the report by briefly reflecting on the necessary conditions for success. It specifically focuses on three key ingredients for success: (i) strong government capabilities, (ii) adequate financing, and (iii) broad societal consensus. Given that these ingredients are scarce in developing countries, the chapter also explores how the international community can assist them in creating the necessary conditions for implementing new industrial policies to accelerate progress towards the SDGs. Four areas are highlighted: (i) sustainable and long-term financing; (ii) capacity development for governments in designing and implementing industrial policy; (iii) technology transfer and skills development, and (iv) an open policy space for developing countries to implement modern industrial policies. The chapter concludes that strengthening multilateralism, international coordination and collaboration on industrial policy issues will be crucial for creating a level playing field and building a better future.

José Antonio Ocampo

"Deep reforms are needed in the international financial system to support sustainable development and expand the provision of global and regional public goods, primarily in the struggle against pandemics and climate change. To this end, there is a need to continue to reform the Bretton Woods Institutions, broadening the voice and participation of developing countries in decision-making processes. It is also necessary to move towards a more representative body at the helm of the international economic cooperation system and build a denser, multi-level architecture, especially strong regional and subregional institutions, which are growing in importance as they support intra-regional trade, investment flows and other economic integration goals."

Professor at Columbia University and former UN Under-Secretary-General for Economic and Social Affairs, Executive Secretary of ECLAC and Finance Minister of Colombia

From design to implementation. Well-crafted industrial policies that look good on paper might fail at the implementation stage unless other necessary conditions are in place. This chapter concludes Part A of the report with a brief reflection on some of these necessary conditions. It focuses on three key ingredients for success emerging from the review of industrial policy cases across developing regions presented in Part B: capabilities, resources and continuity. As some of these ingredients are scarce in developing countries, the chapter also discusses how the international community can support these countries in building the necessary conditions for implementing new industrial policies that can help accelerate SDG progress.

4.1 INGREDIENTS FOR SUCCESS

Three ingredients for successful implementation of modern industrial policy. The review of policy cases conducted for this report and documented in Part B reveals three important ingredients for success: strong government capabilities, proper financing and broad societal consensus.

4.1.1 Strong government capabilities

New challenges and broader goals make industrial policy more complex. An SDG-oriented industrial policy has more ambitious goals than a traditional industrial policy. At the same time, the megatrends discussed in previous chapters, such as the digital revolution or the green transition, introduce new challenges and areas of action for industrial policymakers. These developments increase the complexity of industrial policy implementation. When addressing the priority areas related to SDG 7, 8 and 9, industrial policy targets become interrelated, creating new trade-offs, such as digital automation *versus* direct job creation, and new synergies, such as digitalization and decarbonization. These interrelations must be considered and carefully assessed when monitoring the results of specific industrial policy instruments.

Increased complexity calls for stronger government capabilities. The crucial need for strong government capabilities to successfully implement industrial policy is well documented in the literature.[1] Agencies that are executing industrial policy must have the required capabilities and technical autonomy to perform their mandates, monitor results, meet the objectives and scope, and ensure that specific beneficiaries are targeted. Having these capabilities becomes even more critical in the current context. Existing levels of government capabilities should be upscaled in at least two ways: through digitalization and anticipation.[2] In the context of radical technological change, industrial policy institutions must be equipped with the latest digital technologies. They should be prepared to anticipate future trends and needs that will shape the outcomes of industrial policies.

Weak government capabilities might lead to implementation failures. Industrial policy in developing regions often fails to go beyond the formulation stage, or when it does, fails to achieve the desired objectives. The limited capabilities of public agencies in charge of implementation are typically the main factor behind this outcome. Implementation is not an easy endeavour, especially when industrial policies become cross-sector and challenge-oriented. Introducing and putting in motion novel policies will require rebuilding, renewing, and making operational the technical capabilities of executive agencies. This might also require designing new policies, with the necessary instruments and resources, and the establishment of interstate alliances and negotiation with policy stakeholders.

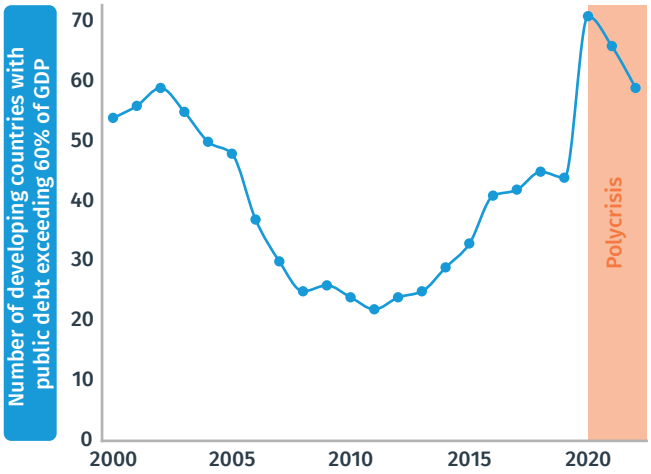
Intragovernmental coordination is crucial. An SDG-oriented industrial policy requires close coordination with other areas of policy action beyond industry. Among others, coordination with environmental, technological and energy policies is crucial.[3] However, the reality in developing countries is often characterized by institutional and policy silos. This disconnection can heighten the risk of policy failure. The review of industrial policies in Africa revealed a series of interrelated policies that fall outside the purview of the government departments responsible for industry.[4] Instead, these policies require the collective efforts of multiple government departments and agencies, both horizontally and vertically, for effective implementation. Similar results were observed in Latin America and the Caribbean (LAC), where a lack of coordination across public policies and regulations often limits the impact of those policies.[5] For example, most digitalization initiatives in the region are not articulated with industrial policy and thus lack the relevant policy instruments, especially technical assistance capabilities and development finance to face the challenges of fostering digitalization. To break out of policy silos, thematic and sectoral policies should be aligned with industrial policies. Furthermore, formal interactions should be established within the government and with relevant policy stakeholders throughout the policymaking process.

4.1.2 Proper financing

Financing industrial policy requires fiscal space. Even if the necessary capabilities are present or developed, a modern industrial policy can only induce change if it has sufficient financial resources. A lack of financial resources can become a significant obstacle, especially in less developed countries where tax collection capability is limited, along with resources allocated to the industrial policy budget. The potential scope and ambition of SDG-oriented industrial policy depend on how vast a country's fiscal space is.

The polycrisis has increased debt distress and reduced the fiscal space of developing countries. The fiscal space of developing countries has been constrained due to tighter global financial conditions. Support and recovery packages to face the polycrisis led to a rapid increase in total public interest payments relative to the size of their economies and government revenues.[6] In 2022, global public debt (i.e. general government domestic and external debt) reached a record $92 trillion. Despite owing a small share of this total (around one-third), developing countries are particularly at risk. By 2022, 60 per cent of them had public debts that exceeded 60 per cent of their GDP (see Figure 4.1). High levels of debt compromise the ability of developing countries to implement the next generation of industrial policy.

Figure 4.1 **A growing number of countries are facing high levels of debt**



Source: UNIDO elaboration based on UN Global Crisis Response Group (2023).

Lack of financial resources can also lead to implementation failures. A common problem when moving from the design to the implementation of industrial policies is the mismatch between the objectives set in the policy document and the financial resources needed to achieve them. A careful assessment of available resources is paramount for achieving success. Some institutions, such as national development financial institutions may support directing and allocating sufficient resourced to implement industrial policies.

National development financial institutions can play a strategic role in implementing industrial policy. Placing development finance at the center of an industrial policy strategy is essential in terms of securing resources and coordinating industrial policy with other policy instruments. However, development finance is a very scarce resource, especially in developing countries. Parsimonious, strategic resource allocation is crucial. This can be achieved, for instance, by carefully screening and financing projects that can make the most significant difference in terms of social and economic outcomes and leveraging public finance with private sector finance. With effective political guidance, clear policy directives and sufficient resources, development finance institutions have the right profile and capability to effectively foster sustainable development.[7]

4.1.3 Broad societal consensus

Industrial policy effectiveness hinges on its continuity. One last lesson from the industrial policy cases reviewed is that success in industrial policy requires several years to materialize. This means that government capacity and financial resources must go hand in hand with broad societal consensus on the goals that the policy aims to achieve to ensure its continuity beyond political cycles. Continuity has been key for learning and accumulating capabilities that can then pay off in terms of development. On the contrary, lack of continuity in political commitment to industrial policy undermines the effectiveness of policy in promoting industrialization. Changes in policies under different governments can destabilize the goals and tools of industrial policy in ways that negatively affect investments in manufacturing and the responsiveness of firms to industrial policy measures. The cyclical and discontinuous nature of politics in many developing nations suggests that policy design and implementation can become fragmented over time, leading to the erosion and failure of certain industrial policy initiatives and outcomes. To counter this, industrial policy should be seamlessly integrated into the long-term development plans of developing countries and be based on broad and legitimate consensus among all stakeholders.

To succeed, industrial policy must be consultation-based and form strong coalitions. Interactions with the private sector and public institutions play a crucial role in determining industrial policy development. Success will depend on forging a compact for industry

consisting of the government, the private sector, civil society, labour and development partners. Often, however, developing countries lack strong coalitions of interests that are vested in the success of industrialization, which can push for the resourcing and implementation of policies supportive of industrialization. Coordinating activities and goals among government and private sector stakeholders is fundamental for modern industrial policies.

SDG-oriented missions are powerful tools to create consensus and ensure policy continuity. The chances of successfully mobilizing public resources will increase if different public organizations advance in convergent directions under guidelines and priorities defined in the political domain.[8] A revision of industrial policy based on societal consensus around the achievement of specific SDGs, can support the continuity of policies beyond political cycles. Such consensus must be based on the identification and involvement of all stakeholders and implies a system of policies that target the SDGs.[9] At the roots of this process are contradictions and controversies due to the distribution of gains and losses. A variety of policy interventions at different political levels (such as individual, organizational or systemic), can foster structural change. Deriving from a political consensus, industrial policy can become the main component of this system of policies aligning it with the overall vision of sustainable development.

4.2 THE NEED FOR SOLIDARITY

Domestic efforts alone will not be sufficient. The task ahead is particularly challenging for developing nations, especially for least developed countries (LDCs). These countries currently lack the infrastructure, skills and capabilities to accelerate SDG progress through rapid industrial development. Support from the international community will be crucial in facilitating the creation of such conditions. A new global deal is needed, based on stronger solidarity, in which today's wealthy industrialized nations support the most vulnerable countries in four key areas: finance, capabilities, technologies and skills and policy space.

4.2.1 Providing finance

Access to quality finance is vital for effectively implementing modern industrial policy. As discussed in the previous section, the effective implementation of modern industrial policy requires sufficient resources. Developing countries, however, have a particularly tight fiscal space. On the one hand, as shown in Figure 4.1, external debt has increased dramatically since the start of the polycrisis. Additionally, capital inflows into developing countries have sharply reversed in recent years, exacerbating liquidity constraints and further raising the cost of external refinancing.[10] In this context, the external financing needs of LDCs and other low-income countries (LICs) are expected to increase substantially but not to cover developmental needs. Instead, a significant part of this historically high level of external financial needs will be devoted to paying high debt amortizations without impacting the real economy.

An unequal international financial architecture makes developing countries' access to financing inadequate and expensive. Lack of access to long-term finance and expensive borrowing terms are major constraints to sustainable industrialization in developing countries. Due to higher risks and underdeveloped financial markets**,** banks are much more likely to provide long-term loans in developed countries than in LICs and LDCs. For example, in LDCs, only 17 per cent of small manufacturing enterprises have access to financial services, which is well below the global average of 30.4 per cent. Borrowing terms are also more expensive in developing countries, as they pay much higher interest rates than in developed countries. Economy-wide costs of capital have been estimated to be up to seven times higher in developing countries than in the United States and Europe.[11]

A systemic reform of the international financial architecture is needed. Tackling this critical bottleneck calls for an urgent reform of the global financial system. This reform should make the system more inclusive by addressing the high cost of debt and rising risks of debt distress. Furthermore, it should significantly increase affordable long-term financing for development and expand contingency financing to countries in need.[12] Access to quality finance can widen the fiscal space of developing countries and enable them to implement the bold policies and investments needed to accelerate SDG progress.

4.2.2 Supporting government capabilities

Capacity development support is needed to design and implement the next generation of industrial policy. The increasingly complex environment around industrial development and industrial policy require stronger government capabilities. This particularly applies to developing countries, which are generally unable to match the ambitious industrial policy programmes deployed by highly industrialized economies. Effectively supporting industrial transformations requires specific technical, operational and political capabilities

at individual, organizational and systemic levels in the public sector.[13] Developing countries, in particular the LDCs, however, often lack such capabilities. Creating and strengthening relevant skills in public agencies is an important feature of structural transformation strategies to accelerate the SDGs.[14]

Increasing governments' capacity means investing in skills and strengthening organizational tools and dynamic capabilities. Policy learning plays a crucial role in capacity development processes that support industrialization, particularly in developing countries. Governments are facing increasing pressures to deliver effective and efficient public policy in a growingly complex and unpredictable industrial development environment. At least three areas need to be strengthened in developing countries to increase the effectiveness of industrial policy formulation, implementation and monitoring.[15] First, developing countries need to invest in the skills of policymakers to use evidence for decision-making. This entails strengthening the professional development of public officials, including their capabilities to access, interpret, validate and act on emerging evidence in situations of high uncertainty. Second, governments need new tools and practices to assess the socio-economic impacts associated with public policy interventions, thereby improving the evidence-based learning about which initiatives work. Third, governments need to strengthen their organizational tools, resources and processes by investing in data management systems, creating knowledge brokers and establishing strategic units.

International efforts to support policy capacity development should be scaled up. While the demand for the international community to bridge funding gaps is growing[16], insufficient attention is still being paid to how to translate the injection of additional resources into concrete progress. To help countries bridge the capability gap in designing and implementing modern industrial policies, the international community can support capacity development activities for policymakers and industrial leaders. This includes establishing platforms to exchange information and share knowledge on best practices around industrial policy, and creating accessible tools to assess the feasibility and potential impact of industrial investment projects. Capacity development requires a search for complementarities, consensus building and partnerships across various actors. While national governments take the lead in policymaking, the complexity of the issues allows for participation of a broader set of actors, including the private sector, academia, non-governmental organizations and international organizations with a stake in industrial development.

4.2.3 Supporting the transfer of new technologies and the creation of new skills

Closing existing technological gaps between developed and developing countries requires technology transfer. Technological learning and innovation depend on the ability of countries to access, adapt and diffuse technological knowledge. Given developing countries' limited maturity of national innovation systems and low institutional capabilities, only a few developing countries have the capacities needed to take advantage of frontier technologies.[17] Research conducted for previous editions of the Industrial Development Report shows significant gaps between high-income industrial economies and the rest of the world when it comes to creating and mastering new technologies. The case of advanced digital production technologies illustrates this well. Only ten countries, including nine high-income industrial countries and China, account for 90 per cent of patents related to these technologies. The same set of countries also account for 70 per cent of global exports from the capital goods needed to make the productive use of these technologies. Developing countries are, at best, passive users when these technologies are embedded in equipment and machinery imported from abroad. Technology transfer is crucial to closing the technological gap between developed and developing countries as it creates a sound and viable technological base.[18]

Productively absorbing new technologies requires new skills. Boosting technology transfer alone is not enough. To make a real change, technology transfer initiatives should go hand in hand with the development of skills and competences needed to put these technologies to work. As documented in the previous chapter of this report, industry is undergoing a remarkable transformation in line with the digital and green revolutions. Factory worker, entrepreneurs and managers need new skills to manage the creative aspects of of sustainable industrial production in a new context. Promoting access to education and technological skills is crucial to ensure that industrialization reduces poverty and inequality. Most developing countries face major challenges in training a sufficiently skilled workforce for modernized industries. Lack of skilled labour, for instance, is a major and growing bottleneck in the absorption of advanced digital production technologies.[19]

A decisive approach must be taken to foster the skills of the future in developing countries. Education for all and in particular, equal access for girls and women to vocational training and employment must be ensured. The international community can support the implementation of skills development programmes and the expansion of vocational training in developing countries to enable people to acquire the

qualifications and skills needed for digitalization and the green economy. Close collaboration with the private sector is crucial to assess the need for further education, retraining and vocational training, as well as to develop relevant school curricula and the training of teaching staff.

International partnerships can help countries develop science, technology and innovation (STI) capabilities to absorb new technologies and accelerate SDG progress. As documented in the progress report of the Global Pilot Programme on STI for SDGs Roadmaps[20], international partnerships can support three important fronts: 1) strengthening the connections between national innovation systems across countries to build national STI capabilities to address the SDG challenges; 2) boosting international flows of relevant knowledge and technology between countries and supporting cross-country STI collaborations while, addressing the SDGs; and 3) brokering international collective STI actions with an ambition to tackle global challenges, namely global public goods, as technological advances can help developing countries to effectively address SDG challenges.

4.2.4 Opening the policy space

The policy space shapes the scope of industrial policy interventions. The ability to leverage industrial policy differs considerably across countries and depends on factors such as their level of industrialization, experience with industrial policy, or their relative strategic position in global affairs.[21] For countries at the initial stages of industrial development and those trying to reverse premature deindustrialization processes, the global setting in which they operate has a significant impact on their chances of success. The international context shapes the policy space of countries because it influences the set of policy measures that are politically and administratively feasible at a given time.[22]

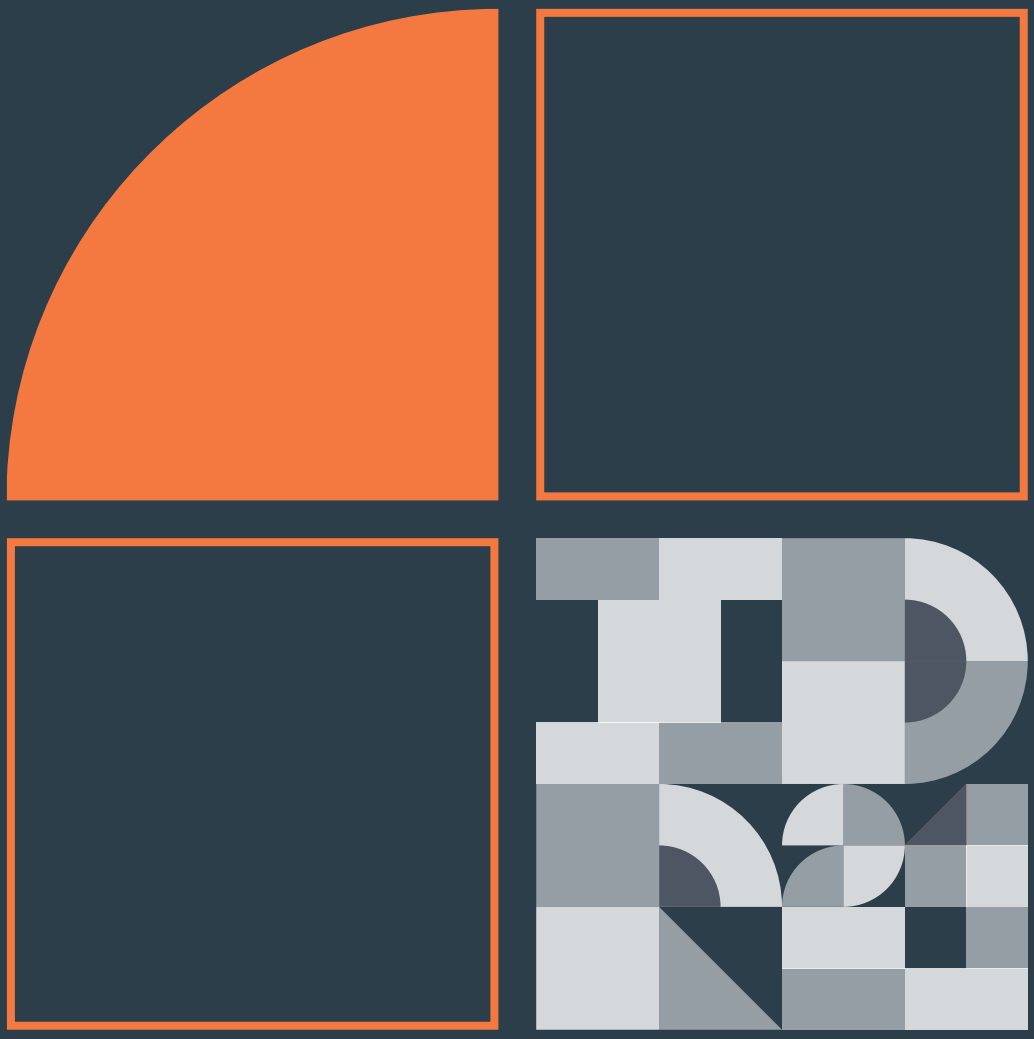
Developing countries are increasingly calling for action at a multilateral level to devise rules that are equitable and fit for purpose. The pertinence to update and upgrade the international architecture that governs critical drivers of industrialization is gaining pace in multilateral circles. There is a growing demand for reforms that would grant developing countries, particularly the least developed ones, the required policy space to address local needs and constraints while keeping the proper alignment with regional and global coordination efforts towards sustainable industrial development and "other common goods".[23]

The international community must ensure a level playing field for fair industrialization. Addressing the increasingly complex and uncertain industrial development environment requires intensified multilateral dialogue on strategies in order to ensure a level playing field. Hence, there is a better chance to balance national interests and reduce negative spillovers from national industrial policies. Concerted dialogue should make it possible to assess and update current multilateral rules and agreements on investment, trade and technology, which have framed the scope for industrial policy programmes in developing countries in the past. The world is changing and the institutional setting around industrial development needs to adapt accordingly.

Strengthening multilateralism, international coordination and collaboration around industrial policy is crucial to build a better future. International cooperation is essential to cope with the polycrisis and accelerating progress towards the SDGs. As highlighted in the previous edition of the IDR, countries alone cannot fight external shocks such as the COVID-19 pandemic. Strengthening multilateralism and coordination around industrial policies is necessary. The transnational nature of disaster risk, the multidimensional nature of resilience, and the multistakeholder approaches needed to face the global crises indicate that the best strategy to cope with the unexpected is to pool resources across jurisdictions. Strengthening multilateralism, international coordination and collaboration around industrial policy issues will be crucial to building a better future. Improved collaboration would reaffirm commitments made around the Decade of Action to deliver the SDGs.

ENDNOTES

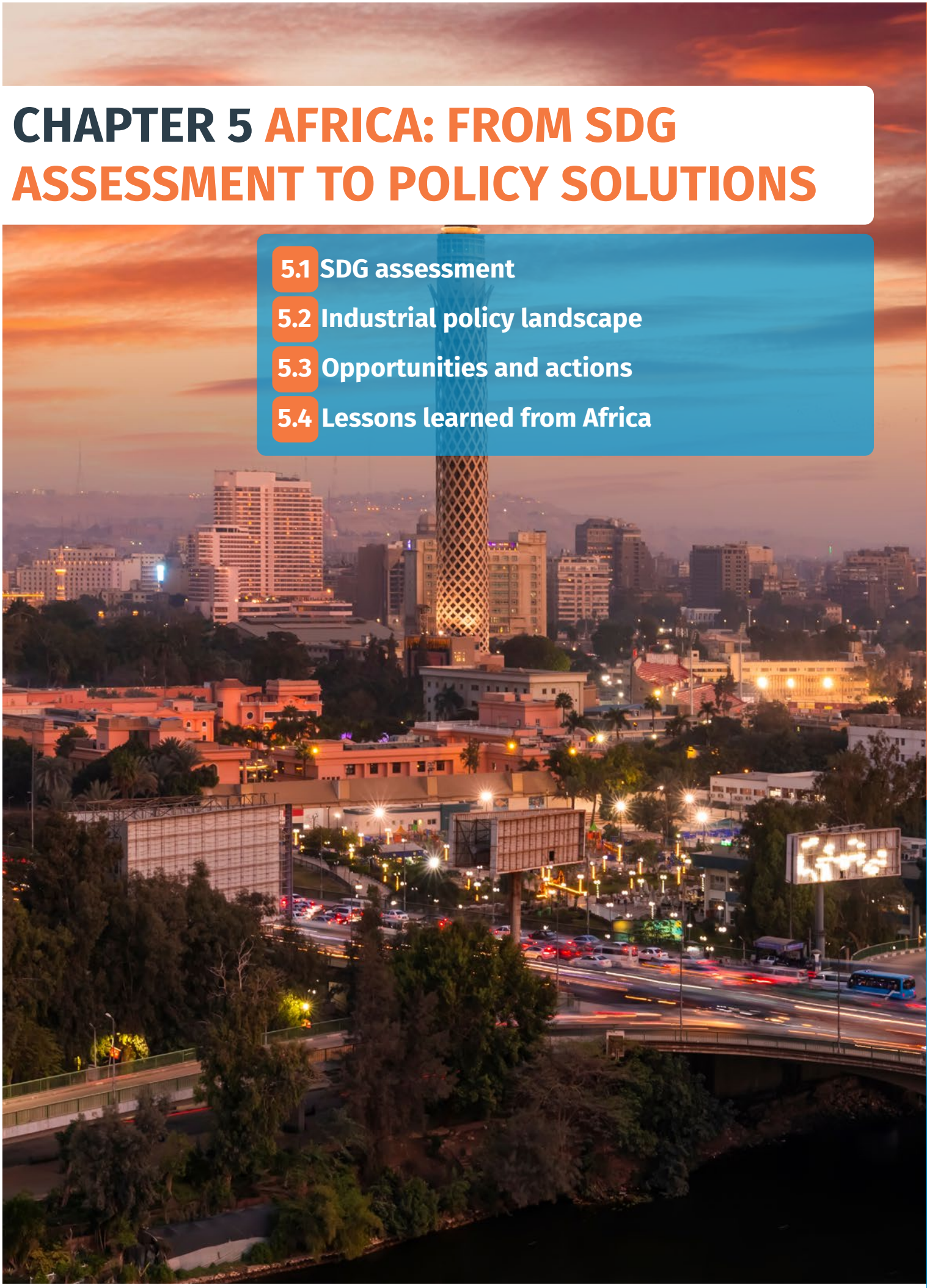
[1] See Yülek et al. (2020) for a recent review.
[2] Ferraz and Peres (2024).
[3] Aiginger (2015).
[4] Tregenna et al. (2024).
[5] Ferraz and Peres (2024).
[6] UN Global Crisis Response Group (2023).
[7] Ferraz (2023).
[8] Mintrom (2019).
[9] Kastelli et al. (2023).
[10] United Nations, Inter-agency Task Force on Financing for Development (2023).
[11] Ibid.
[12] United Nations (2023).
[13] Santiago and Zagato (2024).
[14] United Nations, Inter-agency Task Force on Financing for Development (2023).
[15] Santiago et al. (2024) and Santiago and Zagato (2024).
[16] As reflected in the call for a reform in the global financial system documented above.
[17] United Nations Inter-Agency Task Team on STI (2021a).
[18] UNIDO et al. (2021).
[19] UNIDO (2019a).
[20] United Nations Inter-Agency Task Team on STI (2021b).
[21] Santiago et al. (2024).
[22] UNIDO (2020).
[23] African Group (2023).



PART B

Industrial policy in action: regional perspectives

CHAPTER 5 AFRICA: FROM SDG ASSESSMENT TO POLICY SOLUTIONS



The Sustainable Development Goal (SDG) assessment conducted in this chapter reveals that Africa is at a crucial turning point, with substantial gaps in several key areas compared to other developing regions. However, Africa also holds enormous potential for transformative growth. The continent has made significant progress in some areas such as infrastructure, energy and resource efficiency. To bridge existing gaps and accelerate progress, Africa should focus on adopting clean energy, accelerating economic growth, creating decent jobs, developing industry and fostering innovation. This chapter explores how industrial policy can play a crucial role in achieving progress in these priority areas, and showcases examples of effective policies across the continent, with a specific focus on opportunities related to the energy transition, digitalization, trade and regional integration. By implementing these strategies, Africa can bridge the SDG gaps and at the same time position itself as a competitive, innovative and resilient player in the global arena. The chapter also assesses the situation in least developed countries (LDCs) and highlights significant gaps in their progress towards the SDG targets related to energy access, resource efficiency, industry and innovation. These gaps are particularly acute in African LDCs, where industrialization has progressed much more slowly compared to LDCs in the Asia-Pacific region.

Albert Muchanga

“As part of promoting regional and continental value chain development, African countries are working together by leveraging the platform of the African Continental Free Trade Area. The aim is to harmonize their industrial policies and build specialized production hubs in specific and complementary sectors. Consequently, this will enable them to reap the benefits of a dynamic, inclusive and sustainable industrialization process across the continent. In this way, industrial policy can contribute towards the achievement of the United Nations SDGs in Africa and the African Union Agenda 2063.”

African Union Commissioner for Economic Development, Trade, Tourism, Industry and Minerals

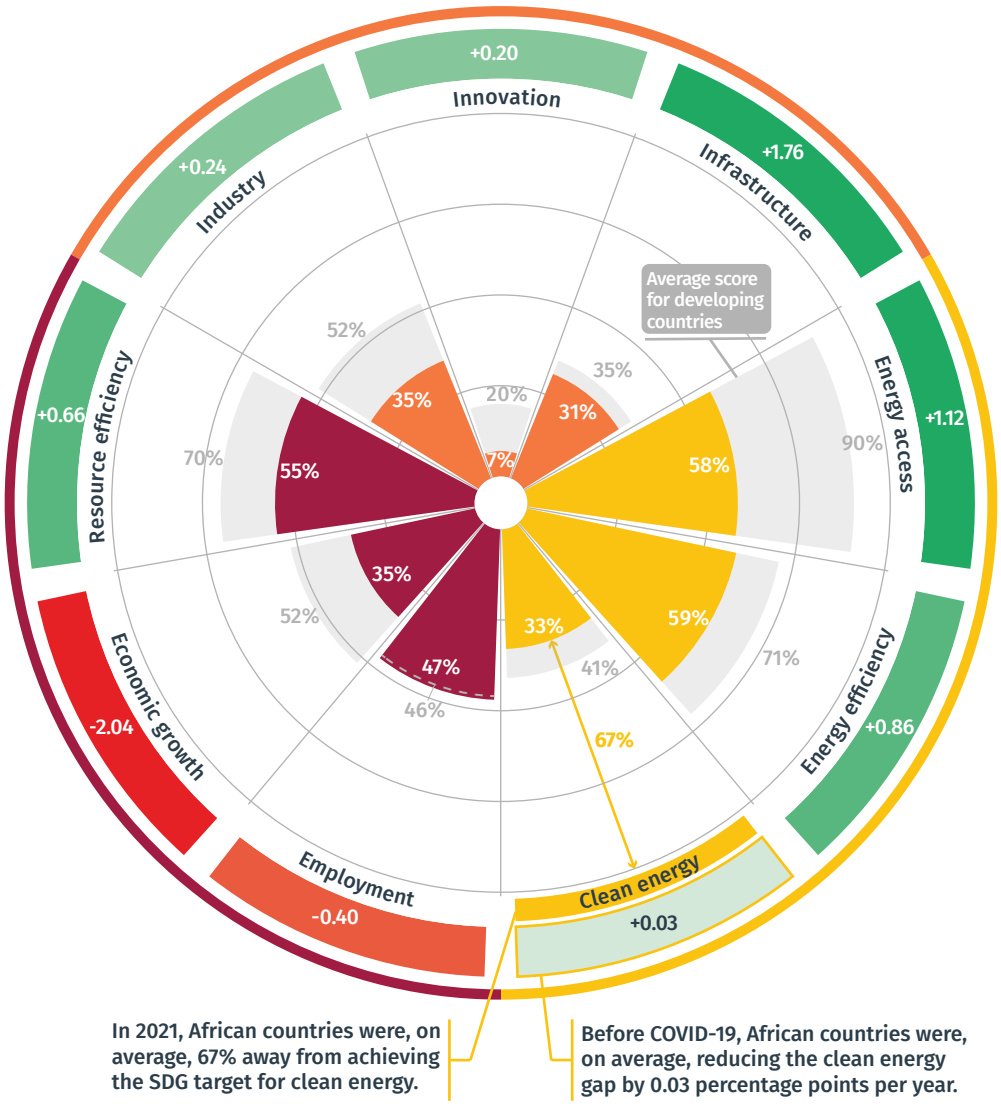
5.1 SDG ASSESSMENT

5.1.1 The current situation

Africa stands at a crucial turning point. The assessment of the continental progress towards achieving SDGs 7, 8 and 9 conducted in this report provides relevant insights into the region's developmental challenges and achievements (Figure 5.1). The assessment results for the year 2021 reflect a continent that is at a crucial turning point, with significant gaps in several key areas compared to other developing regions, but with enormous potential for transformative growth.

Progress in Africa is observed in most of the dimensions assessed, but its speed is insufficient. Some areas, particularly in energy and resource efficiency, are making sustained progress. However, the continent faces ongoing challenges in clean energy adoption, economic growth, employment, industrial development and innovation. Addressing these critical areas through targeted interventions and leveraging Africa's unique resources will be essential to accelerate the continent's sustainable development and support the achievement of the SDGs.

Figure 5.1 **Distance to SDG targets: Africa in 2021**



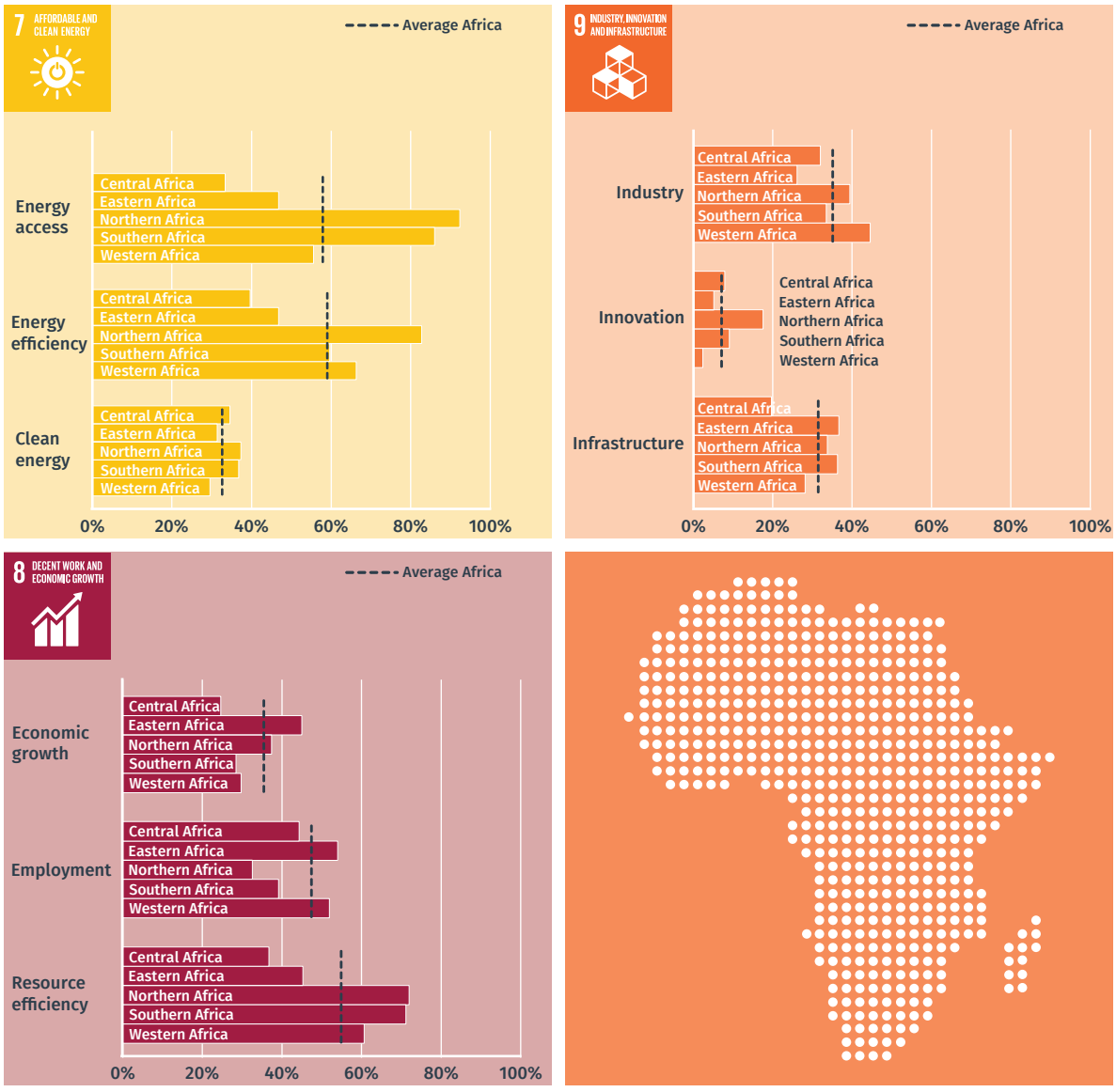
Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the regional level using population weights. The grey areas represent the performance of all developing countries as reported in Figure 3.2. The shaded rectangles on the outer side of the figure reflect the average annual speed of convergence towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from these in 2009, and then dividing the result by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

Energy access continues to be a bottleneck for Africa's industrialization. Africa is lagging behind the global average for developing countries in the three dimensions of SDG 7. The largest and most concerning gap compared to other developing countries is access to energy. While most developing countries are close to achieving universal energy access, only 58 per cent of the African population has access. The rapid rate of convergence, at 1.12 percentage points per year over the past decade, reflects a promising trend in closing the gap and should be sustained and enhanced. A significant gap is also observed in clean energy. On average, Africa is lagging behind 67 percentage points in reaching the SDG targets. The slow progress before COVID-19 underscores a major area of opportunity for the continent in the future. Between 2009 and 2019, the gap in this dimension remained almost unchanged. The region has immense potential to accelerate progress in this dimension by using its abundant renewable resources, presenting an opportunity for the continent to leapfrog into clean industrialization.

Economic growth remains low, and employment conditions are deteriorating. The assessment reveals that Africa faces critical challenges in terms of reaching SDG 8. The region's economic growth performance in 2021 was only one-third of the SDG target, significantly behind the developing world's average.

Figure 5.2 **Assessment of SDGs 7, 8 and 9: how far are different subregions in Africa from the 2030 targets?**



Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the subregional level using population weights. The dotted lines show the average performance of the African continent as presented in Figure 5.1.

Source: UNIDO elaboration based on UNSD (2023a).

The gap in growth rates increased in the decade before COVID-19, flagging structural problems in the continent's ability to maintain economic growth rates to narrow the income gap. Africa's employment performance is comparable to that of other developing nations (almost halfway to achieving the target). Nevertheless, the employment situation has been deteriorating over the past decade. This negative trend emphasizes the need for robust policies that address large-scale underemployment, youth unemployment and gender equality.

Industrialization and innovation targets lag behind other developing regions. The region's industry and innovation scores are substantially below the developing world's average. The average value for innovation is low at 7 per cent of the target achievement and partially explains the continent's difficulties in sustaining high economic growth rates. Africa needs to expand investments in research and development (R&D) to avoid falling behind in the global technology race. Infrastructure development, which is crucial for industrial growth, also shows a considerable gap in realizing the 2030 target. However, the positive upward trend before the pandemic indicates that investments and developments in this sector were on the rise, a trend that must be restored and sustained in coming years.

5.1.2 Subregional differences

Results reveal significant differences across the five subregions of Africa. While the continent faces considerable challenges in achieving SDGs 7, 8 and 9, there is notable heterogeneity across its subregions (see Figure 5.2). The diverse performances of Eastern, Central, Northern, Southern and Western Africa highlight the unique political, economic and social dynamics shaping each subregion's progress towards these goals. Understanding these subregional differences is vital for crafting targeted policies and enhancing regional collaboration.

Results for SDG 7 differ notably across subregions in Africa. The biggest differences are observed in energy access and efficiency. Northern Africa excels and outperforms the regional average in both areas, suggesting a robust approach to energy use that could serve as a model for other subregions. Southern Africa shows strong performance in energy access, demonstrating the impact of sustained efforts in ensuring universal energy availability.[1] The adoption of clean energy across Africa's subregions is fairly consistent but falls below the regional average of 33 per cent in Eastern and Western Africa. More aggressive interventions and investments in sustainable energy are needed in these subregions. In contrast, Southern and Northern Africa lead in this area, indicating potential leadership in sustainable energy practices.

Performance in the different dimensions of SDG 8 varies across African subregions. Northern Africa has low employment performance contrary to its strong economic growth, suggesting a need to translate economic gains into job creation. Southern Africa faces challenges in employment and economic growth, highlighting the urgent need for policies that generate productive and inclusive job opportunities. Eastern Africa outperforms the regional average in both dimensions but lags in resource efficiency, suggesting a need for more sustainable economic practises. Finally, Central Africa lies significantly behind the rest of the region in the three dimensions, highlighting a critical need for comprehensive economic reforms and targeted development strategies.

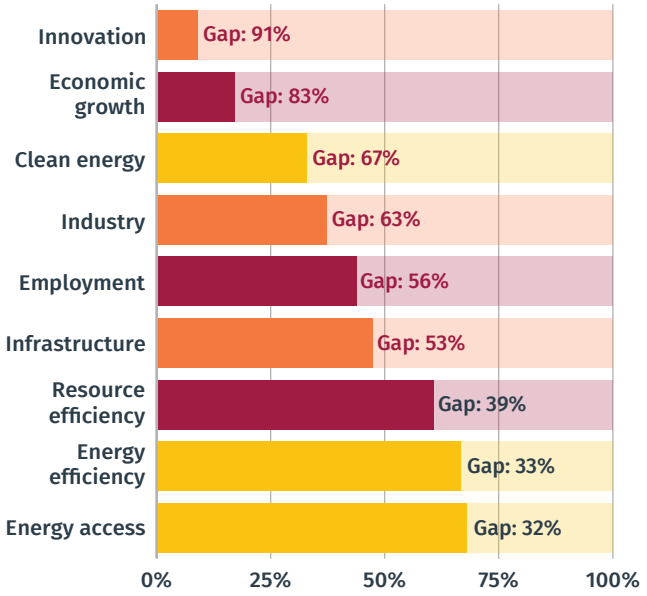
SDG 9 performance, especially innovation, has been slow across all of Africa's subregions. Northern Africa leads in innovation, but the overall low performance across all subregions shows a continent-wide urgency to foster environments that nurture technological advancements. Industry performance is varied, with Western and Northern Africa outperforming other subregions, suggesting a stronger industrial base. Performance in infrastructure is closely aligned with the regional average, except for Central Africa. The above suggests the urgent need for targeted interventions to advance the SDGs in these regions.

5.1.3 Projections to 2030

Projections for the upcoming years reveal critical priority areas for the region. Projecting the achievement of SDGs 7, 8 and 9 by 2030 offers valuable insights into the areas that require immediate attention and strategic focus in Africa. These projections are based on a "business as usual" scenario, which assumes the continuation of pre-COVID-19 trends without additional interventions to improve performance. The methodology, explained in more detail in Chapter 3 of the report, applies the average annual speed of convergence towards the SDG target observed before the pandemic (from 2009 to 2019) to each year between 2021 and 2030. This exercise highlights that Africa must urgently prioritize innovation, economic growth, clean energy, industry, employment and infrastructure (Figure 5.3).

Innovation is a key priority that requires immediate action. With an expected gap of 91 per cent by 2030, innovation emerges as the area requiring the most urgent attention. Africa's low performance in this dimension has profound implications for the region's ability to adapt to global technological changes and enhance its industrial and economic competitiveness.

Figure 5.3 **Projections and distance to targets by 2030 in Africa**



Note: The bars show the relative value for each dimension projected for 2030 and are ordered according to the projected distance to the target. Projections are based on pre-COVID-19 trends (average annual convergence speed between 2009 and 2019). Projected gaps greater than 50 per cent are marked in red.

Source: UNIDO elaboration based on UNSD (2023a).

African countries need to develop local solutions that are adapted to their specific needs and conditions, tap into 4.0 technologies, enhance innovation ecosystems by investing in R&D, and support entrepreneurship. These factors will help the region avoid stagnation in the global technology race.

Economic growth is expected to remain too low to tackle the challenges ahead. The projected 83 per cent gap in economic growth illustrates the pressing need for transformative economic policies in Africa. The region must prioritize diversifying its economy, deepening regional integration, and attracting foreign direct investment (FDI). Focusing on high-demand sectors, such as food processing, agribusiness and digital services, could boost growth and create jobs. The region should target industrial policies that strengthen regional cooperation and promote diversification of the industrial base, along with more sustainable practices in the future extraction of critical raw materials, blue economy resources and oil.

Africa will miss important opportunities for industrialization around the energy transition if it takes a business as usual approach. Despite Africa's abundant renewable resources, a projected gap of 67 per cent in clean energy indicates a critical need for increased investment and policy focus in this area. The continent has the potential to leapfrog into green technologies and electric mobility, which can significantly contribute to the region's industrialization and sustainability goals.

Industry and infrastructure development emerge as critical areas to prioritize. These dimensions are projected to lag behind 63 per cent for industry and 53 per cent for infrastructure from the 2030 targets. Accelerating industrialization is therefore essential. Policies that support the development of industrial clusters, particularly around rare minerals, clean energy sectors and labour-intensive activities, can enhance Africa's manufacturing capacity and economic resilience. Investing in robust physical infrastructure such as rail, roads, digital networks, energy, telecommunication systems and quality infrastructure (such as laboratories for testing and product certification) is vital for interconnecting, integrating, and transforming the African continent. Such investments will ensure that Africa is well-positioned to participate in the global economy and will spur industrial upgrading.

Africa needs to create sufficient high-quality, well-paid jobs to accommodate a growing labour force. If pre-COVID-19 trends are not reversed, the gap in employment targets will continue to grow and by 2030, Africa will be 56 per cent away from reaching the global goals. African countries need robust policies that generate productive and inclusive job opportunities, particularly for youth and women, to bridge these gaps and accelerate progress. Addressing education and promoting the upskilling of he workforce can help tackle entrenched unemployment and facilitate the transition from informal to formal economies, which are critical for improving living standards and economic stability.

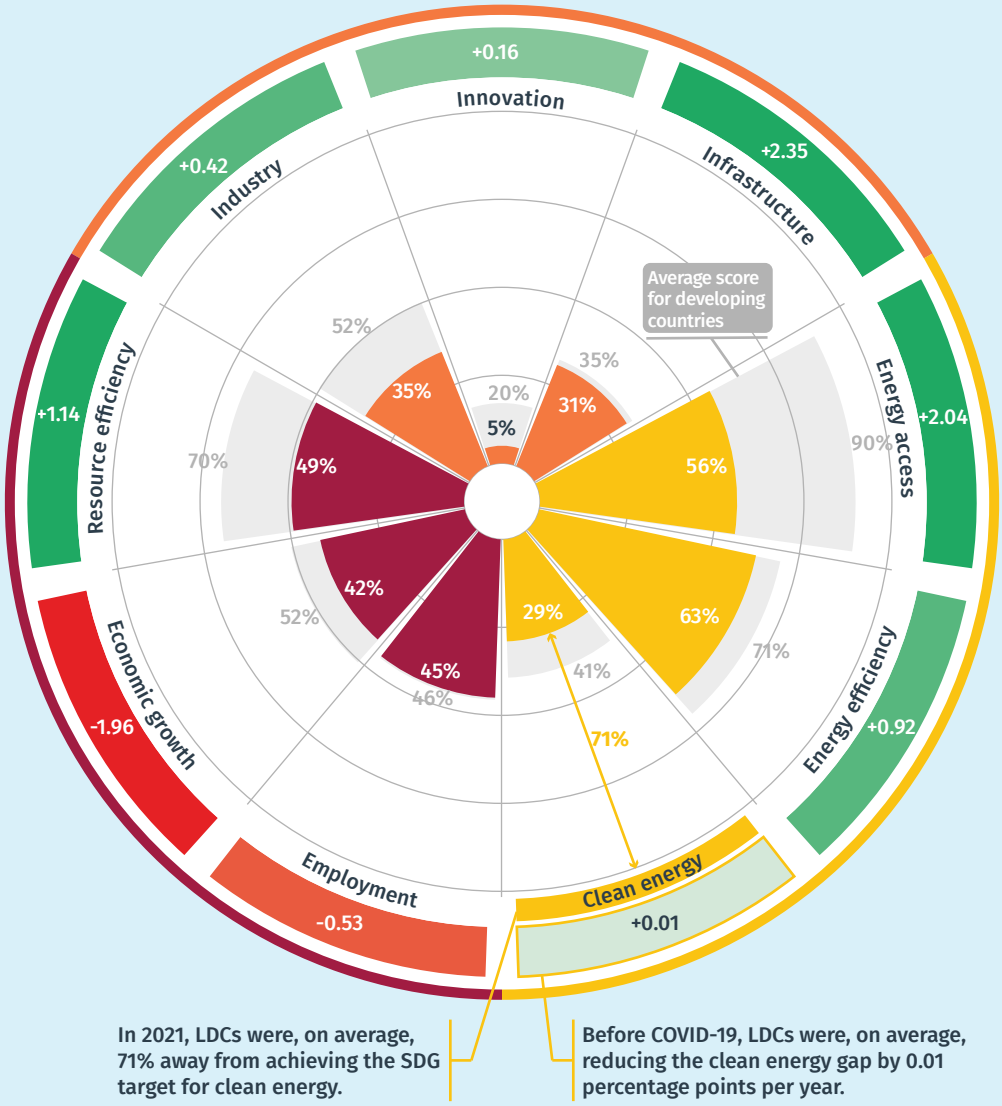
Africa needs strategic shifts and targeted interventions in critical areas to avoid being left behind. Looking forward, policymakers should pay special attention to the gaps in innovation, economic growth and employment, industrialization and infrastructure while focusing on sustainable and inclusive strategies. The next decade is crucial for Africa, and the choices made today will determine the region's trajectory towards achieving the SDGs and realizing its full potential. The upcoming sections of this chapter explore how industrial policy can accelerate progress in these priority areas.[2] Examples of effective policies across the continent focusing on opportunities in the energy transition, digitalization, trade and regional integration are presented. These strategies can bridge the SDG gaps and position Africa as a competitive, innovative and resilient player in the global arena. Before doing so, the following subsection examines the situation of LCDs.

5.1.4 Focus on least developed countries

A closer look at the performance of LDCs. This subsection delves into the performance of LDCs. A focused analysis is necessary due to the significant obstacles these countries face on their path towards sustainable development. This subsection is integrated into this chapter because a considerable number of LDCs are located in Africa, but it also includes countries from other developing regions.

LDCs show significant gaps in their achievement towards the SDGs. As depicted in Figure 5.4, LDCs have fallen far behind in achieving SDGs 7, 8 and 9 compared to the developing country average in all of the dimensions assessed. Substantial gaps exist in critical areas such as clean energy and economic growth. The negative economic growth trend before the outbreak of the COVID-19 pandemic is particularly alarming, and reveals the challenges these countries face in achieving sustainable development. Another pressing factor is their low performance in innovation, as the data demonstrate that only 5 per cent of the target was achieved. LDCs urgently need to enhance their technological capabilities to accelerate progress towards SDG 9.

Figure 5.4 **Distance to SDG targets: LDCs in 2021**



Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated for all LDCs using population weights. The grey areas represent the performance of all developing countries. The shaded rectangles on the outer side of the figure reflect the average annual convergence speed towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from those in 2009, and then dividing the result by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

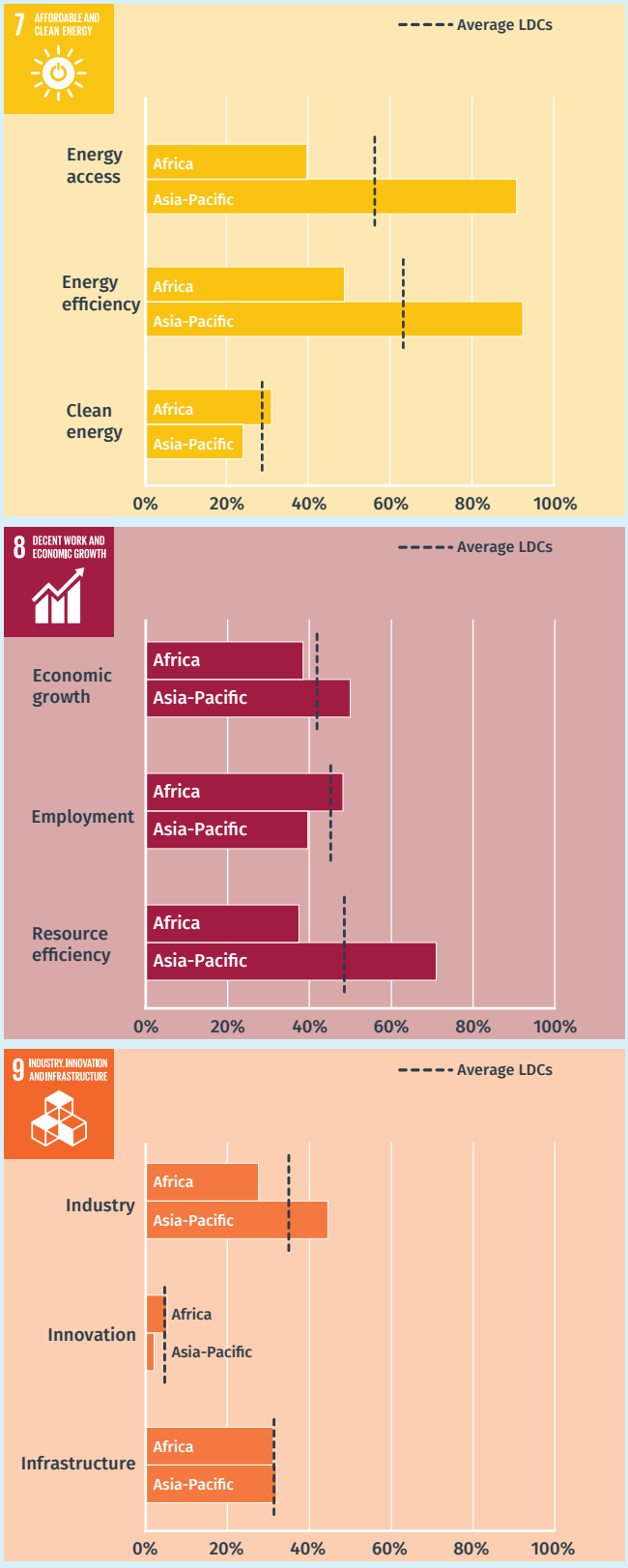
LDCs lag in achieving the SDGs is substantial in four areas. Progress in LDCs is particularly slow in the areas of energy access, resource efficiency, industry and innovation. LDCs are at least 15 percentage points behind the developing country average in all these dimensions. The speed at which LDCs were closing the gap before the pandemic reveals mixed trends. The positive trends in energy access and resource efficiency suggest significant efforts towards expanding energy services. In contrast, progress in industry and innovation has stagnated in these areas.

Asian LDCs are closer to achieving the SDGs than African ones. Not all LDCs are in the same position. LDCs from Asia-Pacific show better results than African ones. As illustrated in Figure 5.5, Asian LDCs are closer to achieving the targets than African LDCs in six of the nine assessed dimensions, reflecting a more favourable trajectory towards sustainable development in these areas. LDCs in Asia-Pacific outperform their African counterparts in energy efficiency and energy access, indicating better integration of sustainable practices and infrastructure. Conversely, African LDCs perform slightly better in clean energy and employment. Most notably, African LDCs are lagging behind in economic growth and industry, with Asian LDCs achieving 45 per cent (for economic growth) and 50 per cent (for industry), compared to Africa's 28 per cent and 38 per cent. These differences illustrate the importance of targeted industrial and energy policies to stimulate growth and close the industrialization gap among LDCs.

LDCs are low-income countries confronting severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets. A total of 45 countries are considered LDCs, with 33 of them in Africa, 11 in Asia-Pacific, and one in Latin America and the Caribbean.[3] The list is reviewed every three years by the Committee for Development Policy and is based on the following criteria: low income per capita, low levels of human assets, and high-levels of economic and environmental vulnerability.

What are LDCs?

Figure 5.5 **Divergent trends in SDG progress: LDCs in Africa and in Asia-Pacific**



Note: The values represent the average level of SDG target achievement for each dimension in 2021 for the LDCs aggregated at the regional level using population weights. The dotted lines show the performance of all LDCs as presented in Figure 5.4.

Source: UNIDO elaboration based on UNSD (2023a).

5.1.5 Drivers of divergence: the role of industry

There are divergent paths of industrialization among LDCs.[4] The start of the millennium saw a similar level of industrialization between LDCs in Asia-Pacific and Africa, but their paths have diverged significantly since then. By 2021, the share of manufacturing industries in gross domestic product (GDP) doubled in LDCs in Asia-Pacific compared to their African counterparts. At the same time, manufacturing value added (MVA) per capita of Asian LDCs grew three times that of African LDCs between 2000 and 2022. This variation in industrialization level and speed is a primary factor behind the observed disparities in SDG progress between the LDCs in these regions.

Manufacturing growth in Asian-Pacific LDCs. Some Eastern and Southern Asian LDCs have benefitted from globalization by successfully developing robust manufacturing bases, especially in labour-intensive sectors. This is exemplified by the rise of vibrant manufacturing hubs in countries like Bangladesh, where strategic policies catalysed significant manufacturing growth in the textiles and apparel sectors.

Bangladesh has progressed from having an economy primarily based on jute and agriculture to becoming the world's third-largest garment exporter. The country's efforts included targeted government support and strategic policies to nurture labour-intensive industries, job creation and long-term sustained economic growth (see Box 6.9 in Chapter 6).

African LDCs experience an industrialization gap. Many African LDCs have struggled to harness their industrial potential. These countries contribute only 0.4 per cent of global MVA despite hosting 9.5 per cent of the global population. Data show that between 2000 and 2022, African LCDs' manufacturing contribution to national GDP decreased. The low levels of human and physical capital, integration into low value added segments of global value chains (GVCs), historical weaknesses in infrastructure, and high reliance on natural resources all act as major constraints to manufacturing growth in the region.

There are several barriers to industrialization for African LDCs. Three main factors shape the industrialization performance of African LDCs: institutional conditions, competitiveness and global participation. The weak institutional frameworks in LDCs influence the domestic business climate, which impacts their level of attractiveness for foreign investors. African LDCs are characterized by low levels of productivity and human capital, which hampers their competitiveness and their ability to capitalize on low labour costs and increase their presence in labour-intensive industries. Lastly, African LDCs' involvement in globalization has not been conducive to export diversification and has only led to the creation of low backward linkages to the domestic economy.

There is an urgent need for targeted industrial policies in African LDCs. The industrialization gap among African LDCs demonstrates that the potential for industrial growth is still largely untapped. Realizing this potential requires strategic policymaking. Tailored industrial policies that address market failures and drive structural transformation, while stimulating international integration are crucial for accelerating African LCDs' progress towards achieving the SDGs. Considering the demographic boom and rising level of education in these countries, policies should focus on infrastructure, clean technologies and youth employment to unleash the potential for industrial growth.

An opportunity to leverage the African Continental Free Trade Area (AfCFTA). The weak integration of African LDCs in the global economy will likely become less of a concern in a future global scenario where regional blocks will be further reinforced. The AfCFTA represents a significant opportunity to better integrate LDCs in the region, and to pave the way towards enhanced access to broader markets. By stimulating demand, driving investment and attracting more FDI into modern sectors, the AfCFTA could become a game-changer for the region's industrial landscape.

The key factors in fostering industrialization. The industrial performance gap between Asian and African LDCs highlights the critical role of industrial policies in shaping the paths of industrialization across regions. The following section explores industrial policy in Africa and the areas of opportunity to advance sustainable development in the region.

5.2 INDUSTRIAL POLICY LANDSCAPE

5.2.1 The current landscape

The renewed interest in industrial policy is also visible in Africa. Industrial policy in Africa has recently gained attention, and has increasingly been adopted and implemented across various countries and regions. The strong revival of industrial policy in Africa has taken centre-stage in the development agenda. This proliferation of industrial policies comes against a backdrop of generally low levels of manufacturing in African countries. The continent contributes approximately 2 per cent of the world's MVA, while Asia accounts for almost 45 per cent.[5]

Today's industrial policies are different from those of the past. Over the past decade, the industrial policy landscape in Africa has evolved, shifting from traditional to diversified and sector-specific policies. This transformation is driven by a desire to address current societal challenges, such as COVID-19 and climate change, and align it with the SDGs related to poverty reduction, employment creation and closing the inequality gap.

Industrial policies are implemented at different levels, from subnational to supranational. Most industrial policies are developed, formulated and implemented by national governments. In certain countries, such as South Africa and Nigeria, some industrial policies are formulated and implemented at subnational levels, such as the state, provincial or city levels. At the supranational level, industrial policies involve two or more countries. They include policies concluded between and coordinated by two countries, several countries, or between a country and an international agency or development institution. Regional industrial policies are typically associated with a regional economic grouping, such as the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC), or the East Africa Community (EAC), while continental industrial policies are implemented across Africa.

Africa's industrial policy landscape encompasses three complementary types of policies. The work commissioned for this report[6] categorized industrial policies into three broad groups. First, industrial policies are categorized as a framework or rolling industrial policies. Framework policies provide an ongoing framework for industrial policy, while rolling policies involve plans that extend over time to implement industrial policies. Second, sector-specific industrial policies focus on a specific sector, such as agroprocessing or clothing and textiles. Third, there are "cognate" policies such as competition policy, investment policy, innovation policy or trade. These policies are closely related to "core" industrial policy and are part of a broader industrial policy.

A diverse landscape of industrial policies is observed in Africa. These types and levels of industrial policies are by no means mutually exclusive, either analytically or in the actual policy domain. In some African countries, there is one integrated single industrial policy, while in other countries, separate policies address different factors such as a sector strategy or an environmental policy. Table 1 presents this typology using the two dimensions discussed earlier in this report, namely the "level" and "type". It also provides examples of current or recent policies in Africa to illustrate each case.

Table 5.1 **Typology of selected industrial policies in Africa**

TYPE: / LEVEL:	Framework or rolling industrial policies	Sector-specific industrial policies	Cognate policies
Continental	African Union's Agenda 2063: The Africa We Want	Common Africa Agro-Parks	African Continental Free Trade Area (AfCFTA)
Regional	West African Common Industrial Policy (2010-2030)	East African Community Fruits and Vegetables Value Chain Strategy and Action Plan (2021-2031)	Common Market for Eastern and Southern Africa Competition Policy
Bi/multi-country	Industrial Policy and Strategic Plan for Mauritius 2020-2025 (UN and Government of Mauritius)	Zambia and the Democratic Republic of Congo (DRC) Cooperation Agreement on electric batteries	DRC and United States Bilateral Investment Treaty
National	Egypt's National Industrial Development Strategy (2012)	Kenya's National Automotive Policy (2019)	Liberia Investment Act (2010)
Subnational	Lagos State Industrial Policy in Nigeria	Agro-industrial Processing Zones (Agropoles) in Senegal	Gauteng Township Economy Revitalization Strategy 2014-2019 in South Africa

Source: UNIDO elaboration based on background report produced by Tregenna et al. (2024).

The type of industrial policy instruments used on the continent varies significantly across countries. Africa's current industrial policy landscape is mixed with broad and general industrial policies aimed at promoting industrialization across multiple or specific sectors. They may also span over multiple years. Many countries in Africa have (national) industrial development or industrialization policies. They can be diverse in nature (national and sectoral) and use different tools such as investment, industrial parks and zones, standards act, patents acts and technology transfer regulations to drive industrialization and structural transformation. In general, African industrial policy still comprises traditional industrial policy mechanisms, such as localization policies. These policies, through various means, aim to boost local manufacturing capacity in response to local content requirements. Similarly, various African countries use special economic zones (SEZs) with attractive tax incentives for local manufacturing and sourcing.

5.2.2 Emerging issues

Industrial policy in Africa must address new priorities. Emerging global issues such as green industrialization and digital transformation are incorporated into industrial policy formulation and implementation across the continent. These challenges are closely related to the Third Industrial Development Decade for Africa (IDDA III).

Climate change is having a severe impact on African countries. Harsh and unpredictable weather conditions have hampered agricultural productivity and created obstacles to establishing connections with manufacturing in upstream and downstream activities. Excessive rainfall, flooding or drought caused by climate change also have devastating effects in several regions of the continent. Climate change-induced catastrophes are igniting renewed interest in green industrialization.

Sustainable standards are key for GVCs. Green industrial policies are particularly important for African countries aiming to cater domestic production for global markets. Lead firms in GVCs increasingly include sustainability requirements when sourcing inputs and materials from transboundary firms. In this regard, including sustainability in industrial policy is critical to ensure that African countries can be competitive players in GVCs.

Rolling and sector-specific policies are increasingly integrating sustainability considerations. Examples of policies that prioritize sustainability are widespread across the continent. For example, Lesotho's National Climate Change Policy (2017) includes interventions such as promoting investments in green and efficient technologies and using climate risk assessment tools in the manufacturing industry. Other recent examples of climate change policies include Namibia's National Policy on Sustainable Special Economic Zones (2022-2027), Zimbabwe's National Development Strategy 1 (2021-2025) with a Green Industry Program anchoring the revised National Determined Contribution Strategy, and Uganda's Green Manufacturing Strategy.[7]

Digital transformation is crucial for industrial development in Africa. Some of the expected benefits of digital technologies for the continent include improved supply chain integration and the introduction of new products and services. By creating new products and industries, digital transformation can promote inclusive and sustainable growth, increase job creation and reduce inequality. At the same time, the development of advanced digital production (ADP) technologies such as Internet of Things and machine learning, offers tremendous opportunities to enhance production capabilities and improve industrial competitiveness. Recognizing the importance of digital transformation, the African Union has developed a Digital Transformation Strategy for Africa (2020-2030), which aims to establish a Digital Single Market by 2030, harmonize policies, strengthen intra-African trade and promote digital skills development.

Regional integration is prominently featured in the ongoing debates around African industrial policy. The importance of regional integration for industrialization, whether across the African continent or between its various subregions, is highlighted through the various regional industrial strategies that have emerged over the last decade. Regional integration initiatives, such as the AfCFTA seek to break down trade barriers between African countries and strengthen industrial capabilities on the continent. These initiatives ensure that a greater share of manufacturing goods is consumed and produced on the continent. Regional integration enhances the implementation of industrial policies, promotes industrialization and boosts intra-regional trade.

Using agroprocessing as an entry point can accelerate industrial development. Agriculture is an important sector in African economies and accounts for a significant share of GDP and employment. Therefore, as income rises and urbanization continues, agroprocessing is a crucial pathway to inclusive industrialization due to its high labour intensity, the dispersed nature of production in rural areas, high representation of women, connections to primary agriculture, and the growing demand for processed food products. A renewed emphasis on industrialization through agroprocessing is prevalent at the continental and subregional levels. With the AfCFTA, agroprocessing regional value chains (RVCs) are seen as part of the

dual pathway to regional integration and industrialization in African countries.[8] Similarly, the SADC has identified RVCs as an important part of its regional industrialization strategy, with a specific emphasis on agroprocessing value chains in its Industrialization Strategy and Roadmap (2015-2063).[9]

5.3 OPPORTUNITIES AND ACTIONS

5.3.1 Green industrialization

The global energy transition will increase the demand for renewable energy and sustainable industrial processes. Future industrialization will increasingly rely on the availability of clean energy to support more sustainable industrial production processes. As countries move towards using renewable energy, important opportunities arise to accelerate industrialization and the manufacturing of local components. Energy inputs are a significant expense in the production of goods and services for industries and businesses. Africa's growing need for clean, reliable and efficient energy provides an opportunity for the continent to increase its economic competitiveness and contribute to sustainable development.

Resource abundance offers significant opportunities for clean energy-led industrialization in Africa. The threat of climate change and its impact on the security and sustainability of life on the planet limits possible industrialization trajectories for developing countries but it also offers sizeable opportunities for new industrialization pathways based on green energy and cleaner production technologies. Africa has significant natural resources that are crucial for energy transition technologies, such as hydropower potential, excellent exposure to sunlight and abundant critical minerals. As a result, there is considerable potential for a large-scale green energy generation, which can drive green energy-led industrialization.

Critical minerals can be leveraged to grow industrial development. Africa's abundance of rare and critical minerals (e.g. lithium, nickel, cobalt, manganese and graphite) offers opportunities for industrial transformation in emerging sectors, such as green hydrogen fuel cells and electric vehicle (EV) batteries. However, the mere discovery of rare minerals does not automatically result in an industrialization opportunity. Governments need to invest in infrastructure development and implement proactive industrial policies to convert minerals into opportunities. Uncoordinated and narrow private sector-led initiatives without investments in infrastructure (grid, pipelines, storage facilities) and lack of appropriate regulatory frameworks for investment may lead to enclaves with no domestic value addition or limited job creation. Developing linkages between mining, energy generation, industry and related technology capabilities is key to achieving sustainable structural transformation.[10]

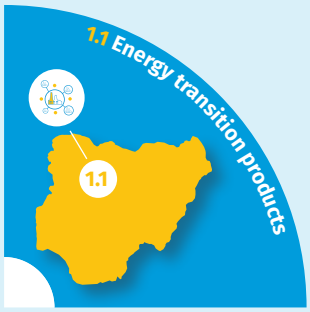
Countries should seek opportunities in the clean energy production value chain. Producing photovoltaic systems for solar energy is another green opportunity for industrialization, but requires large-scale investments to become an economically viable business model. One of the challenges Africa faces in producing its own solar, wind and hydrogen energy is the lack of locally produced equipment and components, which means that green industrialization on the continent will heavily rely on imports from abroad. Creating industrial capabilities to produce such goods can offer new entry points for developing domestic industries. Opportunities also arise in leapfrogging to new manufacturing products related to electric mobility (see Box 5.1 and Box 5.2).

The mere discovery of rare minerals does not automatically result in an industrialization opportunity. Proactive industrial policies are needed.

Box 5.1 Nigeria: strengthening the automotive sector by leveraging electric vehicles

The automotive industry in Nigeria is one of the country's most promising sectors due to its growing domestic market size. However, the country has historically been a net importer of vehicles and automotive components. To start reversing this trend, the Nigerian government sought to revive the industry and enhance its competitiveness through the National Automotive Industry Development Plan (NAIDP), launched in 2014. The National Automotive Design and Development Council (NADDC) reports that there have been several challenges since the introduction of the first NAIDP. These include uncontrolled used car imports, unattractive fiscal measures, inadequate local support, and policy inconsistency. These challenges affect the sustainability of local value chains for the auto industry and the entire economy. The plan was revised in 2022 and 2023 to address some of these challenges. These policy revisions pave the way for the automotive industry to thrive, and align with the country's goal for clean energy.

The NAIDP 2023 is expected to boost local car manufacturing enterprises, allowing them to expand their market presence, foster the local automotive industry and generate new employment opportunities in the formal sector. The policy aims to increase the local production of traditional fuel vehicles by approximately 40 per cent while raising EV production by 30 per cent. This initiative aspires to create one million new job opportunities, support locally manufactured vehicles, enhance R&D and the transfer of technology. Nigeria is thereby seeking to position itself as a hub for automotive manufactured products.



One key objective of the new plan is to establish vehicle assembly plants that source most of their materials locally. The NAIDP focuses primarily on the supply side of automobiles in Nigeria, as well as on the Automobiles Purchase Scheme to stimulate demand. The plan encourages a seamless migration from combustible engines to EVs.

To achieve the target of producing 30 per cent of EVs locally by 2033, the strategy includes a collection of industrial policy instruments addressing several pillars. These instruments include fiscal incentives for assemblers of EVs, such as tax holidays, capital allowances and specific import duties to facilitate investments. The goal is to revamp commercial transport (intracity and intercity buses, school buses, staff buses) with domestically produced electric commercial vehicles to expand the market. Finally, in partnerships with original equipment manufacturers, the strategy aims to set up automotive villages to facilitate technology transfer and development around EVs.

Source: Background report prepared by Tregenna et al. (2024), building on Agarwal et al. (2023), NADDC (2023), and UNCTAD (2023b).

5.3.2 Digitalization

The rapid uptake of digital technologies can boost industrial competitiveness across Africa. Digitalization and the uptake of Fourth Industrial Revolution (4IR) technologies will shape countries' abilities to compete in global markets. Africa can improve its competitiveness and its position in the global industrial landscape by accelerating technological change, particularly in the context of the 4IR and other frontier technologies.

More competitive local industries can serve domestic and regional markets. Adopting new technologies enhances competitiveness and enables local producers to expand their operations and eventually substitute imported goods with local products. The process of learning while expanding domestic production can reinforce this positive outcome and push industrial production further towards regional and global markets. Non-price competitiveness is crucial for sustaining industrial development over time.

Adopting 4IR technologies requires the strengthening of local capabilities and skills. Actively engaging with 4IR technologies requires strong production, innovation and digital capabilities in industrial firms and specific skills in the labour force.[11] African countries lag behind in the development of capabilities and skills.[12] To profit from the opportunities offered by 4IR technologies, industrial policy must address this capability gap and strengthen the absorptive capacity of domestic firms. Kenya's experience provides an interesting example in the African context (see Box 5.3).

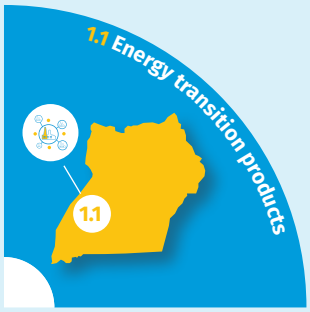
Box 5.2 Uganda: leapfrogging into solar buses

Uganda's nascent solar bus industry is an outcome of the country's drive towards increasing renewable energy consumption over the next decades. Chapter 13 of Uganda's National Development Plan III outlines its plans to implement electric transport solutions, such as solar-powered motorcycles, bicycles and tricycles. This is part of the country's overall objective to diversify its energy sources and improve energy access in the medium- to long-term perspective.

To meet the objective of green industrialization, the Ugandan government launched its solar buses project in 2016 with Kiira Motors Corporation, a state-run motor corporation in charge of manufacturing solar energy-powered EVs. Kiira Motors Corporation signed a memorandum of understanding with the National Enterprise Corporation to establish the Kiira Vehicle Plant in the Jinja Industrial and Business Park in Kampala.

The new locally assembled solar electric buses were developed with Uganda's Makerere University with financial support from the Ugandan government. The state has also invested over $50 million to start mass production of EVs in the country. Kiira Motors Corporation has developed a new hybrid saloon vehicle called the EV Smack, which is expected to be produced on a large scale by 2025.

The solar buses are the first for the continent, and since 2016, have been in use on the streets of Kampala.



It is expected that solar buses can play a role in revitalizing the transport industry and creating direct and indirect employment for more than 7,000 people. Kiira Motors' buses are produced at a factory located in Jinja, and an average of 1,000 buses have been assembled annually since 2021. Production is expected to increase to about 5,000 buses in the medium term.

In addition to the main objective of developing and promoting an environmentally-friendly transport solution, the solar buses project contributes to building an indigenous automotive industry. These initiatives align with Uganda's industrialization goals outlined in the National Development Plan III. Developing an integrated, safe and inclusive public transport system using locally manufactured vehicles has supported job creation and created connections with the country's wider economy and other value chains.

Source: Background report prepared by Tregenna et al. (2024), building on BBC (2016), Kiira Motors Corporation (2023), NPA (2020)

ADP technologies can foster development by creating new markets. New industries, as well as the income and jobs associated with them, originate from technological product innovations that support industrialization and social inclusion.[13] ADP technologies also introduce new and better goods into the market (e.g. smart TVs, smart watches, home control devices, etc.). At the same time, they require additional support from other sectors of the economy, mostly knowledge-intensive services that provide the information and communication technologies (ICTs) and digital solutions needed to implement smart production.

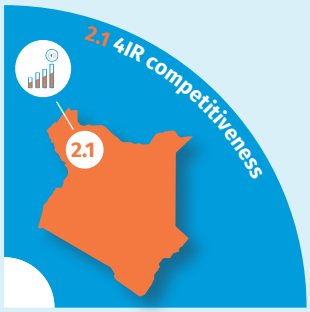
Industrial policy can build domestic capabilities to provide digital solutions in niche areas. Industrial policy can create domestic capabilities to serve new digital markets. The continent's young population offers a demographic advantage with the potential to engage in ICT solutions. Empowered with the right skills, young Africans can easily enter the arena of digital transformation and enable the transition to the most modern technologies required by advanced manufacturing. Related industrial policy approaches should include a sizeable increase in investments to broaden access to specialized skills training, the provision of digital infrastructure, and acquiring the necessary technological and financial resources to run the corresponding production systems (see Box 5.4).

Box 5.3 **Kenya: strengthening local capabilities to embrace the 4IR**

One crucial consideration when adopting ADP technologies is the ability of firms to absorb these technologies. Many firms, especially small and medium sized enterprises (SMEs), simply do not have the technical capabilities to implement ADP technologies. The provision of expert advice and technical assistance can mitigate this obstacle.

The Kenya Industry and Entrepreneurship Project (KIEP) provides a good example of this type of policy. Launched in 2020, the project aims to increase innovation and productivity in selected private sector firms in Kenya by strengthening the private sector (including start-ups, SMEs, incubators, accelerators, technology bootcamp providers, and others) through financial grants and technical assistance. The project is implemented by the Ministry of Industrialisation, Trade and Enterprise Development with support from the World Bank. It fully aligns with Kenya's Vision 2030 of transforming the country into a newly industrialized and globally competitive middle-income country. Its objective is to deliver this industrialization agenda by strengthening the entrepreneurship ecosystem, increasing firm-level innovation and productivity, and developing technical talent in the country. By supporting selected SMEs with high potential to generate demonstration effects, particularly in sectors, such as manufacturing and agribusiness, the project strives to ensure significant catalytic and cascading effects in the economy.

One project component, called the KIEP 250+, supports the business improvement initiatives of 250 eligible SMEs through performance-based grant funding. The programme provides technical assistance to eligible



firms to improve their managerial and technical skills and enhance their access to technology. SMEs accepted into the programme participate in a business diagnosis scan and agree on a performance improvement plan that identifies the gaps to be addressed to increase innovation and productivity. KIEP consists of three components:

- Strengthening the innovation and entrepreneurship ecosystem;
- SME linkages and upgrading; and
- Project implementation support and monitoring and evaluation.

KIEP 250+, under the second component, offers an integrated package of consultancy and business improvement services and financial support to make business transformation, expansion or diversification affordable. Qualified third-party experts provide technical assistance and are chosen by the SME from the KIEP 250+ business development service providers' database. The programme is based on $50 million in funding from the World Bank for 2020-2024.

Source: Background note prepared by CIIP (2024).

5.3.3 Regionalization

Africa shows limited integration into industrial GVCs. The recent wave of globalization has offered developing countries significant opportunities to participate in emerging industries through integration into GVCs. However, Africa has achieved limited success in GVC integration due to weak industrial infrastructure, regulatory inadequacies and capacity constraints. These challenges have limited the continent's contribution to global trade which can be partially reversed through increased regionalization.

Regional integration can foster industrial development along several channels. Regional integration can reduce transaction costs associated with intra-African trade, leading to increased trade flows, economic growth and development across the continent. By reducing intra-regional trade tariffs, the cost of importing and exporting goods between African countries will decrease significantly. This reduction in tariffs directly reduces the financial burden on businesses engaged in cross-border trade. In addition, simplified customs procedures and reduced paperwork can decrease the time and resources required for clearing goods at borders, thereby reducing transaction costs associated with delays and administrative processes.

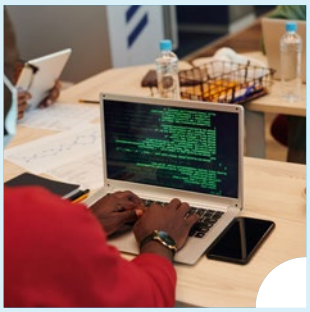
Several multilateral initiatives attempt to foster regional integration. African subregional and global multilateral stakeholders and the African Union have proposed several initiatives to foster regional and GVC integration to enhance African economic development.

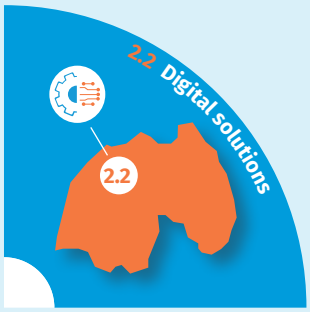
Box 5.4 Rwanda: building an ICT hub to support economic transformation

Rwanda intends to become the leading ICT hub in Africa by fostering an innovative culture and investing heavily in R&D. To achieve this goal, the government launched the ICT Hub Strategy 2024. This strategic plan, which runs from 2019 to 2024, aligns with the goals of the National Strategy for Transformation and other ICT initiatives. With this strategy, Rwanda aspires to train its workforce, promote innovation and advance technological capabilities. Becoming an ICT hub is crucial for Rwanda's economic growth, as it has the potential to create jobs, increase national productivity and attract global alliances to address socioeconomic concerns.

The strategic plan is supported by various ICT strategies and policies, including the SMART Rwanda Master Plan (2016-2020), ICT4RAg (2016-2020), National Digital Talent Policy, National Data Revolution Policy, National Science and Innovation Policy, and the National Cyber Security Policy and Broadband Policy. The ICT hub plan provides a framework for a stronger emphasis on knowledge production, innovation and entrepreneurial development. It offers a consistent, systematic approach to innovation and development, and highlights various technology and areas of innovation that are vital to Rwanda.

One distinct feature of the strategy is that it aims to develop advanced technological capability and proficiency in selected niche areas by building innovation hubs that provide targeted solutions for specific economic sectors. Niche areas in the economic sectors include data-driven farming, health informatics, information and knowledge to improve health-care services and patient outcomes, digital financial services and e-government service delivery.





The strategy also emphasizes skills development for job creation and maintaining a quality workforce for tomorrow's digital world. The strategy aims to cultivate specialized ICT skills among workers to drive innovation, support digital infrastructures, and ensure the functioning of the digital ecosystem. Additionally, generic ICT skills are targeted at workers and citizens to enable them to use digital technologies along with complementary "soft" skills, such as leadership, communication and teamwork skills.

The strategy is supported by the Ministry of Education, a crucial implementing partner that also leverages the Ministry's two primary skills development initiatives - the Digital Literacy Program and the ICT Career Counselling Program to advance job creation. The digital Literacy Program aims to achieve digital literacy among the youth aged 16-24 years, and a minimum of 60 per cent proficiency level in the adult population by 2024. Furthermore, the government aspires to enhance awareness and promote successful ICT careers through a network of national ICT counselling groups. Given the government's growth-enhancing initiatives and investment in the various ICT projects, and the strategy as the key driver, it predicts that employment in ICT will increase to around 100,000 workers by 2035.

Source: UNIDO elaboration based on CIIP (2024), MITEC (2019) and Newfarmer and Twum (2022).

These include three iterations of the Industrial Decade of Development for Africa, the African Productive Capacity Initiative and the Action Plan for the Accelerated Industrial Development of Africa (AIDA). Any new industrial policy design should draw lessons and experience from other parts of the world that have effectively upgraded and integrated into GVCs to make the necessary adjustments for success. Concurrently, it should avoid the weaknesses and mistakes that contributed to failure elsewhere.

The development of regional value chains can accelerate industrial development in the continent. The different industrialization opportunities identified above as key areas of future development (e.g. the agrifood industry for food security, pharmaceutical and medical devices production and green energy technologies) can be structured based on RVCs to maximize value creation in Africa. Likewise, the automotive industry can use similar value chains in Africa to capitalize on the rapidly growing demand for cars and car parts. RVCs can be important avenues for industrialization and growth, especially where firms are still building productive capabilities to meet the thresholds required for large-scale participation in GVCs.[14] Participation in RVCs can thus potentially be a springboard to GVCs and generate continuous benefits through RVCs. RVCs can also be important for environmental sustainability by shortening supply chains and mitigating emissions. The AfCFTA is crucial for unlocking the potential for building and strengthening African RVCs (see Box 5.5).

Box 5.5 AfCFTA: advancing industrialization through regional integration

The launch of the AfCFTA presents a transformative opportunity for the continent. As the largest free-trade area globally, AfCFTA aims to promote regional integration and industrialization, and address long-standing barriers by facilitating the free movement of goods, services, labour and capital.

The AfCFTA is a potential 'game-changer' for Africa, with explicit objectives of structural transformation and industrialization. Successful implementation is expected to yield substantial economic and societal benefits, including higher incomes, poverty reduction and accelerated economic expansion. Estimates suggest a potential 9 per cent increase in regional incomes, equivalent to $571 billion, and the creation of nearly 18 million additional jobs by 2035. This growth is expected to lift approximately 50 million people out of extreme poverty. The agreement also entails wage increases, particularly benefiting women workers.

Beyond economic benefits, AfCFTA provides an opportunity for Africa to leverage economies of scale, advance in industrial digitalization, and move up the technology ladder. At full implementation, the free movement of goods, services, labour and capital is expected to generate higher intra-African trade volumes and a common market capable of addressing many of the industrialization barriers faced by industrial operators in African countries.

Regional integration through the AfCFTA is not only about breaking down trade barriers between African countries. It also involves strengthening industrial capabilities to increase the share of goods produced and consumed on the continent. It is expected that the implementation of the AfCFTA will enhance opportunities to specialize in specific domains of industrial competitiveness and to create new markets and new value chains on the continent. The successful realization of these opportunities depends on Africa's ability to develop the necessary skills, industrial infrastructure and political alignment to build a continent-wide integrated market, capable of generating the required scale of financial resources.

The implementation of AfCFTA has been positive thus far. Africa has made significant strides in areas, such as the Digital Trade Protocol, Rules of Origin and Customs Duties. Furthermore, the Protocol on Competition Policy has recently been finalized. Trade in goods has commenced under the AfCFTA's Guided Trade Initiative. Key sectors prioritized for industrialization in the AfCFTA framework include automotive, pharmaceuticals, transport and logistics, and agribusiness. There is a general expectation that the SEZs will play a pivotal role in the future industrialization plans of member states.

Source: Background note prepared by Tregenna et al. (2024), building on Echandi et al. (2022) Guermazi and Haddad (2023), and Ismail (2021).

5.3.4 Demographic transition, domestic demand and production to meet basic needs

Africa's young population offers a unique opportunity for industrial development. The continent's demographic advantage, embodied in its young population (with almost 75 per cent of the population younger than 35 years in 2022)[15], provides an essential opportunity for the future development of labour-intensive industries, such as food processing and textiles. If harnessed properly, the demographic dividend offers the prospect for Africa's youth to drive the continent's inclusive and sustainable industrialization and economic transformation agenda. Reaping the potential benefits of the demographic dividend requires significant increases in employment opportunities, otherwise, unemployment rates will increase.

Africa's growing population requires sophisticated urban planning. The urban population in the continent is expected to triple to 1.34 billion by 2050.[16] Transforming this potential advantage into actual industrial performance requires sophisticated planning and smart city designs. This would ensure that the diverse talents of African youth are adequately developed, that opportunities to specialize in their respective areas of industrial competitiveness are improved, and that new markets and value chains are created on the continent.

Building industrial capabilities and infrastructure is integral to the demographic dividend. African economies need to transform new opportunities into viable economic business models. It will depend on their ability to develop the required level of skills and industrial and technological infrastructure. Moreover, internal political alignment is crucial to create a continent-wide integrated market that can generate the necessary scale of financial resources.

Well-designed, financed and implemented industrial parks and hubs can maximize new opportunities. Industrial hubs can contribute to industrialization by promoting the clustering of firms and providing a comprehensive package of support measures and infrastructure beyond industrial policy. The hubs can be beneficial in developing industrializing countries, such as low-income African countries with small and scattered manufacturing sectors. Industrial hubs also have the potential to enable developing countries to expand beyond manufacturing the same products by upgrading their manufacturing production structures.[17] Ethiopia's industrial zones serve as one of the many success stories on the continent that resulted from the country's industrial policy (Box 5.6).

Population growth increases food demand, making agro-industries even more important. Growing population alongside sustained rural-to-urban migration and income growth bring significant changes in consumption patterns and put additional pressure on the demand for food. Feeding a rapidly growing population in Africa requires a systems shift in agriculture and agro-industry.[18] This approach opens opportunities to develop agro-industries to drive countries' industrialization goals and spur technological spillovers to other manufacturing industries. The expansion of the agro-industrial manufacturing sector creates on- and off-farm employment opportunities, and promotes dynamic economies that connect rural areas to urban and global markets. This helps to counterbalance the rapid urbanization trends that are taking place in Africa.

Several barriers hamper the development of competitive agro-industries in Africa. Developing agro-industries that are competitive in international markets and that can absorb an increasing number of workers is not an easy task. Many African countries have insufficient infrastructure and are poorly integrated into global markets, especially in rural areas. These challenges are further exacerbated by underdeveloped SMEs, limited access to finance, inadequate forward and backward linkages between farmers and processors, lack of entrepreneurial opportunities and inefficient technologies, high post-harvest losses, high transaction costs for producers, and poor integration into higher value added segments of agricultural value chains.[19]

The AfCFTA is a potential 'game-changer' for Africa, with explicit objectives of structural transformation and industrialization.

Agro-industrial processing zones and integrated agro-food parks are used in Africa to overcome barriers. Food processing industries play a significant role in African free trade zones and export processing zones. These zones benefit from several government incentives that are not applicable to the rest of the country. Most agro-industrial zones and parks were only launched in Africa over the last decade, with strong support from development institutions, such as the African Development Bank (AfDB), the World Bank and UNIDO. These institutions help coordinate various initiatives, such as integrated agro-industrial

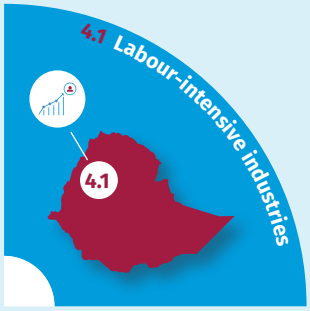
Box 5.6 **Ethiopia: setting-up industrial hubs to foster development and job creation**

Ethiopia is a latecomer in using industrial hubs in its industrialization strategy, with the formal adoption of industrial hubs in policy documents only starting in 2013. Once the policy was adopted, it was extremely successful, with over 20 industrial parks built between 2015 and 2021. These hubs have been instrumental in creating over 100,000 direct manufacturing jobs and around 150,000 indirect jobs.[22] The experience gained from these hubs has positioned Ethiopia to become a leading manufacturing hub in Africa.

Industrial parks are pivotal in Ethiopia's industrial strategy, as they foster cluster agglomeration and provide a conducive environment for medium- and large-scale manufacturing. Spread across various prime locations, such as in Hawassa, Dire Dawa, Kombolcha, Mekele, Adama, Bahir Dar and Jimma, there are currently 32 industrial parks in different areas, special zones and city administrations. Key institutions, such as the Ethiopian Investment Board, the Ethiopian Investment Commission, the Investment Council and the Industrial Parks Development Commission were established and strengthened to manage and regulate industrial parks to improve their efficiency. The Commission also creates opportunities for firms in industrial parks to reach international markets as part of its efforts to increase exports from the industrial parks.

The Government of Ethiopia has also established special credit facilities to support youth, women and domestic investors working in medium-sized enterprises in the industrial parks. The credit facilities from the Development Bank of Ethiopia and the Commercial Bank of Ethiopia are available to support medium-scale enterprises in the industrial parks. Small-scale enterprises are not left out either. The government provides support to small-scale enterprises based on local potential. Once identified, such enterprises establish networks with others to improve their input supply. Additionally, businesses are provided with value chain contributions, training and technical capacity, market linkages with medium- and large-scale firms, and encouraged to engage in technology transfer.

Ethiopia's industrial hubs, particularly the Bole Lemi Industrial Park I, have garnered praise for their inclusive practices. Women constitute the majority of



the labour force in the park, thereby contributing to efforts to reduce inequality and promote social and economic growth. These firms align with the government's domestic economic development plan that focuses on sourcing raw materials locally and connecting firms and industries in Ethiopia.

The Chinese constructed Hawassa is one of Ethiopia's leading industrial parks. It has created over 30,000 jobs (80 per cent women between 18 to 24 years of age) and contributed over $30 million in export revenue since 2017. Practical training provided in the park has empowered Ethiopians and enhanced their capacities. Investor surveys reveal that Ethiopia's strong government support, coordinated institutional setup and political backing are crucial in attracting investors. Global producers such as PVH have been drawn to Ethiopia due to the investments in the Hawassa Industrial Park. In recent years, the park has faced notable challenges. Apart from the adverse effects of the COVID-19 pandemic, Ethiopia's ban from the United States' Africa Growth and Opportunity Act (AGOA) and foreign exchange shortage has caused significant disruptions in the economy, resulting in a slowdown in the park's employment and occupancy rate.

Between 2014 and 2020, the Ethiopian government made a significant investment of $1 billion to develop nine publicly owned industrial parks. This strategic initiative aims to generate substantial export revenue, sustain jobs and expedite industrial development. These efforts are expected to position Ethiopia as a key player and in becoming Africa's manufacturing hub.

Source: Background report prepared by Tregenna et al. (2024), building on Oqubay (2022) Sime et al. (2021), World Bank (2022b) and Xinhua (2019).

parks, agro-corridors, staple-crop processing zones (SCPZs) and special agro-industrial processing zones (SAPZs). While there is limited research on the performance of these zones and parks, early indications point to successes in attracting new investment in the agro-industry. The COMESA supports the Common Agro-Industrial Park (CAIP) for Zambia and Zimbabwe, which is a promising regional programme expected to make an economic and social impact if implemented properly. Other initiatives include the recently launched AfDB SAPZ programme (see Box 5.7).[20]

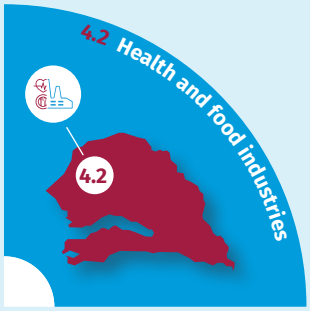
Ensuring equal access to health products requires building domestic capabilities. The COVID-19 pandemic reminded the world of the importance of equitable access to health care, particularly access to health products, such as vaccines and essential medicines for all, regardless of where they live. The local production of medicines, accessible in the areas where they are needed, is a building block of universal access to medicines. A more diversified production of essential health products globally, especially in LDCs and middle-income countries, can generate many benefits, such as tailoring products to local needs, improved availability of health products, higher outreach to hard-to-reach populations, increased regulatory oversight, and better emergency and pandemic preparedness. Therefore, many countries are increasingly seeking to develop the local production of high-quality medicines and other health products.[21]

Box 5.7 **Senegal: boosting food production through special agro-industrial processing zones**

Due to the armed conflict in Ukraine, African food production systems and food security have weakened considerably over the past few years. To address the food crisis, the AfDB launched the SAPZ programme, a multi-country industrialization initiative that leverages Africa's rich agricultural resources to boost food production and tackle the continent's dependence on food imports.

Senegal is one of the participating countries. Implemented by the country's Ministry of Industrial Development and Small and Medium Industry, the programme seeks to establish five agrifood processing centres strategically located in the North (Saint Louis, Matam and Louga), South (Ziguinchor, Kolda and Sédhiou), Center (Kaolack, Kaffrine, Fatick and Diourbel), East (Tambacounda, Kédougou), and West (Sandiara, Malicounda and N'Guénième). These centres, known as "Agropoles", are designed to serve as agro-industrial development hubs that foster collaboration among all stakeholders in the value chain and to enhance capabilities and expertise.

The South Agro-Industrial Processing Zone Project (Agropole Sud) is a prominent component of Senegal's 2035 vision called the Emerging Senegal Plan. Agropole Sud aims to create a conducive environment to increase private investment in targeted value chains, such as agricultural processing, input supply and service provision. Ultimately, the programme is expected to improve food and nutritional security, increase incomes and enhance beneficiaries' access to markets, agricultural inputs and services. The programme is structured around three components: (i) supporting a business ecosystem for private investment in agro-industry, (ii) sustainable improvement of capacities in the agro-industrial sector, and (iii) effective coordination, management and monitoring and evaluation.



The programme aims to reduce rural poverty and boost the share of agro-industry in Senegal's economic growth process. By 2025, the programme is expected to generate around 14,500 direct jobs (50 per cent for women and 60 per cent for youth) and 35,000 indirect jobs. In addition, about 65,000 households, totalling around 365,000 people (50 per cent women and 60 per cent youth), are estimated to be positively impacted by the initiative.

The Agropole project provides space and infrastructure to support agro-industrial development and create job opportunities. This initiative includes agricultural hubs with laying hens, animals, greenhouses and field crops. An agro-industrial development centre provides further support by monitoring critical aspects of the hubs, such as water resources, post-harvest operations, packaging, marketing, ensuring self-sufficiency and potentially facilitating exports.

During the recent 2023 Africa's Investment Market Place, AfDB, Afreximbank, Islamic Development Bank Group and Arise Integrated Industrial Platforms committed a total of $3 billion in financing to deliver an additional 15 to 20 SAPZ projects in Africa to transform underdeveloped rural areas into agro-industrial corridors. These projects are supported by international agencies such as UNIDO.

Source: Background report prepared by Tregenna et al. (2024), building on AfDB (2021a, 2021b).

Beyond public health, the local production of health products can accelerate industrial development. The production of medical products and equipment calls for a broad range of capabilities, which can present a challenge. However, producing health products is also highly appealing as an industry multiplier with several potential linkages and pull-and-push dynamics for local production system development.[23] This medical branch is a cross-sectoral ecosystem comprising medical devices, bio-pharma industries and public health-care institutions, such as hospitals, laboratories and testing facilities. The production of health products is highly dynamic and benefits from co-location, local customization and indigenous innovation. Furthermore, the medical devices and equipment industry is a potential driver for structural transformation because of the high-technology platforms underpinning this complex industrial ecosystem, opportunities for technological innovation, multiple technology linkages and economic spillovers.

Opportunities abound in the pharma sector, especially in Africa. Pharmaceuticals have high product complexity, which can lead to greater opportunities for high local value added production.[24] African demand is expected to grow rapidly in the coming years due to several factors, including increased expenditure, expanded provision, a maturing business environment and increased genericization.[25] Notably, the pharmaceutical sector was identified as a priority sector in industrial development initiatives, such as the IDDA III and AIDA. At the regional level, development plans for the sector have been formulated, such as the 2nd EAC Regional Pharmaceutical Manufacturing Plan of Action 2017-2027 and the ECOWAS Regional Pharmaceutical Plan 2014-2020. At the national level, many governments are considering prioritizing sectors that can benefit the health and industrial development spheres.[26] A good example is the Zimbabwe Pharmaceutical Sector Strategy 2017-2021, which aims to revitalize the industry by increasing the local production of essential drugs, mobilizing the necessary financial resources, and upgrading the technologies and skills used to improve the sector's performance.

Strengthening the local production of health products requires action-oriented policies. Sustainable local production requires effective multi-sectoral cooperation to promote investment, legal and technical environments.[27] In most sub-Saharan African countries, government intervention is necessary to develop a competitive pharmaceutical sector that improves access to medicines and sustainable supply. Industrial policy can set the direction and drive development in the pharmaceutical sector towards a vision shared by both public and private actors.[28] Making the best of this opportunity requires targeted, sustainable public support and industrial policy. The case of Egypt illustrates how continued commitment can bring positive results over the medium- to long term (Box 5.8).

5.4 LESSONS LEARNED FROM AFRICA

Accelerating SDG progress is crucial for Africa. The SDG assessment conducted in this chapter shows a continent at a crucial juncture, with significant shortcomings in several key areas compared to other developing regions, but also with enormous potential for transformative growth. The continent lags behind in five dimensions: adopting clean energy, accelerating economic growth, creating decent jobs, developing industry and fostering innovation. Addressing these critical areas through targeted interventions and using Africa's unique resources will be essential to accelerate the continent's sustainable development and support the achievement of the SDGs.

Industrial development can catalyse progress across several SDGs and reduce the existing gaps. Industrial policies and development initiatives can potentially drive progress across several SDGs simultaneously. Fostering inclusive and sustainable industrialization is a key entry point to achieving numerous SDGs. As shown in Part A of this report, it is clear that industrialization is closely intertwined with progress in other SDGs due to the sector's capacity for innovation and its substantial economic and technological spillover effects throughout the economy. The industrial sector has tremendous potential to contribute to Africa's broader development. However, to unleash this potential, the industrial sector must grow substantially, upgrade towards the production of higher value added segments, adopt and use modern technologies and become more environmentally sustainable.

Future industrial policies on the continent should leverage the opportunities generated by megatrends. Advancing Africa's industrialization calls for a concerted and multifaceted approach, coupled with the resolution of various practical challenges, especially in the light of the megatrends that directly affect industrialization. One important megatrend is rapid technological change, including the rapid spread of frontier technologies associated with the 4IR. The absorption of digital technologies in African manufacturing and the adoption of new technological advancements that enhance labour productivity and efficiency are crucial for the continent to catch up and avoid being left behind. A second megatrend

directly affecting industrialization in Africa is climate change and the urgent need to mitigate it. While many African countries are increasingly factoring this into their industrial policies, environmental sustainability is not yet sufficiently perceived as an opportunity for future development. Green industrialization presents challenges as well as opportunities for industrialization in Africa. Capitalizing on these windows of opportunity requires accelerated actions from governments and firms.

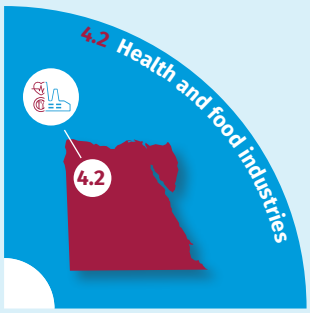
Coordination in and between African governments must be a priority in industrial policy formulation and implementation. The continent must coordinate its policies across different domains. Such coordination is increasingly critical as industrial policies become more ambitious in their objectives. Coordination is indispensable especially in Africa, where insufficient policy coordination between governmental and non-governmental entities can increase the risk of policy failure. The review of the industrial policy landscape conducted in this chapter reveals a series of interrelated policies that are not exclusively the responsibility of government departments for trade or industry. To ensure effective implementation, these policies necessitate the combined efforts of multiple government departments and agencies.

Industrial policies remain the key instrument for accelerating and sustaining Africa's structural transformation. The development of an African industry that is inclusive and environmentally sustainable cannot be taken for granted. This necessitates formulating and implementing appropriate industrial strategies that consider country-specific factors and the global context. Supporting digitalization and broader technological upgrading, as well as the transition to a low-carbon economy through green industrialization is essential. Industrial policies play a pivotal role as the primary instrument for initiating structural changes in the African industrial landscape. A platform for policy dialogue between African countries and their global partners is essential to achieve the scale and pace of Africa's structural transformation.

Box 5.8 **Egypt: fostering pharmaceutical production through industrial policy**

The Egyptian government is strategically focusing on industrialization and boosting domestic manufacturing through policies outlined in the National Industrial Development Strategy (NIDS). The revised NIDS (2022/2023-2026/2027) aims to achieve an 8 per cent industrial growth rate, for industry to contribute 20 per cent to GDP and an annual industrial export growth of between 18 per cent and 25 per cent. The government amended the New Investment Law of 2017 to provide additional incentives, particularly in the pharmaceutical sector, encouraging both foreign and domestic investments.

The pharmaceutical industry is a priority sector with special tax benefits. With 170 manufacturing facilities, it exports $400 million in raw materials annually, holding the highest market value in the Middle East and North Africa region at $56.6 billion in 2023. The industry is expanding its localization efforts. In 2021, the government inaugurated Gypto Pharma City, a cutting-edge industrial zone exclusively designed for the pharmaceutical and health sector. Spanning 180,000 square meters and located 30 kilometres north of Cairo, the facility is one of the largest drug production hubs in the Middle East. This state-initiated project aims to curtail the nation's import expenditure and foster self-sufficiency in health-care.



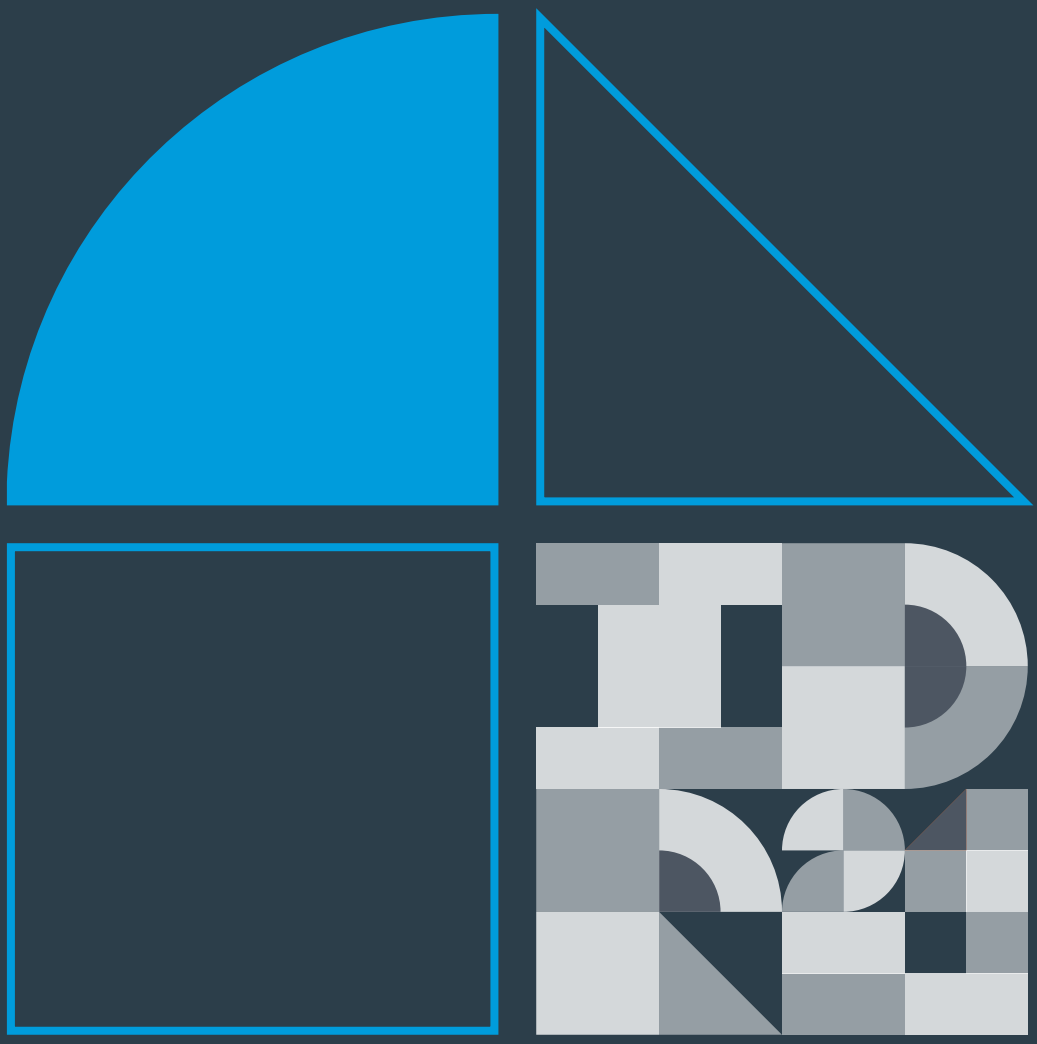
The government recently established a new pharma venture to boost local manufacturing. In May 2023, The Sovereign Fund of Egypt (TSFE) and a private equity firm called B Investments jointly declared the establishment of EZ International, a venture aimed at enhancing Egypt's manufacturing capabilities and trade services in the pharmaceutical sector. The forthcoming initiative will be developed through TSFE's health-care and pharmaceutical industries Subfund in collaboration with the local pharmaceutical chain El-Ezaby Pharmacy. Positioned as a comprehensive solution, EZ International aims to provide logistical and administrative support and facilitate the distribution and trade services for Egypt's pharmaceutical industry.

The success of this industry also connects directly to the realization of the SDGs related to health outcomes, as well as decent work and industrial innovation.

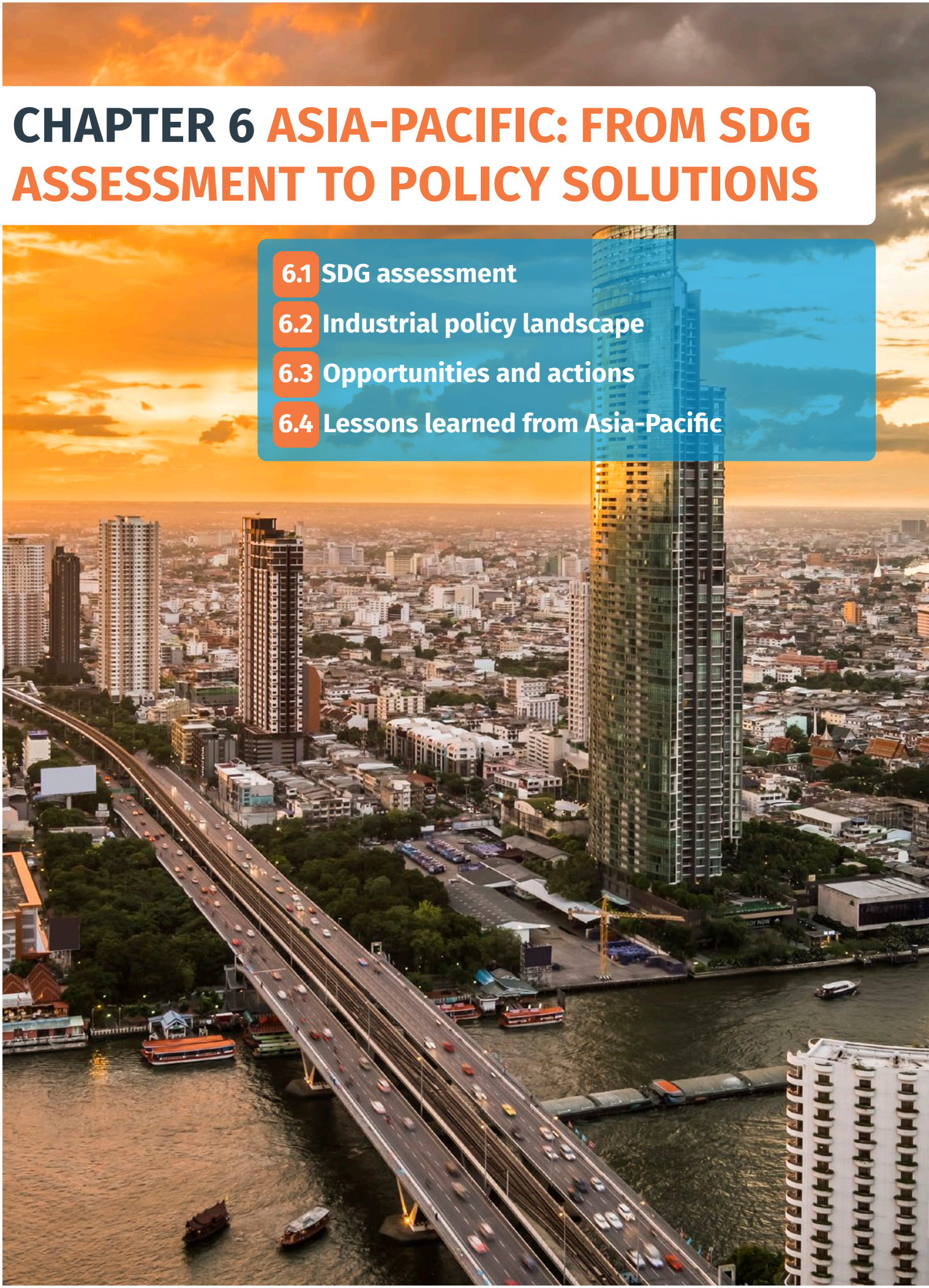
Source: Background report prepared by Tregenna et al. (2024), building on El-Din (2023).

ENDNOTES

[1] The results presented for this subregion are primarily driven by South Africa, a country that accounts for more than 80% of the subregion's population.
[2] Sections 5.2 and 5.3 build on the background report prepared by Tregenna et al. (2024) and regional consultations organized with UNIDO Member States and regional experts in June 2023.
[3] See https://www.un.org/development/desa/dpad/least-developed-country-category.html
[4] This section is based on Haraguchi and Sanfilippo (2024).
[5] UNIDO (2021a).
[6] Tregenna et al. (2024).
[7] Tregenna et al. (2024).
[8] UNCTAD (2022a).
[9] SADC (2015).
[10] Andreoni (2024).
[11] UNIDO (2019a).
[12] Santiago et al. (2023).
[13] UNIDO (2019a).
[14] Ncube and Tregenna (2022).
[15] UNDESA (2022).
[16] Cartwright (2015).
[17] Cramer and Tregenna (2020) .
[18] Oqubay (2022).
[19] UNIDO (2022).
[20] UNIDO (2022).
[21] UNIDO (2022).
[22] UNIDO (2023d).
[23] Andreoni (2021).
[24] WEF (2023b).
[25] Holt et al. (2015).
[26] UNIDO (2019b).
[27] UNIDO (2023d).
[28] UNIDO (2019b).



CHAPTER 6 ASIA-PACIFIC: FROM SDG ASSESSMENT TO POLICY SOLUTIONS



Developing countries in the Asia-Pacific region are characterized by their diversity and dynamism, and show varied progress in meeting Sustainable development Goals (SDGs) 7, 8 and 9. Overall, the region outperforms developing countries' average. The region's performance in meeting industry targets stands out, positioning Eastern and South-eastern Asia as global powerhouses in industrial production. Moreover, the region has made significant advancements in energy access, efficiency and infrastructure. However, despite the region's overall strong economic growth, Asian countries have experienced a deceleration in growth rates over the past decade and face challenges in employment and innovation. This chapter explores how industrial policy can accelerate progress in these priority areas and provides examples of effective policies across the continent, focusing on opportunities related to energy and demographic transitions, digitalization, global rebalancing and regional integration. Case studies from the region emphasize the importance of integrating industrial policy with innovation strategies. This approach has enabled countries to diversify their economies, transition to renewable energy sources and enhance firms' competitiveness and job quality.

Justin Yifu Lin

"Economic development is a continuous process of technological innovation, industrial upgrading and the improvement of infrastructure and institutions. Technological innovation and industrial upgrading in the Asia-Pacific region are constrained by numerous infrastructure and institutional bottlenecks. In a context of limited resources, it is essential that the governments of the region prioritize their interventions and focus on providing adequate infrastructure and institutions to those industries that already have latent comparative advantages. The final objective should be to transform these latent advantages into actual advantages. If the region can allow industrial policy to be implemented according to the above principle, it will be better positioned to achieve inclusive, sustainable and dynamic growth, making the realization of SDGs a reality."

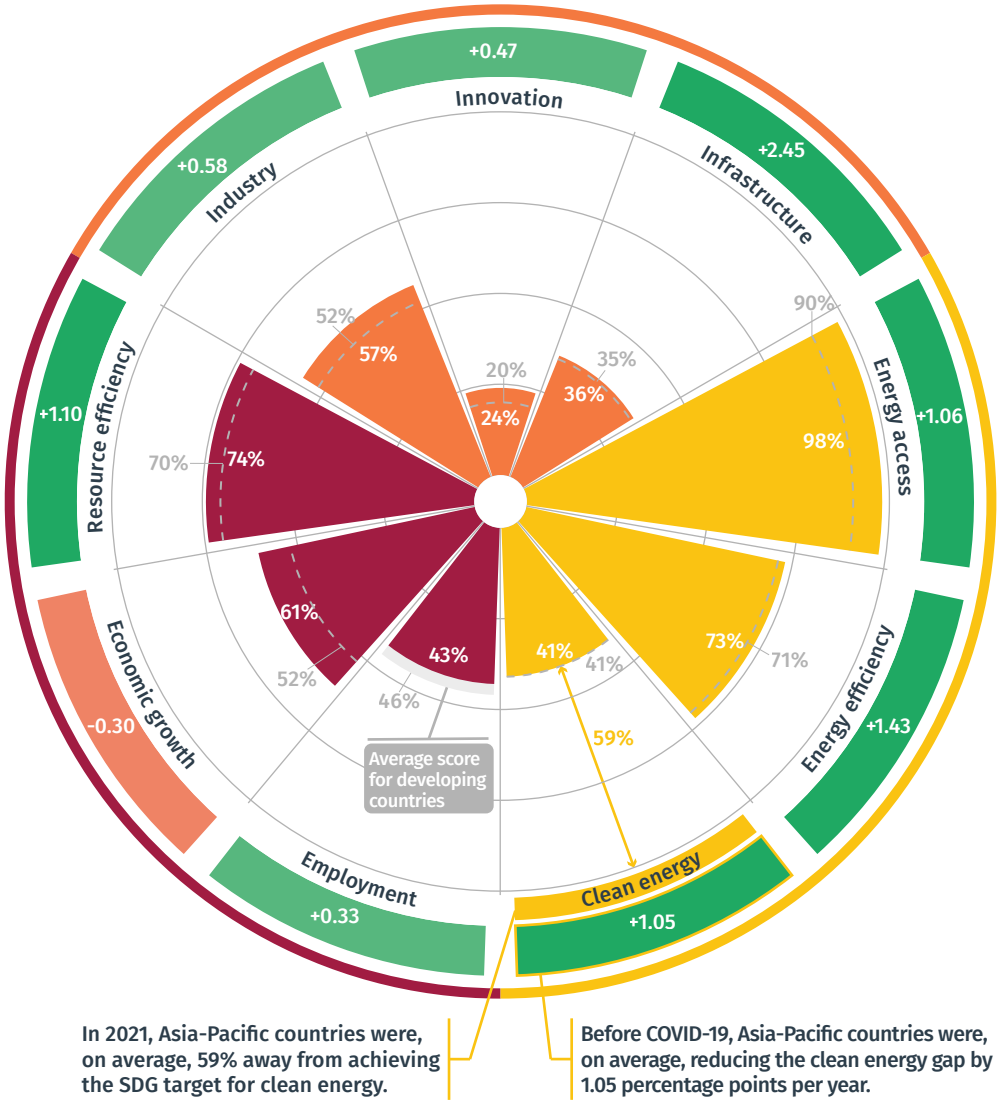
Dean of Institute of New Structural Economics at Peking University and former World Bank Chief Economist and Senior Vice President

6.1 SDG ASSESSMENT

6.1.1 The current situation

Varied progress towards realizing the SDGs reflects the region's dynamic landscape. Developing countries in the Asia-Pacific region[1] are characterized by their diversity and dynamism and show varied progress in meeting SDG 7, 8 and 9. The assessment conducted in this report provides insights into the achievements and the challenges experienced in the region (Figure 6.1). While important achievements have been made, especially in energy access and efficiency as well as in industry, the region faces ongoing challenges in clean energy adoption, decent job creation and innovation. Addressing these areas, especially through targeted support for strengthening industrial innovation ecosystems and expanding the use and production of clean energy, will be crucial for the region to continue its growth trajectory and to attain sustainable development.[2]

Figure 6.1 **Distance to SDG targets: Asia-Pacific in 2021**



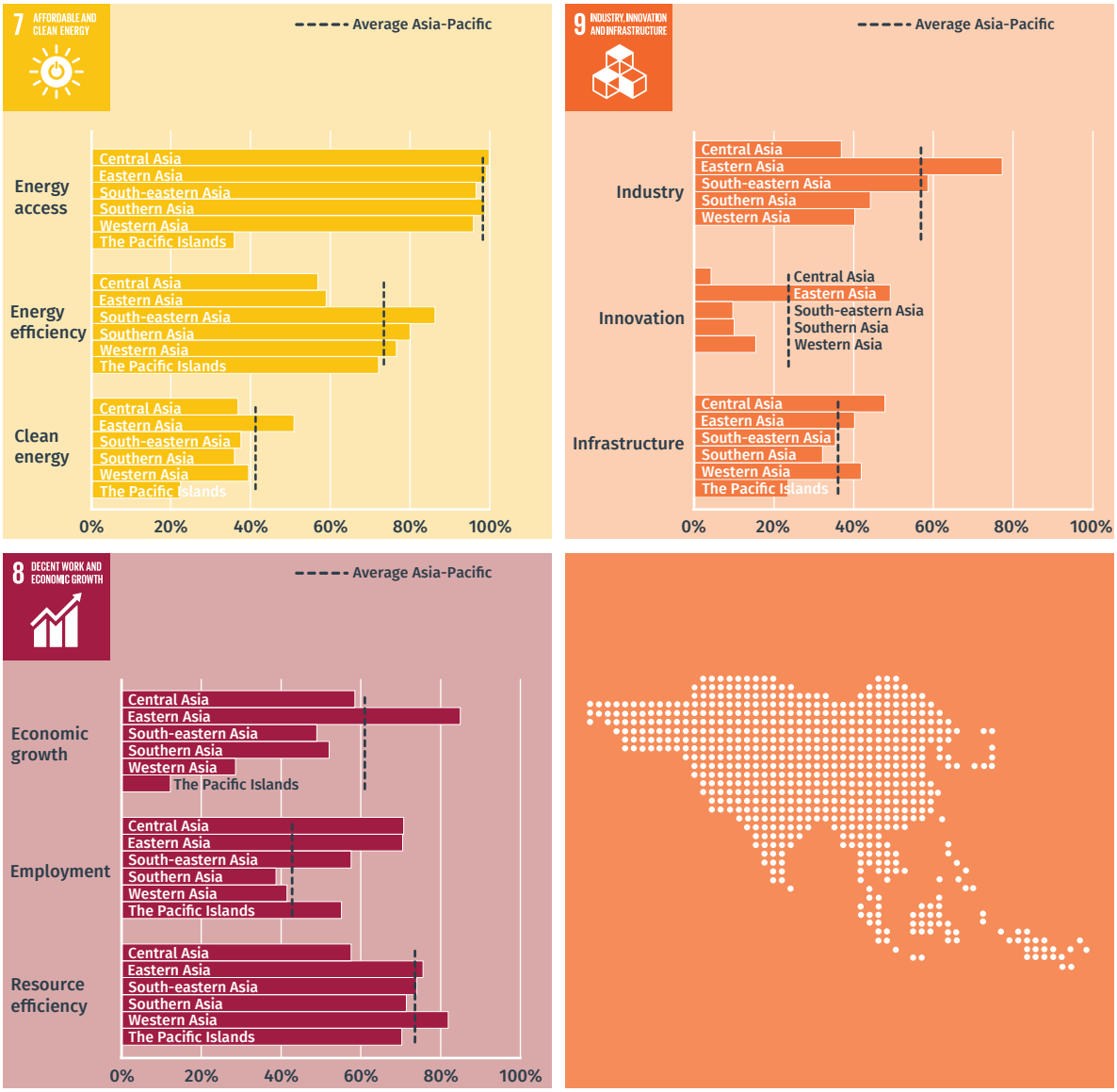
Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the regional level using population weights. The grey areas represent the performance of all developing countries as reported in Figure 3.2. The shaded rectangles on the outer side of the figure reflect the average annual convergence speed towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from those in 2009, and then dividing the result by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

Despite some challenges, the region shows significant achievements in SDG 7. Asia-Pacific's performance in energy access is noteworthy. In 2021, the region achieved an impressive 98 per cent of the target, surpassing the developing countries' average. In energy efficiency, the region also registered a high performance at 73 per cent of target achievement, in line with the average for developing countries. These achievements indicate a robust energy landscape and lay a solid foundation for future developments. However, a significant gap still remains in the third dimension assessed for this goal, namely clean energy: in 2021, the region had not yet achieved 50 per cent of the target.

For SDG 8, the region presents robust economic growth with room for improvement in employment. Asia-Pacific achieved 61 per cent of its target for economic growth, 9 percentage points higher than the developing world's average, reflecting the region's rise as a major global economic player. However, the negative trend in growth rates over the past decade (with a yearly gap increase of 0.30 points towards the SDG target) indicates the need for strategic interventions to reignite growth. Employment, at 43 per cent of the target, remains an area with room for improvement. The region has been closing the gap towards the employment target in the past decade but at a slow pace. Additional efforts are needed to create labour opportunities, especially in countries with rapidly growing populations.

Figure 6.2 **Assessment of SDGs 7, 8 and 9: how far are different subregions in Asia-Pacific from the 2030 targets?**



Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the subregional level using population weights. The dotted lines show the performance of the Asia-Pacific region, as presented in Figure 6.1. Two dimensions related to SDG 9 (industry and innovation) are not shown for the Pacific Islands due to lack of data.

Source: UNIDO elaboration based on UNSD (2023a).

For SDG 9, the region showcases industrial prowess and innovation challenges. Asia-Pacific's industrial performance stands out with a target achievement for industry at 57 per cent, indicating its status as a powerhouse in global industrial production. The region's infrastructure has also seen sustained expansion, with a remarkable gap reduction of 2.45 percentage points per year over the past decade. This demonstrates the region's focus on enhancing framework conditions to support economic dynamism, and making infrastructure development a potential entry point for investments and industrial growth. Innovation remains far from the target. Despite showing a higher score than the developing world's average in 2021, the region's growth in innovation has been modest in the past decade. Slow progress in innovation calls for targeted interventions to foster environments that enable the industrial sector to flourish.

6.1.2 Subregional differences

Asia-Pacific's subregional diversity shows varied achievements towards the SDGs. Being the largest region in the world (both in terms of size and population), Asia-Pacific hosts very diverse countries and economies. To capture some of these diversities, Figure 6.2 presents the 2021 SDG scores for six subregions: Central Asia[3], Eastern Asia[4], South-eastern Asia[5], Southern Asia[6], Western Asia[7] and the Pacific Islands.[8] While specific subregions such as Eastern Asia show strong performances across the board, other regions, such as the Pacific Islands encounter considerable challenges. This heterogeneity calls for tailored approaches and regional cooperation to ensure no subregion is left behind in the journey towards sustainable development.

The results of subregions' progress towards achieving SDG 7 vary considerably. With the regional clean energy average at 41 per cent, Eastern Asia is the clean energy leader at 51 per cent of the target achieved. In contrast, the Pacific Islands trail at 22 per cent, highlighting the urgent need for investments and sustainable policy initiatives in this subregion. Eastern Asia and Southern Asia have nearly reached the optimal target in terms of energy access, while the Pacific Islands lag considerably at 36 per cent, illustrating the large disparity in the region's energy access. South-eastern Asia leads with 86 per cent in terms of energy efficiency, indicating efficient energy practices, while Eastern Asia lags behind at 57 per cent.

Challenges and disparities are observed across subregions in the achievement of SDG 8. Eastern Asia shows a strong economic growth performance at 85 per cent of the target achievement, which is significantly above the regional average of 61 per cent. Similarly, Central, Southern and South-eastern Asia perform well but fall short of the regional average. In contrast, Western Asia (at 29 per cent) and the Pacific Islands (at 12 per cent) have encountered significant challenges in this area, which reveals the urgent need for economic revitalization and diversification strategies. Employment remains a significant challenge across all subregions, particularly in Southern Asia (at 39 per cent), which is behind the regional average (43 per cent).

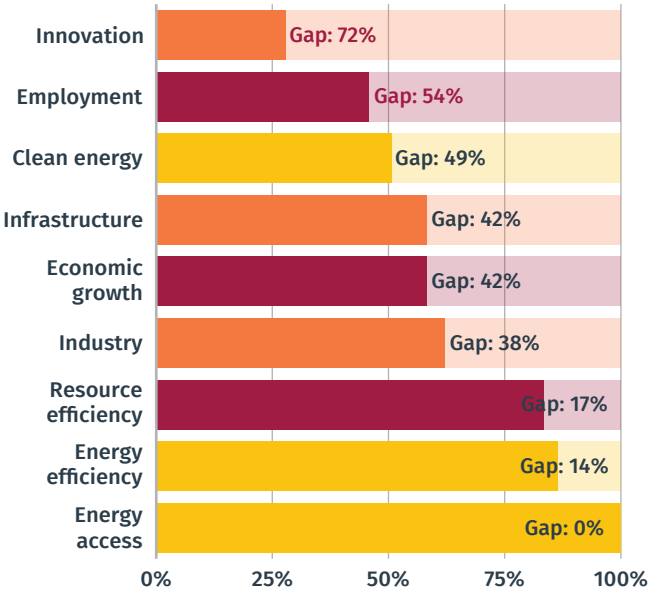
Under SDG 9, there are gaps in industrial and innovative capacities that need urgent action. As expected, Eastern and South-eastern Asia's industrial performance stand out with a target achievement of 77 per cent and 59 per cent, respectively. In contrast, Western, Central and Southern Asia's performance was weaker. Infrastructure development varies across the subregions, with Central Asia leading at 48 per cent, considerably above the regional average. the Pacific Islands, at 23 per cent, show significant infrastructure gaps that need to be addressed. The innovation target reveals the biggest disparities in the region. Eastern Asia leads innovation development at 49 per cent of the SDG target, almost double of the regional average of 24 per cent. In contrast, innovation in Central Asia lags behind at only 4 per cent of the target. The data indicate an urgent need for enhanced focus on technological and creative capacities in most subregions analysed in this chapter.

6.1.3 Projections to 2030

Projections into the upcoming years highlight crucial priority areas for the region. Projecting the achievements of SDGs 7, 8 and 9 by 2030 offers valuable insights into the areas that require immediate attention and strategic focus in Asia-Pacific. These projections are based on a "business as usual" scenario, which assumes the continuation of pre-COVID-19 trends without additional interventions to improve performance. The methodology, explained in more detail in Chapter 3 of the report, applies the average annual speed of convergence towards the SDG target observed before the pandemic (from 2009 to 2019) to each year between 2021 and 2030. This exercise highlights the need for Asia-Pacific to prioritize innovation and employment, followed by a focus on clean energy, economic growth and infrastructure development (Figure 6.3).

Innovation requires substantial policy intervention. Projected to have a 72 per cent gap by 2030, innovation emerges as the most critical area in need of improvement in Asia-Pacific. This gap indicates that despite the region's industrial prowess, it lags behind in fostering a robust ecosystem for technological advancements and creative solutions. Policy interventions to enhance research and development (R&D), support for start-ups and integrated digital technologies are crucial for closing this gap. Additionally, tapping into Industry 4.0 technologies can spur competitiveness and diversification whilst aiding the region to restore rapid economic growth.

Figure 6.3 **Projections and distance to targets by 2030 in Asia-Pacific**



Note: The bars show the relative value for each dimension projected for 2030 and are ordered according to the projected distance to the target. Projections are based on pre-COVID-19 trends (average annual convergence speed between 2009 and 2019). The projected gaps greater than 50 per cent are marked in red.

Source: UNIDO elaboration based on UNSD (2023a).

Accelerating decent job creation calls for immediate action. With a projected gap of 54 per cent in 2030, addressing employment challenges is another priority area in the region. Countries in Asia-Pacific need to focus on creating job opportunities and improving labour market conditions, especially for the youth and marginalized groups. Attracting foreign direct investment (FDI) that is relocating, and supporting the development of labour-intensive industries can be a key strategy in this regard.[9]

The transition towards clean energy needs to be accelerated to meet the SDG targets. While the region has made significant strides in energy access and efficiency, accelerating the transition to renewable and sustainable energy sources emerges as a pending priority. Investment in renewable energy generation and developing new industrial clusters around electric mobility present important opportunities for accelerating progress towards SDG 7 and strengthening industrial development.

Policy interventions are needed to enhance economic growth and infrastructure development. Although both targets surpassed the halfway mark to reaching the SDG target, the gap by 2030 will continue to be significant. By 2030, the gap to the target is projected to be 42 per cent for the region. Enhancing economic growth through regional strategies and improving infrastructure, particularly in transport and digital connectivity, can bolster industrial growth and economic development.

Modern industrial policy can become a lever to accelerate progress in these priority areas. The upcoming sections of this chapter present the region's current industrial landscape and delve into how industrial policy can drive progress in these priority areas by harnessing windows of opportunities in energy transition, demographic trends, digitalization, global rebalancing of value chains and regional integration.[10] Complementing the discussions, concrete examples of policies in action across the region will show how targeted interventions and strategic planning can turn challenges into sustainable growth and development opportunities.

6.2 INDUSTRIAL POLICY LANDSCAPE

6.2.1 The current landscape

Developing Asia has always championed industrial policy. Despite global trends towards market-driven economic policies, developing Asia has consistently embraced industrial policy as a cornerstone for growth and development. This approach has evolved, reflecting its pivotal role in fostering industries that are crucial for national development. The region's historical reliance on targeted industrial policies has leveraged tariffs, government subsidies, preferential credit and technology licensing to support specific domestic industries, thereby advancing industrialization.

Asia's successful industrial policy use is well documented in literature. The notion of Asia as a champion of industrial policy is emphasized by the transformative economic journeys of countries, such as Japan and the Republic of Korea. These nations have achieved remarkable economic upgrading through their long-standing commitment to industrial policy, elevating them to developed country status in just one generation. These historical success stories reflect the potential of well-crafted policies to catalyse rapid industrialization and economic development.

Led by China, a new wave of industrial policy has emerged. A resurgence of industrial policy has been observed across Asia-Pacific, with China leading the way, followed by other Asian countries. Nations from North-eastern Asia, South-eastern Asia, Southern Asia, Central Asia and the Pacific Islands are increasingly adopting strategic industrial policies. This shift,

especially evident since the turn of the millennium, emphasizes a transition in the region from traditional sectors, such as textiles and garments, to industries that leverage advanced technologies to enhance production efficiency and economic integration.

Countries in special situations are embracing industrial policies. Asia-Pacific's least developed countries (LDCs), landlocked developing countries and small island developing states (SIDS) face distinct challenges in achieving structural transformation. For instance, while LDCs in the Asia-Pacific region have made strides towards graduating from their LDC status, this success brings new challenges associated with losing privileges specifically allotted to LDCs, such as preferential market access and dedicated funding streams. Nations are proactively anticipating these transitions and adjusting their industrial policies by adopting "smooth transition strategies" to ensure a seamless shift.[11] This is the case, for example, of Bangladesh, where the government is making efforts to mitigate the impact of this graduation on the Ready-Made Garment (RMG) sector (see Box 6.9).

Global shocks and geopolitical tensions are catalysing the revival. The new wave of industrial policies in the region was accelerated by the polycrisis. The COVID-19 pandemic and geopolitical disruptions, such as the armed conflict in Ukraine, have highlighted the vulnerabilities of global supply chains and the limitations of free-market fundamentals in addressing emerging economic challenges. These events have consequently caused a strategic shift in the focus and objectives of industrial policies in the Asia-Pacific region, which now focus on mitigating the adverse effects of global disruptions while steering towards long-term sustainable development.

There is a strategic shift towards digitalization and the clean energy transition. The focus of current industrial policies in Asia-Pacific has shifted towards embracing digital transformation, accelerating the clean energy transition and upgrading value chains. This strategic shift is aimed at positioning the region at the forefront of global economic and technological advancements. By investing in digital transformation and clean energy initiatives, the region is laying the groundwork for sustainable growth and resilience against global economic volatilities.

Modern industrial policies in the region use a diversity of instruments. The toolkit for contemporary industrial policy in Asia-Pacific includes financial incentives, public investment in R&D, FDI attraction, public procurement, and the utilization of Special Economic Zones (SEZs) and industrial parks. These instruments are tailored to support the region's priorities, including digital transformation, clean energy adoption and industrial upgrading.[12]

Industrial policy features vary across subregions. Despite a resurgence in industrial policy across Asia-Pacific, the implementation and focus of such policies vary significantly across subregions. This diversity reflects the unique economic, social and geopolitical contexts of each area in the whole region. Tailoring industrial policy to suit subregional strengths and needs is critical for maximizing its effectiveness and ensuring that no country is left behind in the pursuit of sustainable development and economic prosperity.

6.2.2 Differences by subregions

Asia-Pacific, the world's largest continent, hosts a variety of industrial realities. The region can be broadly categorized into four distinct groups based on their industrial policy landscapes: Eastern and South-eastern Asia, Central and Southern Asia, Western Asia and the Pacific Islands. Each subregion exhibits unique industrial strategies, priorities and challenges, and requires an understanding of their respective policy environments to harness their full potential for sustainable industrial development.

Eastern and South-eastern Asia

A strategic approach to blend import substitution with export promotion. Traditionally, South-eastern Asian countries have navigated the path to industrialization by implementing dualistic trade policies. They are open to exporting while restricting imports. This approach ensures that domestic industries thrive. The blend of import substitution with export promotion has enabled the achievement of scale economies, adjusting over time to meet development needs. Furthermore, these economies have supported enterprise development and national champions, nurturing firms to achieve global brand recognition and international market presence.[13]

A renewed focus on increasing domestic value addition. Eastern and South-eastern Asian countries have been intensifying efforts to enhance domestic value addition by transitioning from global manufacturing hubs to leaders in innovation and technology. This shift aligns with policies aiming to deepen the integration of advanced technologies in manufacturing processes, thereby increasing the sophistication and value of domestically produced goods.

High-tech and green industries are increasingly becoming the pillars of industrial strategies. The region has identified high-tech and green industries as the cornerstone of their industrial strategies. Initiatives such as "*Made in China 2025*" and "*Thailand 4.0*" reflect a strategic shift from traditional manufacturing bases to global leaders in innovation and sustainability.

Indonesia is another major economy that is focusing on harnessing its green and digital economies to attain sustainable development growth, as reflected in its Low Carbon Development Initiative (LCDI).

Strategies for new technologies to foster competitiveness. Selective FDI and export-led growth strategies are implemented in Eastern and Southern Asian countries to absorb new technologies and enhance regional competitiveness. Countries in the region ensure that their industries remain at the forefront of technological advancements and contribute to economic expansion by attracting FDI in targeted sectors (i.e. renewable energy, electric vehicles (EVs) and digital technologies) that promise sustainable growth and leverage export markets. For instance, Cambodia's plans to attract FDI aim to promote inclusive quality investments that add value and create jobs.[14] Similarly, Viet Nam's openness to FDI across many sectors with low registered capital requirements exemplifies the government's commitment to economic reform to foster a favourable business environment, poised to rebound exports and stimulate growth.[15]

Investments in Eastern Asia are shifting towards clean energy industries. In 2023, China's substantial investment in clean energy, notably in solar power, EVs and batteries emphasized the sector's paramount importance to the country's economic and industrial dynamism. Clean energy sectors contributed a record Yuan 11.4 trillion ($1.6 trillion) to China's economy, marking them as the largest driver of the nation's economic growth and accounting for a substantial portion of gross domestic product (GDP) expansion.[16] This surge in clean-energy investment reflects a broader strategic shift towards sustainable and innovative growth models across the region.

Central and Southern Asia

Countries in subregions are leveraging their latecomer status to spur industrialization. Central and Southern Asian countries are leveraging their latecomer status to accelerate their transition to manufacturing-led economies. Despite facing significant challenges, these nations are adopting strategies that utilize their existing resources and capabilities to invigorate industrialization, and to catch up with more developed economies**.** A key focus area is the efficient use of natural resources and the development of skills and infrastructure necessary to support industrialization. Initiatives such as India's "Make in India" and SEZs across the region aim to build a robust industrial base to sustain long-term economic growth.

Premature de-industrialization is a major challenge in Southern Asia. Despite achieving high GDP growth rates, Southern Asian countries face obstacles in establishing backward and forward production linkages, indicating premature de-industrialization. The struggle to create comprehensive industrial ecosystems that integrate various stages of production processes hampers these countries' ability to sustain long-term industrial and economic advancement.

Enhancing trade facilitation is a major challenge for Central Asian countries. Countries in Central Asia are predominantly landlocked, which means they need to overcome specific geographical constraints to integrate into the global market. Recent restrictions, particularly concerning the use of land and airspace of the Russian Federation, have required adaptations to regional transport corridors. In response, these nations are prioritizing the digitalization of customs procedures to facilitate trade and enable effective participation in global value chains (GVCs).[17]

Divergent industrial pathways between Central and Southern Asia. Each subregion has its own set of priorities. Southern Asian countries are exploring technology to accelerate industrial upgrading and create jobs. This is reflected in India's National Manufacturing Policy, which aims to shift the country to more automated manufacturing to motivate competitiveness in the capital goods industry. In Bangladesh, automated manufacturing is being used to advance robotics and artificial intelligence (AI), and to modernize the garment industry. Conversely, in Central Asian countries, efforts are oriented towards digitalizing customs procedures for trade facilitation and the positive engagement of "transit facilitation", for instance the Central Asia Regional Economic Cooperation Program.[18]

Western Asia

Diversification away from oil-based economies is a top priority in the subregion. For Western Asian countries, particularly the Gulf Cooperation Council (GCC) countries[19], diversifying the economy away from oil-based economies towards knowledge-intensive industries remains a top priority. The shift towards sectors such as high-tech manufacturing, health industries and renewable energy reflects a strategic reorientation aimed at reducing oil dependency and fostering sustainable economic development.

Green hydrogen and renewable energy projects are gaining ground. Countries in the subregion are focusing on green hydrogen and renewable energy projects, with countries like Saudi Arabia and the United Arab Emirates leading ambitious initiatives to become regional hubs for green energy. These projects contribute to environmental sustainability and open new avenues for industrial and economic diversification.

Subregional efforts are geared towards attracting FDI and promoting industrial diversification. The development of state-of-the-art infrastructure and the strategic use of SEZs are pivotal to Western Asia's efforts to attract FDI and promote industrial diversification. The region's investment in world-class airports, seaports and industrial parks is designed to create an enabling environment for domestic and international businesses to thrive.

Subregional differences between the Gulf Cooperation Council (GCC) countries and the Levant region. In Western Asia, the GCC countries and countries of the Levant region[20] showcase distinct industrial policy approaches reflecting their unique economic characteristics and development goals. The GCC's focus on diversification away from hydrocarbon-dependent economies contrasts with the Levant's efforts towards building sound industrial infrastructure amidst political and economic challenges. The former is seeking to move beyond oil based on significant public investments in capital-intensive industries, whereas in the latter, industrial policy has historically focused on creating industrial infrastructure as a means for economic restructuring.

The Pacific Islands

The Pacific Islands face unique industrialization challenges. Geographical isolation, limited natural resources and small domestic markets are the major challenges these islands face on their path towards industrial development, compared to other developing regions. These constraints require innovative approaches to industrial development, emphasizing the importance of sustainable practices and regional cooperation.

Illegal, unreported and unregulated fishing is a major challenge in this subregion. Fisheries play a significant role in the economies of the Pacific Islands, by providing food security, employment and substantial contributions to GDP. A major challenge in this sector is illegal, unreported and unregulated (IUU) fishing. This practice leads to the overexploitation of fishery resources, and monitoring coastal fisheries is historically unaffordable in many countries. Additionally, the impact of climate change on rising sea temperatures can make fish move to deeper seas, and countries in the Pacific Islands would lose their monopoly control in the sector.

The digitalization of fisheries is a key policy objective in the subregion. The Pacific Islands are increasingly turning to digital technology to enhance the sustainability of their fisheries sector. Innovations such as e-reporting and e-monitoring are being adopted to improve stock assessments, measure bycatch and combat IUU fishing. The commitment of the Forum Fisheries Agency (FFA) members to gradually adopt e-monitoring for fishing vessels by 2022 exemplifies the region's proactive approach to leveraging technology for conservation and efficiency.[21]

Regional cooperation is key for creating sustainable industries in the Pacific Islands. In addition to leveraging digitalization to control IUU, regional cooperation is pivotal for the Pacific Islands to create sustainable industries. Initiatives such as the Vessel Day Scheme illustrate how collective action and shared governance can lead to the sustainable management of natural resources in fishing and agricultural processing. The scheme provides a foundation for industrial development that respects environmental limits and community needs.

From policy formulation to actionable pathways. Overall, the industrial policy landscape of Asia-Pacific reveals that countries have been adopting a variety of strategies to respond to global challenges and seize the opportunities presented by global economic shifts. These policies are dynamically evolving to embrace technological advancements, sustainable practices and innovative growth models. The next section summarizes key megatrends in industrial policy to accelerate SDG progress in the region.

6.3 OPPORTUNITIES AND ACTIONS

Five areas of opportunity to accelerate SDG progress through modern industrial policy. There are ample opportunities for tapping into the region's potential through improved industrial policy. This section highlights five opportunity areas directly related to the megatrends discussed in Part A: energy transition, digitalization, global rebalancing, regional integration and the demographic transition. Industrial policies that harness these opportunities can accelerate Asia-Pacific's progress towards achieving the SDGs.

6.3.1 Energy transition

Harnessing the region's renewable energy potential. Asia-Pacific's abundant solar, wind and hydro resources offer unprecedented opportunities for an energy transition. Countries in the region are well-positioned to capitalize on these abundant resources to fuel their transition to clean energy. The solar intensity and wind patterns across the vast Asian landscapes, from the Gobi Desert to the South China Sea, provide a natural advantage that could drive a global shift towards renewable energy sources.

Investments are imperative for renewable energy projects. Realizing the potential of renewable resources requires substantial investments from both the public and private sectors. These investments should be channeled towards developing and deploying green technologies, such as photovoltaic (PV) cells, wind turbines and hydroelectric plants. Governments across the region need to create enabling environments that can attract and secure investments, and ensure that renewable energy is a cornerstone of their national strategies.

The energy transition requires a conducive environment for green investments. Governments can develop and implement incentives and green finance mechanisms to attract private sector engagement to the renewable energy sector. These could include tax incentives, green bonds and subsidies that reduce the financial risks associated with projects. By providing a stable and supportive policy framework, Asia-Pacific countries can accelerate the flow of capital into the sector, drive innovation and scale-up in green technologies.

Key initiatives demonstrate how to steer industrial development away from fossil fuels. Several key initiatives across Asian subregions are seeking to transition from traditional fossil fuels to more sustainable energy sources. These range from large-scale solar farms in the deserts of Western Asia to the expansion of hydroelectric power in the mountainous regions of Central Asia. These initiatives contribute to SDG 7 and foster regional collaboration and knowledge-sharing of best practices for sustainable energy generation. For instance, the NEOM Green Hydrogen Project in Saudi Arabia exemplifies a strategic move towards producing green hydrogen as an alternative energy source. It sets a precedent for clean energy initiatives that are both ambitious and aligned with national development goals (see Box 6.1).

Leveraging industrial capabilities to support the global energy transition. Besides producing clean energy, the Asia-Pacific region, particularly Eastern and Southeastern Asia, possesses an advanced industrial base that can play a pivotal role in the global shift towards sustainable energy. The high industrial capabilities of countries in this region in sectors such as solar panels, wind turbines and batteries for EVs can be harnessed to produce and meet the demands of goods and technologies needed globally for the energy transition.

The advanced industrial base of Eastern and Southeastern Asia can play a pivotal role in the global shift towards sustainable energy.

China is taking a leading role in green industrialization. China's remarkable surge in clean energy investment demonstrates the country's forward-thinking approach to economic development through green industries. In 2023, clean energy investments in China, particularly in solar power, EVs and batteries, demonstrated the nation's commitment to sustainable growth and positioned clean energy as the leading driver of China's economic expansion. This strategic shift towards clean energy investment, accounting for an impressive 40 per cent of GDP growth and distinguishing itself as the leading sector for economic acceleration, offers valuable insights for crafting industrial policy and fostering investment in the Asia-Pacific region.[22] China's New Energy Vehicle (NEV) Industrial Development Plan provides a good example of how the region can leverage its industrial capabilities and manufacturing to contribute meaningfully to the energy transition (see Box 6.2).

6.3.2 Digitalization

Asia-Pacific is pioneering 4IR technologies, with China leading the way. The Fourth Industrial Revolution (4IR) is transforming the Asia-Pacific region, and China is at the forefront of integrating advanced digital systems into manufacturing. This digital leap is enhancing the firms' competitiveness by improving efficiency, quality and functionality, thus also contributing to climate resilience. The widespread adoption of 4IR technologies, such as robots, drones and automation across various industries signifies a shift towards high value added manufacturing and services.

The widespread adoption of 4IR technologies can spur industrial competitiveness in the region. The integration of digital technologies in both manufacturing and service sectors is pivotal for elevating productivity and competitiveness.

Box 6.1 Saudi Arabia: leveraging renewables to produce green hydrogen

Aligning with the global transition from fossil fuels to renewable energy sources, Saudi Arabia, like other Western Asian countries, is seeking to redirect its production and export matrix to be more economically and environmentally sustainable. Green hydrogen plays a significant role in this strategy, as the country is well-positioned in this market due to its geographical location, substantial renewable energy resources, significant investments in logistical infrastructure and extensive expertise in the energy sector.

The NEOM Green Hydrogen Project (NGHP) was launched in Saudi Arabia and represents one of the world's largest green hydrogen production operations. It is commercially viable and powered entirely by renewable resources. This landmark initiative reflects the country's commitment to achieving a net-zero carbon footprint by 2050.

Scheduled for commissioning in 2026, the NGHP is a joint venture between the NEOM Green Hydrogen Company (NGHC), ACWA Power and Air Products, with Envision Energy providing wind turbines via Air Products. The NGHP generates green hydrogen and aims to distribute it globally as green ammonia. The partnership with Air Products entails constructing and operating a green hydrogen and ammonia production plant in NEOM for three decades. Upon completion, the mega-plant will utilize up to 4 GW of solar and wind energy to produce approximately 600 tons of green ammonia per day for export.

The project is financially backed by a $6.7 billion agreement for engineering, procurement and construction,

alongside a significant investment of $8.5 billion from the Saudi Public Investment Fund in ACWA Power. Its financial framework is a blend of long-term debt and equity, with ACWA Power holding a 33.3 per cent stake. The National Infrastructure Fund (NIF), the Saudi Industrial Development Fund, and leading banks including First Abu Dhabi Bank, HSBC and Standard Chartered Bank are key financiers, and the project is supported by a consortium of 23 banks and investment entities.

The initiative promises substantial environmental impact by potentially reducing carbon emissions by approximately 5 million metric tons annually. Accordingly, the NGHP represents a stride forward in the global quest for sustainable energy solutions, placing Saudi Arabia at the forefront of the green hydrogen revolution. The project aligns with the country's ambitious climate goals and sets a precedent for international collaborative efforts in the renewable energy sector.

Source: Background report produced by Mishrif (2024), building on Carpenter (2022), IEA (2022), MEP Middle East (2023) and UNIDO et al. (2023).

From smart manufacturing to digital services, the adoption of AI, the Internet of Things (IoT) and cloud computing is driving a significant transformation in how businesses operate, improve efficiencies and innovate business models.

4IR technologies need digital infrastructure to spread in the region. Building a robust digital infrastructure is paramount to fostering innovation and supporting the widespread adoption of digital technologies. Enhancing digital connectivity is crucial for enabling businesses and economies to thrive in the digital era, thus ensuring that the Asia-Pacific is at the cutting edge of technological innovation.

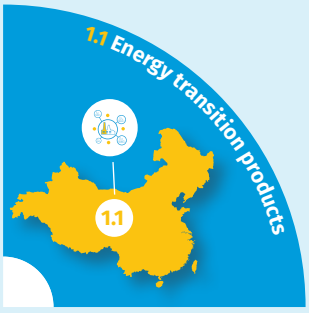
Box 6.2 China: leapfrogging into electric mobility through industrial policy

China's New Energy Vehicle (NEV) Industrial Development Plan outlines a dynamic approach to promoting technological advancement and environmental leadership for the country, supported by decades of policy evolution and innovation-driven strategies. As one of the leading nations in EV technology, China has capitalized on its abundant resources and government support to become the world's premier EV manufacturer and a major player in the sustainable mobility revolution.

China recognized the strategic positioning of the automotive sector in the country's industry in its 1994 "Automotive Industry Policy." However, electromobility allowed China to leapfrog from traditional automotive to become an EV powerhouse. The foundation for China's success was driven by its support for developing the EV value chain, which initially focused on R&D investment and rapidly advancing key technologies. China's dynamic policy adjustments targeted different stages of EV market development, addressed bottleneck constraints and scaled up manufacturing capabilities.

China's state-led support, including subsidies, tax exemptions, R&D support and initiatives such as the "Ten Cities, One Thousand Vehicles" project to encourage EV adoption, has been key for China's dominance in the EV sector. The national prioritization of EV technology since the early 2000s, coupled with local government incentives and the direct involvement of high-level government actors, has catalysed the industry's growth and the expansion of domestic EV manufacturers.

In 2018, the country initiated a strategic shift from direct subsidies to a market-driven model aimed at scaling manufacturing capabilities and stimulating technological innovation. As subsidies phased out, new market mechanisms were introduced, such as credits for car manufacturers, consumer incentives for the private purchase of EVs and non-financial policies, such as preferential license quotas and traffic control. More stringent criteria for accessing credits and subsidies were introduced, and these mechanisms steered the industry towards sustainable growth, technological innovation and competitiveness.



The New Energy Vehicle Industry Development Plan (2021-2035) reflects a mature and holistic policy approach, acknowledging past achievements while recognizing areas for improvement, such as core technology innovation, quality assurance systems and infrastructure development. The strategic tasks outlined in the plan aim to enhance technological innovation capacity, build a new industrial ecosystem, and promote integrated development while deepening international cooperation and improving infrastructure systems. A notable focus is the establishment of an efficient power battery recycling system, highlighting the importance of sustainability and environmental stewardship in China's EV strategy.

China's journey from early automotive industry promotion to becoming the world's largest EV market underscores the effectiveness of dynamic industrial policies. The country accounted for 60 per cent of new vehicle registrations in 2022 and represented 40 per cent of the global electric car stock. The industry's value addition skyrocketed from $764 million in 2011 to $18.0 billion in 2022, with exports following a similar upward trajectory. China has also established itself as the largest producer of lithium batteries, a critical component of EVs.

By fostering a strong and innovative market, the government now emphasizes its role in resource allocation, strategic planning, standard formulation and quality supervision. This innovation-driven development strategy, characterized by industry, academia and research collaboration, with enterprises leading the technological innovation system, showcases how China has successfully navigated the transition to a sustainable mobility future.

Source: Background report produced by Rasiah (2024), building on official documents, Yang (2023) and Wang et al. (2023).

Transformative industrial policies can support technological upgrading. Countries across the region are employing industrial policies to transition from low- and medium- to high value added activities through significant technological upgrades. Targeted interventions are being implemented to facilitate the adoption of 4IR technologies in the industrial sector of specific regions. India's Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) Udyog Bharat 4.0 exemplifies such an initiative. SAMARTH acts as a catalyst for innovation, skill development and enhanced competitiveness in the sector, and showcases the potential of adopting Industry 4.0 technologies across the Indian manufacturing sector (see Box 6.3).

Box 6.3 India: raising awareness and promoting the adoption of Industry 4.0 technologies across manufacturing firms

India's Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) Udyog Bharat 4.0 aims to promote the adoption of Industry 4.0 technologies in Indian manufacturing firms by 2025, through awareness programmes, experience and demonstration centres, capacity training and networking initiatives between industry and academia. It is an initiative of the Department of Heavy Industry that focuses on four key projects:

1. The Centre for Industry 4.0 (C4i4) Lab promotes the adoption of Industry 4.0 technology through awareness and training programmes, demonstrations of technologies, the Industry 4.0 Maturity and Readiness assessment tool, and by providing advisory services.

2. The Foundation for Smart Manufacturing (FSM) centre, a joint initiative of the Indian Institute of Technology Delhi and the Automation Industry Association, conducts Industry 4.0 technology demonstration workshops, and provides access to prototyping, testing and learning facilities.

3. The I4.0India@IISc Smart Factory, developed by the Indian Institute of Science, serves as a demonstrator of Industry 4.0 technology and testing facility for both "automation-intensive" and "labour-intensive" smart solutions.

4. Industry 4.0 projects at the Department of Heavy Industry's Centre of Excellence in Advanced Manufacturing Technology and the Indian Institute of Technology Kharagpur aim to stimulate innovation in the manufacturing of smart machines.

The initiative involves an array of stakeholders, including government departments (the Department of Heavy Industry, the Department of Industrial Policy and Promotion, the Department of Small and Medium Enterprises and the Department of Information Technology), industry associations (the Confederation of Indian Industry, the Federation of Indian Chambers of Commerce and Industry and the Automation Association of India), research and technology institutes (the Indian Institutes of Technology, the Indian Institute of Science, the Central Manufacturing Technology Institute, the National Institutes of Technology, the Defense Research and Development Organization institutions and private industrial R&D entities), and support organizations (German Machinery and Plant Manufacturers Association and the National Research Development Corporation of India).

The impacts of SAMARTH are evident in its extensive outreach and engagement activities. In 2019, 25 awareness seminars on Industry 4.0 were held, followed by 88 webinars, training programmes and awareness events in 2020 and 2021. Additionally, over 1,000 companies have directly engaged in the C4i4 Lab's awareness workshops since 2018, showcasing the initiative's extensive reach and influence.

Source: Background report produced by CIIP (2024).

Strategically integrating the digital transition into national plans. The strategic integration of the digital transition into national development plans is essential for maximizing the benefits of digitalization. By aligning digital strategies with broader economic goals, countries can ensure a cohesive approach to leveraging digital technologies for sustainable growth, innovation and societal advancement. Jordan's information and communication technology (ICT) sector exemplifies the transformative power of digitalization in driving economic growth (see Box 6). As a regional digital hub, Jordan has leveraged its ICT sector to attract investment, foster innovation and create high-quality jobs, demonstrating the significant role digital technologies can play in economic diversification and development.

Box 6.4 **Jordan: paving the way to become a regional ICT hub**

In the context of the 4IR, countries increasingly rely on digital solutions for their operations. Digital solutions allow countries to expand their ICT sector to serve domestic markets and become exporters of modern digital services. Supported by the government, Jordan's ICT sector has made significant progress in attracting global giants, such as Cisco, Expedia, Amazon, Microsoft and Oracle. As a result, local companies are expanding to specialize in information technology (IT) and business process outsourcing to service regional and international clients.

Given its political stability, proximity to GCC markets, abundance of university graduates, and good infrastructure, Jordan is well-positioned to enhance its position as an ICT hub, and potentially contribute to employment, exports and value addition. Accordingly, the government has launched a series of initiatives to transform the country into a global IT centre, which includes the REACH 2025 plan, launched in 2016, and the National Digital Transformation Strategy and Implementation Plan (2021-2025), launched in 2021.

REACH 2025 proposes various reforms to improve access to finance, investor incentives and tax exemptions, which were recently adopted. The plan's core elements include smart specialization and demand-driven innovation, public sector innovation, start-up and entrepreneurship support, ICT skills development, improvements in the business environment and smart digital infrastructure. The National Digital Transformation Strategy and Implementation Plan, in turn, aims to enhance the digitalization of government services, improve connectivity, and create at least 50,000 direct jobs in the digital sector by 2025. To jointly develop policies, implement the strategy and increase private sector participation, the Ministry of Digital Economy and Entrepreneurship established the National Digital Transformation Committee, comprising 70 per cent of private sector membership and 30 per cent of public sector membership.

The government has taken steps to support the digital economy by endorsing a public-private partnership model to expand the national broadband network, support digital skills development for youth, launch a plan for government e-payments, and support access to finance and global markets for entrepreneurs. These initiatives successfully deliver the skills needed to support the digital economy through comprehensive reforms in the country's education and student training systems. At the same time, the government has created an enabling environment for the digital economy by simplifying and reviewing processes as well as legislations and regulations, all resulting in a high-performing investment environment that is attractive to FDI.[23]

Jordan is looking to enhance local capacities to absorb, develop and penetrate AI technologies with Jordan's AI Strategy and Implementation Plan (2023-2027). The plan includes 68 carefully selected projects and initiatives based on building AI ecosystems in Jordan and implementing projects focused on AI in priority economic sectors. The plan aims to create job opportunities, improve the efficiency and quality of government services, and promote suitable opportunities for innovation and entrepreneurship.

Source: UNIDO elaboration based on Adaileh and Alshawawer (2021), IFC (2021), OECD (2022a) and UNCTAD (2022b).

6.3.3 Global rebalancing

Adapting to the new global economic landscape. Globalization is undergoing a pivotal transformation, marked by a shift away from extended value chains that have characterized the global economic system for decades. This transformation was initiated after the global financial crisis and further catalysed by the COVID-19 pandemic, prompting a re-evaluation and redesign of supply chains worldwide. The restructuring of GVCs presents challenges and opportunities for Asian-Pacific countries, prompting the region to redefine its role in the global economic system through innovative industrial strategies to leverage its unique strengths.

Shifts in FDI trends entail important consequences for the region's industrial sector. Backshoring represents the relocation of manufacturing activities back to a company's home country. This trend, initially driven by a growing emphasis on sustainable production and reduction of supply chain vulnerabilities, can have several risks for developing countries. In particular, it can lead to job losses, especially in lower-skilled countries, and can reduce technology transfer and competitiveness.[24] However, these trends also allow Asian nations to shift towards high-value manufacturing and service sectors.

The regionalization of industrial value chains can offset the negative impacts of backshoring. Despite the challenges posed by backshoring, the regionalization of GVCs offers a unique opportunity for Southern and South-eastern Asia. The proximity of these regions to East Asian economic powerhouses positions them to benefit from shifting global trade patterns. Strategic industrial policies can help these countries attract investments that are relocating from traditional industrial hubs, so that they can leverage their geographical proximity to enhance their participation in GVCs.[25]

Strategic industrial policies are needed to transform challenges into opportunities. By implementing strategic industrial policies, Asia-Pacific countries can harness the opportunities arising from the current global rebalancing. Policies that foster innovation, enhance competitiveness, and promote sustainable development can position these nations to take advantage of the shifting dynamics in global trade, and to climb the value chain more rapidly. By focusing on high-value manufacturing and services, the region can transform these global trends into engines of growth and development.

Industrial parks and SEZs hold significant potential to attract investments and progress. Industrial parks and SEZs can attract FDI and nurture high-tech industries by offering a conducive environment for business through tax incentives, advanced infrastructure and streamlined regulatory frameworks. They hold significant potential to drive Asia-Pacific's adaptation to global economic realignments. The case of Bahrain International Investment Park exemplifies how strategically developed SEZs can become catalysts for industrial diversification and economic modernization (see Box 6.5).

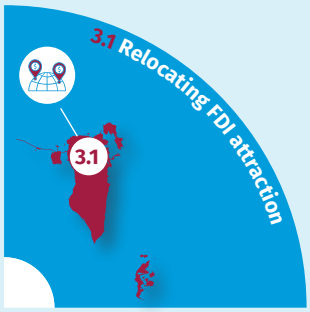
6.3.4 Greater regional integration

Strengthening regional integration to fight market volatility. Regional cooperation and trade agreements serve as critical buffers against global market fluctuations by providing a stable environment for economic growth and development. In Asia-Pacific, efforts to deepen regional integration have been pivotal in creating resilient supply chains and mitigating the impacts of international economic turbulence. By prioritizing collaborative frameworks and agreements, countries in the region can leverage collective strength to navigate through uncertainties while ensuring sustained industrial and economic prosperity.

Fostering small and medium enterprise (SME) growth through regional industrial policies. Regional industrial policies play a significant role in driving industrial growth, nurturing SMEs, and broadening the scope of industrial activities. These policies provide a conducive environment for SMEs to thrive by simplifying access to finance, technology and markets. Furthermore, they catalyse industrial diversification and innovation, create job opportunities, and foster a competitive industrial landscape that promotes a shared regional vision and cooperation.

Stimulating innovation through cross-regional initiatives. Participation in cross-regional industrial policy initiatives offers countries in Asia-Pacific a platform to develop their industrial capabilities and cultivate innovation. By engaging in collaborative projects and policy exchanges, nations tap into a wider pool of resources, knowledge and technologies and accelerate innovation and industrial development. This collaborative approach encourages the sharing of best practices and propels the region towards adopting advanced technologies and innovative industrial solutions. The Gulf Organization for Industrial Consulting (GOIC) exemplifies the benefits of regional cooperation in championing industrial development (see Box 6.6).

Box 6.5 **Bahrain: leveraging investment parks to foster economic diversification and upgrading**



The Bahrain International Investment Park (BIIP), a cornerstone of Bahrain's industrial and economic development strategy, provides an example of how countries can leverage their strategic location and investment incentives to foster industrial diversification and global trade. Established in 2005 by the Ministry of Industry, Commerce, and Tourism (MOICT) in collaboration with the Economic Development Board (EDB), the park spans 3,000,000 square meters in the Salman Industrial City and is designed to enhance industrial diversification in the country.

Strategically located in the northwest area of the island, near the Bahrain Logistics Zone (BLZ) and the Sheikh Khalifa bin Salman Port (KBSP), BIIP benefits from exceptional connectivity to transportation networks, offering businesses efficient access to the rapidly growing markets of the Northern Gulf region. Its proximity to major logistics hubs facilitates seamless trade across Kuwait, Iraq, Saudi Arabia, Qatar and Northern Iran.

The park offers highly subsidized land rent options and pre-built industrial units in the Baytik Industrial Oasis while catering to an array of business needs. Strategic investment incentives include fast-track application processing, the rapid allocation of land and industrial units, conducting a project's environmental assessment, and lack of restrictions on recruitment for the first five years of operation. Moreover, companies in the industrial and services sectors have 100 per cent ownership and are tax free for ten years, and there is a 5 per cent customs duty exemption on raw materials, plant machinery and spare parts imported for manufacturing purposes.

BIIP has successfully attracted over $2 billion in investments in diverse industries, ranging from food processing, aluminium smelting, consumer goods, IT, pharmaceuticals, petrochemicals and knowledge-based services. The park is home to multinational giants like Mondelez and Arla and a thriving ecosystem of SMEs. This diversity drives Bahrain's industrial diversification efforts and creates substantial employment opportunities, with over 5,200 people employed by 114 multinational and indigenous companies operating within the park. The influx of investment also bolstered the country's FDI stock to $32.2 billion in 2022.

BIIP's achievements reflect the transformative power of strategic economic zones in leveraging geographical advantages, investment incentives and a diverse industrial portfolio to fuel industrial growth, economic diversification and global trade connectivity.

Source: Background report produced by Mishrif (2024).

Policies that foster innovation and enhance competitiveness can position Asian economies to take advantage of the shifting dynamics in global trade.

Boosting intra-trade and knowledge transfer. Deepening regional integration is a valuable opportunity to amplify intra-trade and facilitate the transfer of knowledge across the Asia-Pacific region. Initiatives that reduce non-tariff barriers and promote regional trade agreements, such as the Regional Comprehensive Economic Partnership (RCEP), contribute significantly to trade flows and industrial collaboration. This approach strengthens economic ties in the region and advances a culture of knowledge sharing and mutual learning, which is crucial for industrial advancement and innovation.

Enhancing sustainable fisheries through regional cooperation. In the Pacific Islands, regional cooperation is instrumental to improve the management of fish stocks, and the effectiveness of control and monitoring measures of IUU fishing. The Pacific Islands can address the industry's challenges collectively by promoting data sharing, harmonizing fishery data collection, and strengthening capacity for the marine fishery resources assessment. Initiatives like the Vessel Day Scheme, introduced in 2011, demonstrate how regional integration can help overcome the constraints of geographical isolation and limited resources (see Box 6.7).

Box 6.6 The Gulf Organization for Industrial Consulting: coordinating industrial policy at the regional level

The Gulf Organization for Industrial Consulting (GOIC) has played a major role in harmonizing industrial policies in the GCC countries and Yemen since its establishment in 1976. The GOIC supports the development of the industrial sectors of the GCC member states' industrial sectors through the regulation and organization of socio-economic aspects. The organization identifies, locates and screens opportunities for new industrial investments and potential business partners in the GCC market, while actively supporting industrial diversification and growth in the region. The GOIC supports public-private partnerships and has cooperative agreements and alliances with several public and private organizations on a local, regional and global scale.

The GOIC has created specialized programmes and offices that provide technical activities and industrial services. For example, the Manufacturing Investment Opportunities Program identifies investment opportunities across industrial sectors and promotes fresh and profitable manufacturing project ideas suitable for the region's private sector investors at regional or national levels. The Economic and Industrial Intelligence Program provides sector-specific research on industrial development strategies, macroeconomic analyses and forecasts significant economic changes in the GCC, including in trade policy development among GCC countries. It offers high-calibre professional services, research, consulting services for industrial and economic development, and encourages financial and technological collaboration among already-established industrial entities. The Industrial Sub-Contracting and Partnership Exchange (SPX) Programme, supported by UNIDO, serves as a platform for business interactions and matchmaking in industrial relations between contractors and subcontractors, which are mostly SMEs. In parallel, the GOIC's Industrial Technical Assistance Program for Small and Medium Size Industries comprehensively evaluates industrial facilities to identify areas for possible savings in relation to productivity, waste reduction and energy efficiency. These evaluations include the facilities' location, amenities, services and manufacturing processes.

In addition to providing technical support for planning and evaluating industrial initiatives, some specialized offices of the GOIC also compile data and studies on the industrial sector in GCC countries to inform investment decisions. For example, the Industrial Market Intelligence is an internet portal that offers a single, conveniently accessible source of industry statistics and information. This portal provides a tool comprising a database on Gulf industries, foreign trade data, socio-economic indicators, investment opportunities in the GCC, technology providers and industrial experts in the GCC countries.

A vital component of GOIC's services are project pre-feasibility and feasibility studies, and customized reports to assist private and public clients in making sound, reliable and knowledgeable choices regarding industrial projects, whether new or well-established. Moreover, the Training and Capacity Development Program strengthens organizational and human capacities for sustainable development in the industrial sector, while offering specialized training courses, seminars and workshops for government agencies, investors, industrialists and experts concerned with industrial development in the GCC countries.

Source: Background report produced by Mishrif (2024).

6.3.5 Demographic transition

Harnessing demographic potential for economic growth. Asia's demographic landscape provides a significant opportunity for catalysing economic development in the region. With effective policy frameworks that focus on integrating the young population through education and vocational training complemented with industrial policies to create productive jobs, Asian countries can transform demographic potential into economic progress. Such policies can also address the needs of ageing populations, while ensuring job opportunities to youth.

Economically integrating youth populations through industrial policy. The young and growing population in many Asian countries is a potential economic powerhouse that can be integrated through targeted industrial policies. By investing in education and vocational training countries can create a skilled workforce ready to meet the challenges of modern industries and the digital economy. However, education alone will not guarantee the absorption of the growing labour force into the economic system. Industrial policies need to be implemented in parallel to create, expand or modernize the economic activities that will provide employment opportunities for these workers. Pakistan's and Bangladesh's policies around textiles and apparel illustrate the significant role that industrial policy can play in fostering labour-intensive industries to facilitate, create and sustain quality jobs (see Box 6.8 and Box 6.9).

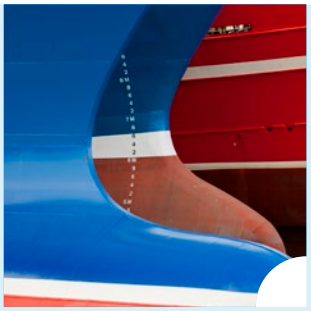
Box 6.7 **Vessel Day Scheme: coordinating fishery activity in the Pacific Islands**

The Pacific Islands, characterized by their small land size and vast distances between islands, have demonstrated remarkable success in implementing a collective industrial policy centred on cooperation, conservation and sharing. The regional policy framework has significantly enhanced fish harvesting, processing, employment and revenue.

In the Pacific Islands, where most government revenue is derived from tuna fishing, the challenges of IUU fishing and environmental harm loom. Pacific states draw between 1 per cent and 95 per cent of all government revenue from tuna harvesting, totaling 1.5 million metric tons annually, and supporting approximately 18,700 jobs each year (between 2013 and 2018).

The Parties to the Nauru Agreement (PNA) of 1982, comprising nine Pacific Island nations, have collaboratively established the Exclusive Economic Zones (EEZs) to govern over 10 million square miles of the Pacific Ocean. This area supplies over 30 per cent of the global market for tuna, and sees concerted efforts from governments and conservation bodies to protect marine life and habitats. The introduction of the Vessel Day Scheme (VDS) in 2007 under the PNA marked a pivotal change by transitioning from a system based on catch fees, to auctioning timeslots for fishing within member EEZs. This scheme ensures that members have consistent and equitable income distribution from commercial fishing activities while effectively limiting overfishing.

The VDS' success in fostering sustainable fishing practices is evident in its contribution to government revenue, which supports essential public services and conservation efforts to combat climate change



impacts. Furthermore, the scheme promotes downstream processing and canning in the industry and discourages illegal fishing practices and environmentally harmful fishing methods.

Key organizations, including the Pacific Community (SPC), the Pacific Islands Forum Fisheries Agency (FFA) and PNA member countries have played crucial roles in this initiative's success. The scheme's ability to increase profits significantly, from $50 million in 2010 to $500 million in 2020, emphasizes the economic benefits of collaborative industrial policy and regional cooperation in the Pacific Islands.

Source: Background report produced by Rasiah (2024).

Box 6.8 **Pakistan: promoting the textile and apparel industries to create jobs**

Pakistan's textile industry is the largest and one of the oldest manufacturing industries in the country. It is the largest exporting sector, and has strong backward and forward linkages to the rest of the economy. The textile value chain begins with cotton production, after which the ginned cotton is spun into cotton yarn or mixed with synthetic polymers to make synthetic fibres. The yarn is then woven or knit into fabric, which is used to make garments and other products. UNIDO estimates indicate that the textile and apparel industry accounted for 42 per cent of total manufacturing jobs in the country in 2018, and almost one-third of the country's manufacturing output. The activities of the textiles (spinning, knitting, weaving, processing, etc.) and ready-made garments industry have created and provided job security for millions of people and new entrants into the labour market.

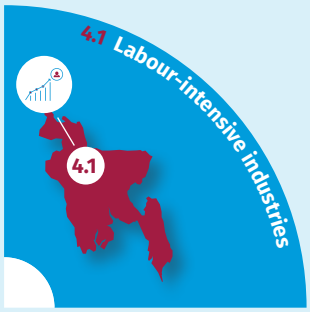
Despite its importance, the sector faces stiff challenges, including low domestic and foreign investments, regulatory impediments and low productivity. To address some of these challenges, the government launched the Textiles and Apparel Policy (2020–2025) to boost value added exports and become one of the major players in the global textiles and apparel supply chain. This policy marks a strategic endeavour to position the country as a global leader in textile exports. The policy targets comprehensive industrial upgrading and skill development to meet the demands of modern markets, and is aimed at enhancing the pivotal role of the textiles and apparel sector in the national economy. It is a collaborative effort involving the Ministry of Commerce and key industry stakeholders, designed to boost Pakistan's textile exports to $25.3 billion by 2025 and $50 billion by 2030. The policy seeks to revitalize the entire textile ecosystem, from cotton farming to high-end apparel manufacturing, by fostering investment in the supply chain and developing value added sectors.

A key measure of the Textiles and Apparel Policy (2020-2025) is the emphasis on integrating Pakistan's textile sector into GVCs. Recognizing the transformative power of GVCs in job creation and economic acceleration, the policy delineates a roadmap for Pakistan to harness global networks, thereby fostering employment opportunities and driving growth. Participation in GVCs is crucial for achieving the policy's strategic objectives, aiming to unlock new markets, enhance product value and ensure sustainable sector growth.

To achieve this, the policy combines several instruments, including the custom duty-free import of textiles and apparel machinery, tax credits, the rationalization of the tariff structure and the simplification of temporary import schemes. The policy places a significant focus on human resources, particularly on increasing the participation of women in the manufacturing process and training programmes to equip the workforce with skills for the evolving industry landscape. To do so, the government is investing in mass vocational training programmes. Design institutes and the textile industry are also collaborating to keep up with emerging fashion trends and market intelligence.

Source: Background report produced by Rasiah (2024), building on the official documents and Textiles Intelligence (2022).

Box 6.9 **Bangladesh: building industrial capabilities around ready-made garments**



Bangladesh's journey to becoming the world's third-largest garment exporter is a compelling story of strategic industrial policy and targeted government support. This transformation from a primarily jute and agriculture-based economy to a global textile and apparel hub, showcases the country's deliberate and focused approach to industrial development.

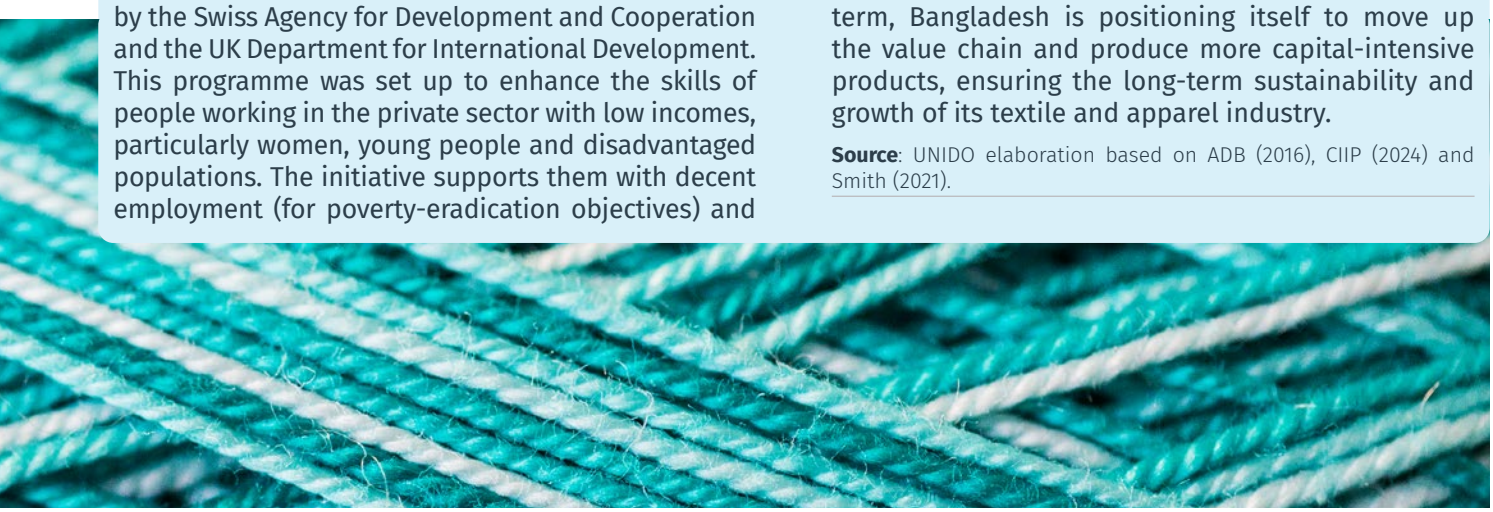
In the late 1970s, Bangladesh embarked on a mission to develop new industrial capacities, with the Ready-Made Garment (RMG) sector at its heart. Recognizing the potential of this labour-intensive industry, policymakers implemented a series of industrial policies, including the establishment of SEZs and the creation of a duty-free environment for RMG exports. These efforts were complemented by external factors such as the Multi-Fibre Arrangement (MFA), enabling Bangladesh to enjoy quota-free access to key markets until 2005. Post-MFA, the European Union's (EU) Everything But Arms scheme has been instrumental for the sector's development, ensuring duty-free quota-free (DFQF) access to EU and United Kingdom (UK) markets, which currently represent the destination of between 50 per cent and 60 per cent of Bangladesh's RMG exports.

The Textile Policy 2017 outlines ambitious goals to strengthen the primary textile sector, significantly increase textile exports, and attract investment into the textile and apparel supply chains. It emphasizes the development of value added sectors, revitalizing cotton farmers' profitability and strengthening the fibre sector. The policy aims to create a competitive and sustainable textile industry by focusing on human resource development, especially promoting women's participation in manufacturing.

This policy complements other initiatives oriented towards strengthening the skill base of the country, such as the training programme named Sudokkho, funded by the Swiss Agency for Development and Cooperation and the UK Department for International Development. This programme was set up to enhance the skills of people working in the private sector with low incomes, particularly women, young people and disadvantaged populations. The initiative supports them with decent employment (for poverty-eradication objectives) and stimulates further investment in training by trainees, private training providers and employers. It started in 2014 and one of the two sectors targeted was RMG. The programme supports private training providers and industry-based training initiatives (supply-side stimulation), and raises awareness about the value of developing the skills of trainees and industry (demand-side stimulation). It also supports the industry skills councils, the development of skills training packages to meet the industry's occupational standards, and the capacity-building of national training consultancy service providers to sustain a long-term development process. So far, more than 110,000 people have graduated from Sudokkho training. Estimates indicate that at least two-thirds of these workers improved their income in skilled or semi-skilled jobs within six months of completing Sudokkho-supported training.

Bangladesh's RMG is now the most vital industrial sector in the country, representing 12 per cent of its GDP and around 80 per cent of total exports. With access to major markets and a skilled workforce, the sector has experienced remarkable growth, even amid global challenges. The sector's success, bolstered by the government's efforts to maintain duty-free market access and FDI, faces new challenges as Bangladesh prepares to graduate from its LDC status in 2026. As the potential loss of DFQF access to vital EU and UK markets poses a significant concern, the government is actively engaging in negotiations to secure this access, which is a critical component of Bangladesh's smooth transition strategy. In the long term, Bangladesh is positioning itself to move up the value chain and produce more capital-intensive products, ensuring the long-term sustainability and growth of its textile and apparel industry.

Source: UNIDO elaboration based on ADB (2016), CIIP (2024) and Smith (2021).



6.4 LESSONS LEARNED FROM ASIA-PACIFIC

Embracing strategic industrial policy for sustainable growth. The Asia-Pacific region's journey underscores the importance of embracing strategic industrial policies tailored to national and regional strengths. The successful implementation of policies in countries targeting sectors such as renewable energy, digitalization and advanced manufacturing demonstrates the potential of well-crafted strategies to catalyse rapid industrialization and economic development. To be successful, these policies need to be flexible and adaptable to change in response to global and regional dynamics, as experienced by countries in Asia-Pacific.

Aligning industrial and innovation strategies for sustainable development. Lessons from East Asia's economic transformation reveal the pivotal role of integrating industrial policy with innovation strategies. This approach has enabled countries to diversify their economies, shift towards renewable energy sources, and enhance firm competitiveness and job quality. The successful transition of sectors leveraging advanced technologies illustrates the importance of government support in nurturing sectors that are critical for national and regional development.

Strengthening the foundation for future growth. The lessons from Asia-Pacific's industrial development journey indicate the importance of strengthening the industry foundation for future growth through education, skill development and the integration of digital technologies. By focusing on human capital development and fostering a culture of innovation and entrepreneurship, countries can build a resilient and dynamic industrial sector capable of adapting to future challenges and opportunities.

Adapting to global economic shifts. The Asia-Pacific region's response to global economic shifts, including trends of backshoring and the regionalization of GVCs, offers valuable lessons for policymakers. By adopting flexible and forward-looking industrial policies, countries can navigate challenges posed by sectoral trends while capitalizing on new opportunities for growth and development. Strategic policies that encourage investment in high-value manufacturing and services can enable countries to climb the value chain and integrate more deeply into the global economy.

Balancing global integration with local development needs. The experience of the Asia-Pacific region illustrates the critical balance between global integration and addressing local development needs. As countries navigate the complexities of global market integration, the focus remains on ensuring that industrial policies are responsive to local contexts. This balance is crucial for fostering sustainable development, enhancing regional cooperation, and ensuring equitable progress towards the SDGs.

ENDNOTES

[1] The analysis of this chapter focuses on the developing economies of Asia-Pacific, defined as those not classified by UNIDO as high-income industrial economies. The latest classification is available in UNIDO (2023c).

[2] The results presented in this chapter are in line with the main findings reported in the latest edition of United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)'s SDG Progress Report for the region UNESCAP (2023). This report, which analyses progress on the 17 SDGs and their 169 targets, indicates that at current trends, the region will fall short of the majority of measurable targets, including targets of goals in which good overall progress was achieved, such as SDGs 7, 8 and 9. The report underscores the need to accelerate observed trends in areas such as energy efficiency, economic growth and innovation; and to reverse regressing trends in more critical areas including clean energy and employment.

[3] Central Asia includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

[4] East Asia includes China, D.P.R. of Korea, Hong Kong SAR, China, Macao SAR, China and Mongolia.

[5] South-eastern Asia includes Cambodia, Indonesia, Lao P.D.R, Malaysia, Myanmar, Philippines, Thailand, Timor-Leste and Viet Nam.

[6] Southern Asia includes Afghanistan, Bangladesh, Bhutan, India, Iran (I.R of), Maldives, Nepal, Pakistan and Sri Lanka.

[7] Western Asia includes Bahrain, Cyprus, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates and Yemen.

[8] The Pacific Islands include Cook Islands, Fiji, French Polynesia, Kiribati, Marshall Islands, Micronesia (F.S of), Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

[9] The urgency of addressing this dimension has also been highlighted in UNESCAP's SDG progress report UNESCAP (2023), which pinpointed full employment and decent work as critical areas with an urgent need to reserve negative trends in the region.

[10] Sections 6.2 and 6.3 build on the background reports prepared by Mishrif (2024) and Rasiah (2024) and regional consultations organized with UNIDO Member States and regional experts in June 2023.

[11] UNESCAP (2022) it aims to support regional dialogue, in preparation for the High-level Political Forum on Sustainable Development (HLPF).

[12] Mishrif (2024) and Patunru (2023).

[13] Kumar (2020).

[14] Sothear (2023).

[15] Vetterotti and Förster (2023).

[16] Myllyvirta (2024).

[17] UNESCAP (2021).

[18] UNESCAP (2021).

[19] The Gulf Cooperation Council (GCC) brings together six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

[20] The background report produced by Mishrif (2024) includes the following countries from the Levant region: Jordan, Lebanon, State of Palestine and Syrian Arab Republic.

[21] UNESCAP (2020).

[22] Myllyvirta (2024).

[23] Adaileh and Alshawawer (2021).

[24] Di Stefano et al. (2023) find that an increasing number of companies are revising their location strategies and implementing reshoring decisions, including backshoring (relocation in the home country).

[25] Smith (2023).

CHAPTER 7 EASTERN EUROPE: FROM SDG ASSESSMENT TO POLICY SOLUTIONS

The Sustainable Development Goal (SDG) assessment conducted in this chapter indicates that Eastern Europe has solid foundations in energy access, employment and infrastructure development. However, progress in key areas such as innovation, clean energy and resource efficiency has been slow. Additionally, there has been a strong deceleration of economic growth rates in recent years, calling for targeted interventions to spur industrial competitiveness and bring the region closer to achieving the SDGs by 2030. This chapter presents opportunities for SDG acceleration through digitalization, clean energy production, foreign direct investment (FDI) attraction and regional integration. There is an emerging shift towards more active industrial policy interventions in some parts of the region, suggesting a renewed consensus on the importance of industrial development. However, numerous challenges hamper the successful formulation and deployment of industrial policies. Case studies from the region underscore the importance of collaboration with relevant stakeholders, industrial policy continuity and cross-regional alignment for successful implementation of industrial policy and sustainable growth.

Olga Algayerova

“Each country in Eastern Europe has its unique economic trajectory and challenges, so a wide variety of industrial policy measures is used across the region. It is suffering from global challenges, such as food, energy, climate or debt crises, exacerbated by the economic consequences of the armed conflict in Ukraine. The mid-term review of Agenda 2030 is clear: we are off track with the SDGs. Sustainable economic development requires ongoing reforms, investments in human capital and focus on innovation and entrepreneurship. By focusing on sustainable industrialization, innovation, and inclusive economic growth, Eastern European countries will make substantial progress towards all 17 SDGs.”

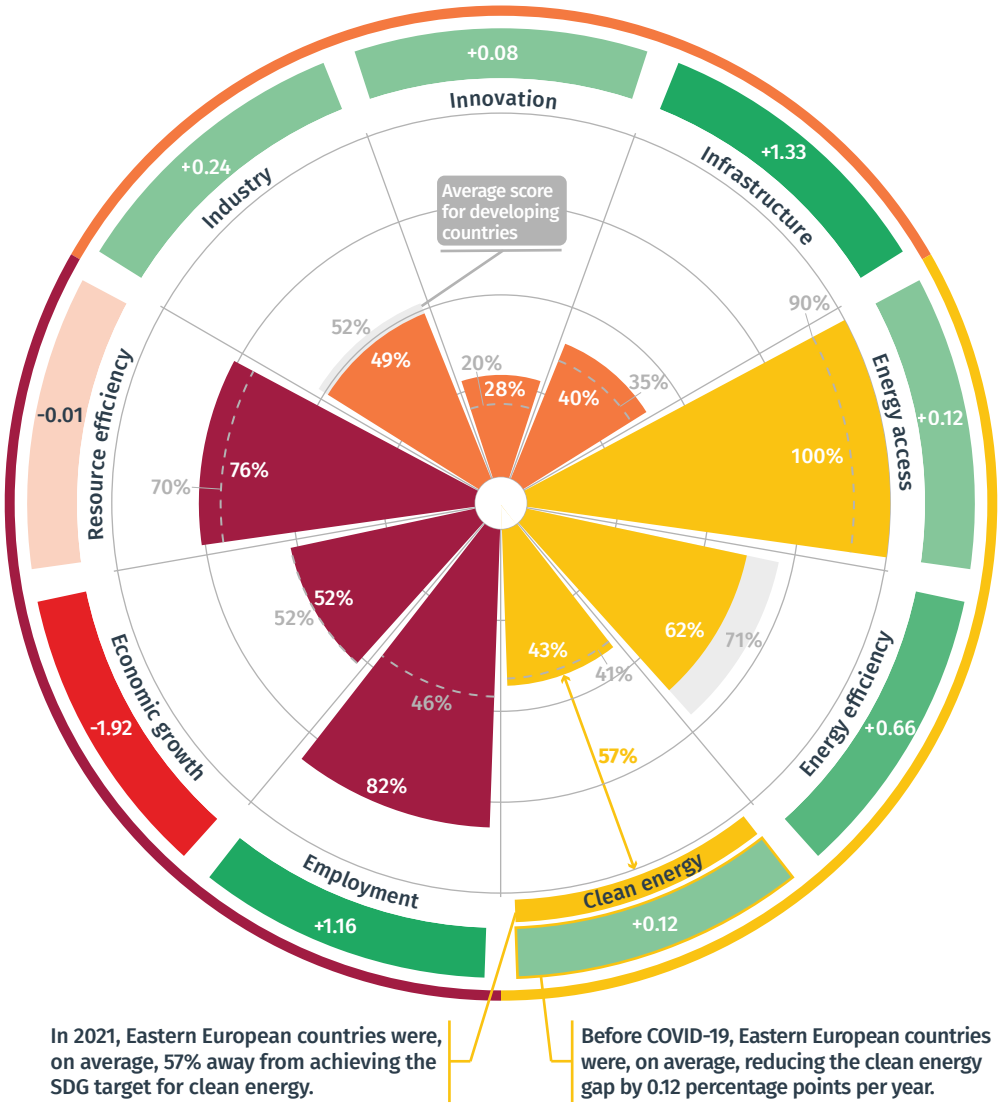
Advisor to the Ministry of Foreign and European Affairs of the Slovak Republic and Former Executive Secretary of the UN Economic Commission for Europe

7.1 SDG ASSESSMENT

7.1.1 The current situation

Eastern Europe is closer to the SDGs 7, 8 and 9 targets than other developing regions. The SDG assessment conducted for this report provides a unique perspective on the region's developmental strides and challenges. Overall, Eastern Europe[1] presents better results than the other developing regions examined. The Eastern Europe SDG assessment demonstrates that in all dimensions except for one, the scores for 2021 are equal to or higher than other developing countries' average (Figure 7.1). Comparisons aside, the assessment highlights a region with solid foundations in energy access, employment and infrastructure development. However, the challenges in economic growth, clean energy and innovation call for strategic attention. Eastern Europe needs to harness its strengths while addressing these gaps with targeted and innovative policy interventions to ensure sustainable and inclusive growth aligned with the SDGs.

Figure 7.1 **Distance to SDG targets: Eastern Europe in 2021**



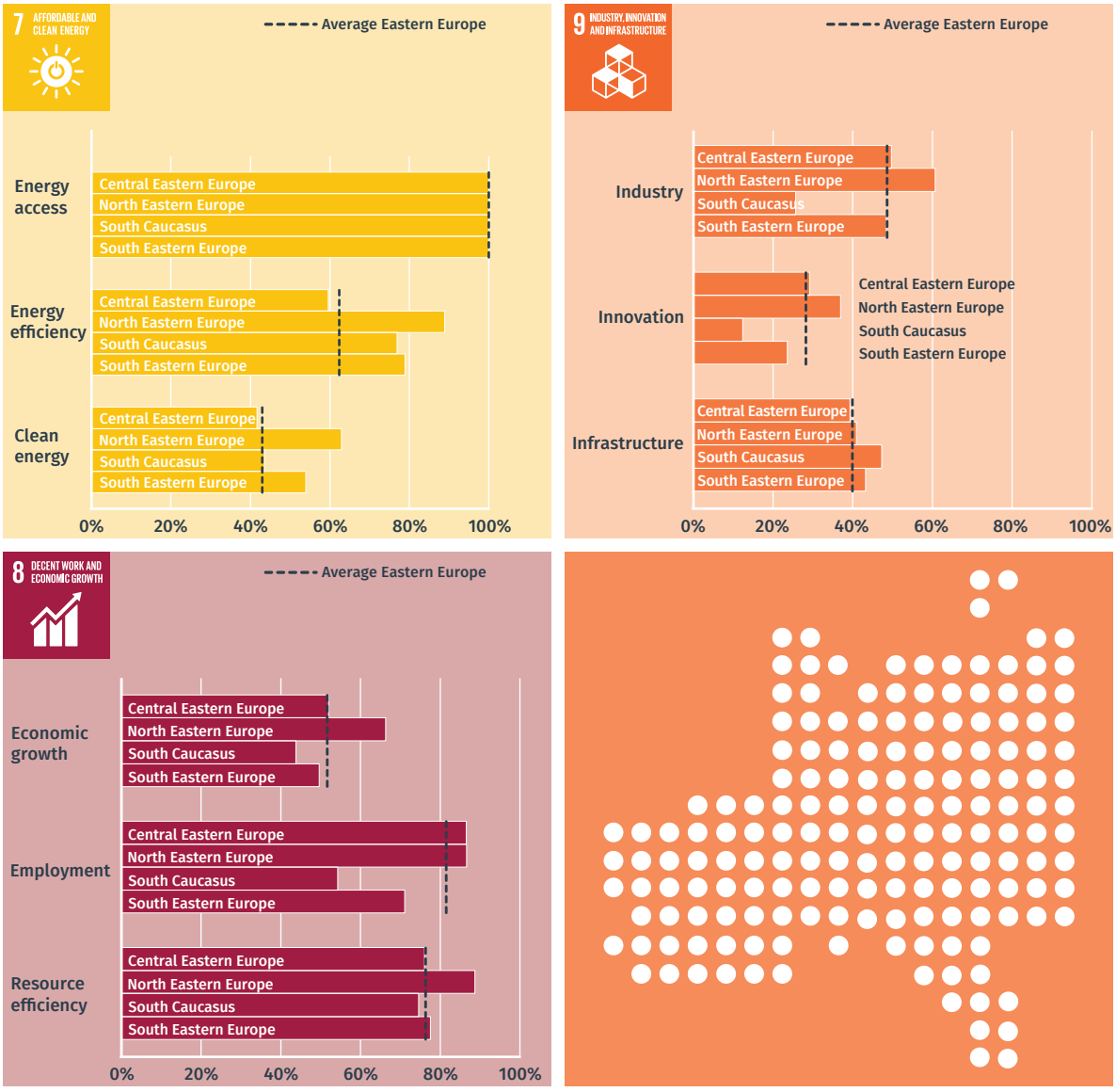
Note: The values represent the average level of SDG target achievement for each dimension in 2021 aggregated at the regional level using population weights. The grey areas show the performance of all developing countries as reported in Figure 3.2. The shaded rectangles on the outer side the figure reflect the average annual convergence speed towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from these in 2009, and then dividing them by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

The region shows a mixed performance for SDG 7, affordable and clean energy for all. Commendable efforts were made in the region in terms of clean energy and sustainable energy sources; however, the gap to the target in 2021 was 57 per cent, highlighting a need for accelerated efforts. The clean energy trajectory during the last decade showed a modest reduction in the gap of 0.12 percentage points per year, suggesting that if the pre-COVID-19 trend continues, Eastern Europe will not reach its clean energy targets by 2030. In stark contrast, energy access in the region has reached the optimal target (100 per cent) and outperforms the developing world's average of 90 per cent. This achievement sets a solid foundation for future development. Slower progress is evident in energy efficiency, where the region scores 62 per cent compared to 71 per cent in the developing world. The speed of convergence in energy efficiency at 0.66 percentage points per year indicates a dynamic progression and demonstrates the need for continued investments and policy focus to realize energy efficiency goals.

Performance in SDG 8 relating to decent work and economic growth presents strengths and weaknesses. The region has a high employment index value of 82 per cent, which significantly outperforms the developing world's average of 46 per cent, and these values are coupled with a highly positive pre-COVID-19 trend.

Figure 7.2 **Assessment of SDGs 7, 8 and 9: how far are different subregions in Eastern Europe from the 2030 targets?**



Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the subregional level using population weights. The dotted lines show the average performance of Eastern Europe, as presented in Figure 7.1.

Source: UNIDO elaboration based on UNSD (2023a).

The data underscore the potential to capitalize on the region's human resources for further development. In contrast, Eastern Europe is witnessing a concerning decline in economic growth. The current gap of 48 per cent to the target is in line with the values observed in other developing regions. This gap, however, grew at almost 2 percentage points per year before the COVID-19 pandemic. The deceleration in economic growth demonstrates the urgent need for economic revitalization strategies to foster sustainable and inclusive growth.

The region shows a promising yet uneven picture under SDG 9 for industry, innovation and infrastructure. Close to the halfway mark to the industrial performance target in 2021, and with a positive pre-COVID-19 trend, Eastern Europe shows strong potential in industrial development compared to other developing regions. In innovation, the region performs comparatively better than the developing world. Pre-COVID-19 trends in both these dimensions suggest stagnant progress over the past decade and indicates ample room for improvement. In contrast, the region's robust annual convergence speed of 1.33 for infrastructure development reflects significant progress and sets a strong foundation for future growth.

7.1.2 Subregional differences

Different dynamics are observed in Eastern Europe. Similar to other regions analysed, Eastern Europe also includes countries at different stages of industrial development and with varying skills and resources. Four subregions are analysed based on their geographical location within Eastern Europe: Central Eastern Europe (CEE)[2], North Eastern Europe (NEE)[3], South Caucasus (SC)[4] and South Eastern Europe (SEE)[5]. The heterogeneity observed across these subregions emphasizes the need for tailored strategies to address each area's diverse challenges and to leverage their unique strengths (see Figure 7.2).

NEE emerges as the regional leader in clean energy and energy efficiency. The 2021 score for the subregion in these two dimensions is 63 per cent for clean energy and 89 per cent for energy efficiency, surpassing the regional average of 43 per cent and 62 per cent, respectively. This robust performance highlights NEE's commitment to sustainable energy practices, and positions it as a potential model for the rest of the region. Comparatively, SEE ranks a close second while the CEE and SC regions lag behind in these dimensions. In 2021, CEE registered a performance of 42 per cent in clean energy, while SC achieved 44 per cent. Energy efficiency achievements in CEE were 60 per cent, while the SC obtained 77 per cent. These indicate room for improvement and call for a more strategic focus on optimizing energy use.

The subregional performance in relation to SDG 8 is nuanced. NEE and CEE exhibited strong employment scores, with both achieving 87 per cent in 2021, indicating a successful mobilization of human resources. In contrast, SC faces significant employment challenges, underscoring the need for targeted job creation policies. Economic growth shows a varied landscape, with NEE leading at 66 per cent, while SC and SEE fell behind the regional average, with scores of 44 per cent and 50 per cent, respectively. In resource efficiency, NEE performs better than the regional average, suggesting a stronger focus on sustainable economic practices.

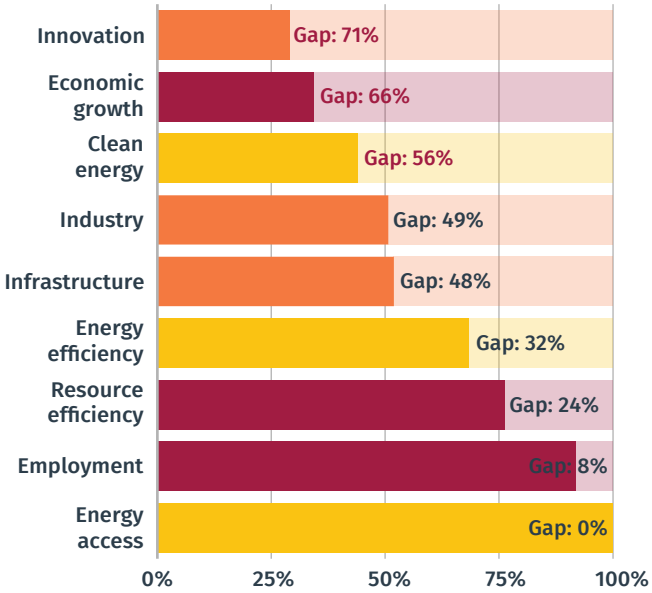
Innovation emerges as a critical area for improvement across all subregions. NEE achieved an above average innovation score of 37 per cent in 2021. The low innovation performance in SEE (24 per cent) and SC (12 per cent) highlights the urgency to foster enabling environments that are conducive to technological advancements and creativity. Industry also exhibits disparities, with NEE leading with a score of 50 per cent, and SC lagging behind with a score of only 26 per cent of the target in 2021. The close alignment in subregional infrastructure development around 40 per cent of the target indicates similar challenges in this area.

7.1.3 Projections to 2030

Projections into the upcoming years reveal critical priority areas for the region. Projecting the achievements of SDGs 7, 8 and 9 by 2030 offers valuable insights into the areas that require immediate attention and strategic focus in Eastern Europe. These projections are based on a "business as usual" scenario, which assumes the continuation of pre-COVID-19 trends without additional interventions to improve performance. The methodology, explained in more detail in Chapter 3 of the report, applies the average annual speed of convergence towards the SDG target observed before the pandemic (from 2009 to 2019) to each year between 2021 and 2030. The exercise reveals that Eastern Europe will not reach half the target value by 2030 in innovation, economic growth and clean energy (Figure 7.3). Making concerted efforts and strategic interventions in these areas is paramount for the region to progress towards the 2030 targets and enhance its overall socio-economic resilience and sustainability.

Innovation emerges as the area requiring the most urgent attention, with a projected gap of 71 per cent. The slow progress in this domain suggests a need for substantial improvements in fostering enabling environments that are conducive to technological advancements and creativity. Policies aimed at strengthening industrial innovation ecosystems particularly around Industry 4.0 technologies, could enhance the region's competitiveness and spur technological catch-up with advanced economies.

Figure 7.3 **Projections and distance to targets by 2030 in Eastern Europe**



Note: The bars show the relative value for each dimension projected for 2030 and are ordered according to the projected distance to the target. Projections are envisioned using pre-COVID-19 trends (average annual convergence speed between 2009 and 2019). The projected gaps greater than 50 per cent are marked in red.

Source: UNIDO elaboration based on the UNSD (2023a).

Slowing economic growth represents a major challenge for the region. The average economic growth rate in Eastern Europe today is similar to that observed in developing countries. If the negative pre-pandemic trends continue in the coming years, the region will have a projected 66 per cent gap from reaching its 2030 SDG target. This result underscores the need for transformative economic strategies to reignite and sustain inclusive growth. Policy actions focusing on revitalizing key industries, enhancing productivity, and fostering market diversification could be instrumental to closing this gap.

Clean energy remains a critical area for Eastern Europe, with a projected 56 per cent gap by 2030. Despite the region's progress in other energy-related dimensions, such as energy access and efficiency, the transition to clean energy sources needs to accelerate. Investments in renewable energy generation and supportive policies for sustainable energy practices will boost the region's industrial development and contribute to environmental sustainability.

Well-crafted industrial policies can help Eastern European countries accelerate progress in these crucial dimensions. The following sections of this chapter will explore how industrial policy can accelerate progress in these priority areas.[6] They will showcase examples of effective policies across the region and focus on some of the opportunities opened up by the megatrends reviewed in Part A.

7.2 INDUSTRIAL POLICY LANDSCAPE

7.2.4 The current landscape

The post-transition period was characterized by market-driven industrialization. During the post-socialist transition period, Eastern Europe developed without actively and strategically using industrial policy instruments. Foreign direct investment (FDI) attraction was the primary policy tool to foster industrial development. Governments offered incentives to foreign investors, and a skilled and cost-competitive labour force resulted in the establishment of several multinational enterprises (MNEs) that set up production in the region. Market forces took the lead in determining which sectors and activities were dominant in the regional economies, resulting in a specialization of assemblers in the manufacturing value chains. While this model catalysed a strong integration of the region (particularly across CEE and parts of SEE) into the global value chain (GVC), achieving certain SDG dimensions (most notably in clean energy, sustained economic growth and innovation) proves especially challenging.

In recent years, Eastern Europe has seen a revival of industrial policy. Since the early 2000s, a gradual shift in the policy from market-driven industrialization to one supported by industrial policy has been observed across Eastern Europe. Currently, the two areas of green and digital transformations, commonly referred to as 'the twin transition', feature heavily on the countries' agendas. The focus on these pillars echoes global developments and represents unique opportunities and challenges for the industrializing economies of Eastern Europe.

Industrial policy implementation continues to be challenging in the region. Having transitioned economic policy from central planning to a market-driven approach, the successful formulation and deployment of industrial policies for improved innovativeness, sustainability and growth continues to represent a formidable challenge. Broad, untargeted policies often dominate industrial policymaking, and institutional shortcomings pose implementation challenges. In some countries, an apprehensive position towards industrial policy prevails. In other instances, overly ambitious industrial strategies with distortive effects hinder successful industrial development. Moreover, as in all developing regions, the industrial policy space is highly constrained by the availability of financing, which remains scarce.

Three salient elements that are shaping current industrial policies are the European Union (EU) initiatives, Smart Specialisation Strategies (S3) and FDI attraction. Industrial policies found in the region are multi-faceted, reflecting a notable diversity in natural, factor and institutional endowments. Given the geographical specificities of the region, the EU plays a major role in setting the tone of industrial policy. On the one hand, industrial policies of Eastern Europe often entail the translation of EU industrial policies into domestic contexts. On the other hand, they also include the conception of national industrial policies. Furthermore, S3 strategies are increasingly being adopted across the region, with the aim of identifying a country's research, innovation and entrepreneurial potentials for building a comparative advantage. Finally, FDI attraction continues to be actively used across the region, although with varied success in terms of targeting FDI that can lead to local upgrading. Focusing on these elements, the following segment will examine the broad use of industrial policies in the region, covering cross-regional, multi-country, national as well as subnational policies.

The EU shapes the industrial policy of a large part of Eastern Europe. While the single market, together with various horizontal policies, have long been regarded as the most effective industrial policy instruments utilized by the EU,[7] there has been a distinct shift towards a more vertical approach to industrial policymaking since the 2010s.[8] This is discernible from the European Commission's latest industrial strategy documents[9], the establishment of the European Innovation Council, the European Green Deal, the European Chips Act, and the changes to the communication on state aid rules related to Important Projects of Common European Interest (IPCEI). These developments partially translate to a more vertical industrial policy approach in Eastern Europe.

The S3 methodology is shaping the national industrial and innovation strategies of most countries in the region. S3 strategies require the state to take on a supporting and collaborative role with other market actors to identify opportunities for specialization that build on existing capabilities and niches. Thereby, the country (or a subnational unit) identifies priority areas that reflect its comparative advantages, and facilitates a constant feedback loop between key actors, including the state, academia and private sector. Bulgaria, Croatia, Czechia, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia are all mandated to set up their S3 as EU member states. Likewise, countries such as the Republic of Moldova, Ukraine and Georgia participate in the Deep and Comprehensive Free Trade Area (DCFTA) and the EU Smart Specialization Platform. While adopting a national S3 strategy is not a precondition for the Western Balkan economies to secure access to the EU Instrument for Pre-accession Assistance (IPA) funds,

all the economies in the SEE region have initiated the integration of S3 into their industrial policies in recent years.

The S3 methodology offers notable potential but is challenging to implement. The experiences with S3 in different parts of Europe reveal that while the strategies offer notable potential, their implementation can be challenging in lagging regions. This is mainly due to the fact that private sector actors are largely absent in the formulation of these strategies, and local institutions lack the technical capabilities to take a leading role in implementing the S3 process. Therefore, arbitrarily defined priority sectors mirror national specializations or those of neighbouring regions, rather than the unique characteristics and strengths of a particular territory. Nonetheless, there are also cases where the S3 strategies have been implemented relatively well, such as in parts of Poland or Czechia (see Box 7.3), which can serve as references for other countries in the region.

FDI attraction has been central in development policies both in the post-transition period and today. Facilitating the accumulation of industrial capabilities, GVC integration and job creation through FDI has been a central aspect of the industrial development strategies of post-socialist transition economies. This has been the case in CEE and SEE, and to a lesser extent in the SC. As such, FDI promotion policies are implemented across much of the region, and are indirectly tied to the countries' industrial strategy. Commonly used instruments include various financial and non-financial incentives, such as creating special economic zones (SEZs), tax breaks and the disbursement of FDI-related subsidies.

FDI attraction policies face limitations, especially when they are not properly integrated into an industrial strategy. FDI-driven industrialization has been particularly successful in advancing convergence and productivity growth in countries that are geographically closer to developed industrial networks. The ability to attract foreign investment remains lower for countries that are further away from Europe's industrial core, or for those where investors perceive political risks as being high. Moreover, the subsidiary-based economic model currently falls short of promoting innovation even in the most industrialized parts of the region. FDI promotion policies in the region are formulated as standalone policies instead of being integrated into a wider industrial strategy. As a result, assembly-type and natural resource-seeking FDI dominates, with very limited links to innovation. Furthermore, spillovers and linkages to the domestic economy remain weak.

Some countries have tried to attract FDI targeted towards specific priority sectors. Recently, there have been increasing efforts to focus on key sectors, but the outcomes have been mixed. For instance, high-tech sectors such as in information and communication (ICT) service centres receive preferential FDI treatment in countries including Czechia, Slovakia, Poland, Bulgaria, Republic of Moldova, Belarus and Georgia in their most recent FDI promotion strategies. However, the effectiveness of these initiatives varies across different regions and sectors.

Other cross-regional and multi-country industrial policy initiatives aim to expand the role of regional supply chains. The Eurasian Economic Union (with members from Armenia, Belarus and the Russian Federation) has its own Industrial Policy Department within its Commission, mandated to eliminate barriers in the industrial sphere and augment regional industrial integration.[10] The case of Armenia suggests that the membership in the Union has primarily benefited sectors such as food processing and textile production, but has had limited impact on sectors of higher technological sophistication.[11]

7.2.5 Differences by subregions

Industrial policy instruments and priorities also differ across subregions in Eastern Europe. The region's industrial policy landscape is diverse, with countries using different industrial policy tools and with varied results. Notably, it is important to distinguish Eastern European EU member states from the rest when examining regional policies.

The role of the EU is most visible in the EU member states. Bulgaria, Croatia, Czechia, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia all operate under the framework of joint EU industrial policy rooted in Article 173 of the Treaty on the Functioning of the EU. This makes regional initiatives a particularly significant component of these countries' industrial policymaking.

EU member states have specific financial instruments and regional initiatives at their disposal. EU regional initiatives are valuable for fostering knowledge and learning from more developed economies. Some of these initiatives connect innovative domestic enterprises to international production networks, heavily focused on the green and digital transitions. One such success story is the participation of Estonia, Poland, Slovakia and Czechia in the IPCEI, which gives these states access to aid and state-of-the-art technology in hydrogen or battery value chains. Other programmes include the Horizon Europe programme and the Recovery and Resilience Facility, which are known as prominent industrial policy tools to advance the SDGs.

Other CEE countries, even if not in the EU, are strongly influenced by the EU when aligning their industrial regulatory frameworks and technical standards. The Eastern Partnership (EaP) adopted a new strategy, setting the agenda for the 2021-2027 programming period. One of EaP's targets is speeding up the adjustment of the industry to structural changes, including green and digital transitions.[12] Currently, Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova and Ukraine are included in the programme. Multiple regional and national-level policy advisory projects are scheduled for the next few years. Among them are the growth from the green small and medium enterprise (SMEs) exports, the creation of skill-sharing networks, and the provision of technical assistance on legislative and regulatory frameworks.

In the last decade, industrial policy use has been more prominent in the SEE countries. Towards the end of the 2000s and during the 2010s, Western Balkan countries began adopting formal national-level industrial policy strategies. Adoption, however, has not always translated into implementation, and the results in terms of instigating genuine structural change are limited.[13]

The influence of the EU is noticeable in the industrial policy formulation process of the SEE countries. Harmonization of industrial policy is an integral part of the EU accession negotiation process currently underway for some Western Balkan countries and is expected for others in the near future. The requirements for candidate countries extend beyond legislative changes. They encompass institutional frameworks, policy development and implementation, capacity development, skills development, and more. Each area is accompanied by benchmarks and criteria that guide and evaluate the candidate country's progress and readiness. The primary objective is to ensure that the candidate country's economic framework and industrial policies align with the EU standards, fostering a competitive and sustainable business environment.

The CEE countries benefited more than other sub-regions from the regionalization of industrial value chains. FDI-driven industrialization has been particularly successful in driving convergence and productivity growth in countries located geographically closer to developed industrial networks. This has been the case for Slovakia, Czechia, Hungary and Poland, where growing MNE presence resulted in them becoming part of the group of the most industrialized countries in Europe. The removal of market barriers for investors following these countries' EU accession, combined with sizable state support given to foreign investors, played a catalytic role.

FDI promotion policies are implemented across the SEE countries but with less success in industrial upgrading. FDI tends to remain untargeted in the Western Balkans, which raises some limitations in the quality of investments received. This is augmented by the lack of accompanying framework conditions in education, infrastructure and capabilities, which limits the prospects for attracting FDI that is conducive to industrial upgrading or structural transformation. Export-focused FDI remains scarce, particularly in more advanced technological domains.[14]

Industrial parks and free economic zones present a growing policy trend in the SC. To attract investors, preferential regimes with customs, tax benefits and simplified permit processes are used. In the case of Azerbaijan, special economic zones and industrial parks form the backbone of the national industrial strategy. Similarly, Georgia operates four major free industrial zones in the country, and Armenia three, though the performance of these zones has so far been below their potential.[15]

7.3 OPPORTUNITIES AND ACTIONS

There are at least four areas of opportunity to accelerate SDG progress in Eastern Europe through modern industrial policy. There are ample opportunities for tapping into the region's potential through improved industrial policy set-up. This section highlights four opportunity areas directly related to the megatrends discussed in Part A: energy transition, digitalization, global rebalancing and regional integration. Industrial policies that harness these opportunities can help accelerate Eastern Europe's progress towards achieving the SDGs.

7.3.1 Energy transition

The region possesses suitable preconditions for producing renewable energy, which remains untapped. The potential for an increase in renewable energy production is reflected by the 57 per cent gap to the clean energy target as of 2021. This holds particularly true for the wind and solar energy sectors, where ample land and favourable climatic conditions provide a good foundation for harnessing renewable resources. In this sense, Eastern Europe can play a pivotal role in the transition of Europe towards a greener and more sustainable energy landscape.

At the present stage, there are significant differences in progress across the region in terms of the SDG 7 target of affordable and clean energy. Some countries, such as Montenegro and Ukraine have taken a clear stance by prioritizing renewable energy production, with Montenegro integrating renewable energy production in its S3 strategy and successfully emerging as an energy exporter (see Box 7.1 and Box 7.2). In other instances, countries have taken a hesitant stance towards the green transition and continue to support and subsidize fossil fuels.

Box 7.1 Ukraine: encouraging private sector investments to achieve the energy transition

Ukraine has significant potential to expand its energy generation from renewable energy resources, including wind, solar, hydropower and biomass. The guiding framework for the current development of the renewable energy sector was defined in 2017 with the adoption of the Energy Strategy of Ukraine-2035. The strategy sets the target for renewable energy production at 12.8 per cent of overall electricity consumption, with a sub-target for hydropower set at 6.7 per cent.

To reach this target, the Government of Ukraine encouraged private sector investments in renewable energy sources by offering generous feed-in-tariffs (FITs) for variable renewable projects without capacity limits. Under the FIT programme, eligible renewable electricity producers are guaranteed a long-term fixed price for all the electricity they generate and supply to the grid. The FIT policy increased the share of renewables in Ukraine's electricity generation mix from 3 per cent in 2009 to 12.4 per cent in 2020. However, the FTIs proved to be financially unsustainable for the Ukrainian budget in the long run. As a result, the FIT rates were reduced several times over the period, and the scheme was put on hold for the deployment of new facilities in 2020.

To address this issue, Ukraine established a framework in 2019 for implementing policies, such as green auctions, to foster competitive conditions

in producing electric power from alternative energy sources. Ukraine's green auctions incorporate pre-qualification requirements to guarantee the participation of genuinely committed bidders. The prerequisites encompass bid bonds, validation of land ownership and an agreement for grid connection. The purpose of the criteria is to lower the possibility of project non-realization and to make fake bids more costly.

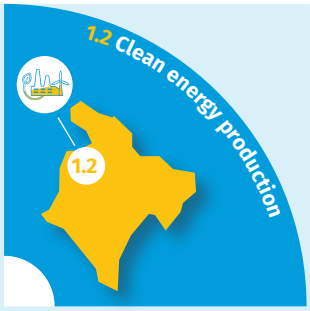
The auction-based system is expected to reduce energy costs through a competitive bidding procedure and constitutes a positive development in the fixed rates of the FITs. In July 2022, the Ukraine National Recovery Plan was approved and outlines a multi-year budget of approximately $130 billion, aimed at achieving energy self-sufficiency and advancing green energy initiatives within the European Green Deal policy.

Source: Background report prepared by Zavarská et al. (2024), building on Anatolitis and Grundlach (2023) and Cahill and Dawes (2022).

The region can benefit from the adoption of a 'mission-oriented' approach to industrial strategy. Under this setting, the SDGs would act as the foundational principle, based on which concrete, measurable targets are formulated in industrial policies.[16] In turn, the approach provides a clear and quantifiable vision of the economy. Furthermore, it proves productive to combine the "carrot and stick" approach by incentivizing sustainable energy production and improved energy efficiency, while at the same time imposing regulations to fight negative externalities caused by a business as usual approach. Given the potential social fallout feared in the heavily fossil fuel-reliant parts of the region, embedding other SDGs (such as SDG 8 – decent work and economic growth) in industrial policymaking can guide the provision of social safety nets for impacted individuals to ensure no one is left behind.

Eastern Europe possesses suitable preconditions for producing renewable energy, which remains untapped.

Box 7.2 Montenegro: gearing economic specialization to become a clean energy hub for Europe



Montenegro's 2018 S3 strategy identifies energy and sustainable environment' as one of the four strategic priorities, with the objective to become recognized as a regional energy hub with high-level use of renewable energy sources. Montenegro's energy generation was mainly based on hydroelectric, with the biggest plants built in the 1960s and 1970s. Since then, the country has seen a significant increase in its renewable energy capacity, particularly over the past ten years. Today, approximately 79 per cent of total electricity generation capacity is derived from renewable sources, ranking the country second in Eastern Europe, just behind Albania. Notably, this percentage substantially exceeds the European average of 54 per cent.

While the share of renewable energy was significant even during the socialist era, this proportion has steadily increased over the past decade. In 2013, renewable sources accounted for 73.7 per cent of the country's electricity capacity, and by 2022, this share rose to 78.8 per cent. This growth is primarily attributed to the development of wind energy, with two new wind farms created in 2017 and 2019. Additionally, solar energy has seen a rise in the last ten years, spurred by the growing interest in photovoltaics.

The expansion of renewable energy did not happen on its own, but rather resulted from active state support. One of the cornerstone policies was the adoption of the Energy Law in 2010, which aimed to harmonize the national energy market with European Union standards. This law introduced significant incentives for renewable energy projects, including FITs, which guarantee fixed, preferential prices for renewable energy producers. These tariffs have driven private investments in wind energy projects and small hydro plants. The government has also streamlined the permitting process for renewable energy projects and provided substantial tax incentives to promote renewable energy sources.

The focus on renewable energy is also evident in some of the most important national strategic documents, including the National Strategy for Sustainable Development, the Directions of the Development of Montenegro 2018-2021, the S3 strategy 2019-2024 and the Energy Development Strategy of Montenegro, which identify energy, sustainable environment and the increase of renewables as one of the key priority sectors and strategic goals for the country. Complementing these strategies, the country has also developed an Action Plan for the implementation of the Energy Development Strategy and a National Renewable Energy Action Plan.

Source: Background paper prepared by Zavarská et al. (2024).

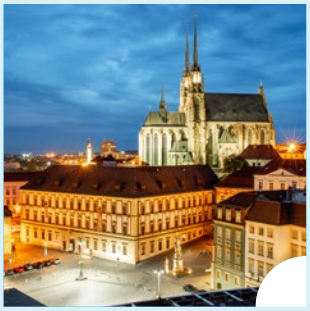
7.3.2 Digitalization

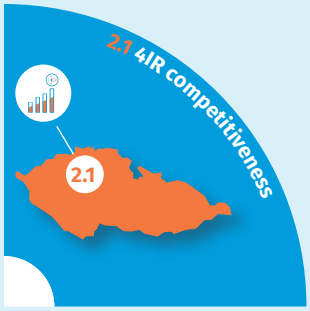
Digitalization offers an opportunity for competitiveness in Eastern Europe. The digital transition presents a promising avenue for advancing regional industrial development by driving job creation (SDG 8) and industrial upgrading (SDG 9). Some parts of the region are performing relatively well in expanding their ICT specialists through higher education, adopting advanced industrial technologies, such as robots in the manufacturing sector, attracting sizable FDI in outsourced IT services, or by cultivating fast-growing digital startups. The concerted policy effort to develop a competitive digital economy in NEE countries such as in Estonia, can inspire other countries of the region. This includes initiatives ranging from digital governance and the use of public procurement to support the IT sector, establishment of a legislative environment conducive to new firm creation, to promoting digital skills through education.

Using the full potential of digitalization requires the strengthening of industrial ecosystems. The region's progress reveals that competitive digital enterprises can emerge even when the economy's digitalization is underdeveloped. Creating an ecosystem around these relatively isolated success stories with a more supportive policy environment can lead to wider socioeconomic wins. Moreover, effectively bridging the ICT sector with regional manufacturers will enhance industrial competitiveness, particularly if linkages to GVCs can be stimulated. The case of the South Moravian S3 strategy in Czechia provides a good example of coordinated policy efforts in digitalization (see Box 7.3).

Advanced digitalization can also create new job opportunities in Eastern Europe. Digitalization can provide more inclusive development, given the flexible employment opportunities linked to the digital

Box 7.3 Czechia: fostering an effective subnational innovation system to drive local employment





The region of South Moravia in south-western Czechia, is home to the second largest city in the country, Brno. In terms of gross domestic product (GDP) per inhabitant (purchasing power parity adjusted), the region reached 90 per cent of the EU average in 2021, a notable increase from 79 per cent recorded a decade prior. The South Moravian economy is characterized by a strong industrial heritage in mechanical and electrical engineering, and by dynamically expanding into new sectors in ICT and biotechnology. In the past years, the region has successfully created an ecosystem conducive to innovation, yielding impressive results and insights for other regions.

The initial impetus to boost the region's innovation capabilities can be traced back to the early 2000s, when the region experienced an economic transition which resulted in high unemployment due to the loss of competitiveness in key manufacturing sectors. Policymakers in South Moravia began to consider ways of supporting endogenous sources of growth to complement the exogenous development model based on FDI attraction. This period coincided with the EU's pilot experimentations with Research and Innovation S3, which were picked up by South Moravia's innovation experts, leading to the formulation of South Moravia's first S3 strategy in 2001.

As part of the first S3 strategy, the South Moravian Innovation Centre (JIC) was founded to support entrepreneurship and the commercial use of research and development (R&D) activities. With around 100 internal experts, linkages to venture capital, and other start-up investors, JIC significantly contributed to fostering a local innovation system to support increasingly complex projects. JIC continues to play a major supportive role in this direction today by offering consultation services, providing financial support to local entrepreneurs from early phases, connecting different actors and encouraging spin-offs from universities. JIC activities also provide "innovation vouchers", which award SMEs with credit to finance the purchase of services from research institutions. Considering that most businesses applying for the vouchers had no prior experience with academia, the policy tool created a bridge between local entrepreneurs and researchers and motivated continued collaboration.

Furthermore, the JIC became responsible for coordinating the implementation of the region's S3 agenda. Since the inception of the S3 approach in South Moravia, five generations of strategies have been formulated, reflecting the region's evolving economic conditions. While the first two S3 focused on motivating the emergence of start-ups, it soon became apparent that a wider take on what comprises an innovation-oriented economy was needed.

sectors. As the Fourth Industrial Revolution (4IR) spreads across the continent, the demand for digital solutions will increase rapidly. Building on its highly skilled labour force, which has a cost-competitive advantage compared to richer countries of the continent, Eastern Europe has ample opportunities to develop export-oriented, knowledge-intensive business services tied to advanced manufacturing models (see Box 7.4).

7.3.3 Global rebalancing

Eastern Europe holds notable potential to be on the receiving end of changing FDI patterns. Integrating FDI promotion objectives into a wider industrial strategy is an opportunity for the region when value chains are gradually being restructured in a way that emphazises geographical proximity. The region lies close to developed industrial networks and large consumer markets, while still offering a cost optimization incentive to investors. Indeed, there is already growing anecdotal evidence of 'nearshored' FDI flowing into the region[17], which can advance industrial development and SDG progress. Still, present value chain structures are very sticky, and decisions to make substantial changes to the status quo are costly and viable only over the long term. Hence, a long-term holistic FDI promotion strategy on the part of the host country will be necessary, aiming to maximize the advantages arising from MNE presence.

Hence, the subsequent S3 strategies focused on areas such as upgrading of R&D infrastructure, augmenting the international competitiveness of public research institutions, attracting FDI, developing nontechnical competencies of firms, and supporting selected domains of specialization around Industry 4.0 technologies (e.g. software and IT services, measurement and sensing devices and equipment, or advanced machines and engineering facilities).

The smart specialization approach has further spurred the establishment of various dedicated incubators and centres for technology transfer at public universities, and the formulation of specific strategic goals. For instance, the most recent S3 strategy (2021-2027) sets the upgrading of activities of MNEs present in the region as one of its core targets, and maps a number of proposed activities and associated performance metrics for this purpose. Collaboration with the regional office of the national investment promotion agency (CzechInvest) further ensures alignment with national programmes. The policy evaluation process in turn considers the fulfilment of the strategic goals themselves, as well as the outputs of individual activities related to the overarching target.

In recent years, the region of South Moravia has become the most knowledge-intensive region in Czechia when considering R&D expenditure as a share of regional GDP, surpassing even the capital region of Prague. The share of employed persons in high-tech sectors has grown notably, presently reaching levels comparable to multiple highly developed Western European regions. Importantly, the initial policy objective to diversify the economic base to encompass innovative domestic firms has been successfully met. Supported by the JIC and the overall policy environment, the region has contributed to the emergence of a number of competitive firms found mainly in the IT services and software, computers, electronic and optical equipment, as well as machinery sectors, which provide solid employment opportunities to the local population. Over the past years, the region of South Moravia, in collaboration with the municipal administration of the City of Brno, has invested around CZK 200 million (ca. $8.7 million) annually in various innovation capacity development policy initiatives.

Naturally, a plethora of challenges remain, including intra-regional economic disparities, scarcity of human capital, underdeveloped infrastructure, outflow of intellectual property and capital, and the lack of systematic and stable collaboration between universities and firms. These require appropriate policy responses going forward. Still, key success factors of South Moravia's subnational industrial strategy can be traced to the long-term commitment of regional and municipal policymakers to instil structural change. Moreover, the application and local adaptation of state-of-the-art innovation policy knowledge through the engagement of local experts contributed favourably. Finally, the collaborative partnership and co-financing of projects between a broad range of relevant local actors, including universities, the regional government, the municipal government and the private sector, creates an efficient feedback loop and displays important characteristics of an entrepreneurial region.

Source: Background paper prepared by Zavarská et al. (2024), building on Matulova et al. (2015) and JIC (2021).

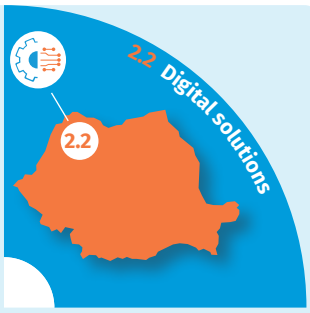
FDI attraction policies can be improved to leverage the presence of MNEs to drive SDG 8 and SDG 9. FDI policies in the region tend to act in isolation from industrial policies, each with its own mandate and agenda, leading to passive membership in GVCs. Perceiving FDI attraction efforts as an indispensable component of industrial policy would lead to a more strategic vision for attracting specific types of investment in preferred sectors and activities. There are opportunities to be found in promoting quality over quantity. In this sense, getting ministries to more effectively communicate with FDI promotion agencies would allow the integration of international and GVC perspectives with the domestic industrial policy perspective. If strategically coordinated with other policies (such as infrastructure, education and innovation policies), FDI can boost a country's domestic capabilities and stimulate SDG 9. The establishment of technology parks to attract high-quality FDI constitutes an interesting instrument in moving towards that direction (see Box 7.5).

Box 7.4 **Romania: aspiring to become the digital hub of Europe**

A promising digital economic landscape is emerging in Romania, which in recent years has been the preferred digital outsourcing destination, attracting FDI from MNEs, such as Oracle, IBM and Amazon. Likewise, a handful of internationally competitive domestic firms have emerged from the country, including the robotic process automation firm UiPath and the cybersecurity firm Bitdefender. ICT activities and services exports are increasingly contributing to GDP growth over the past decade. Similarly, the share of ICT graduates (6.4 per cent in 2022) is higher in Romania than in many Western European economies (the EU average is 3.9 per cent).

The Government of Romania has actively targeted the development of the ICT sector since the early 2000s. The most significant policy intervention was abolishing income taxes for ICT professionals as a tool to mitigate the outflow of high-skilled human capital. Recent studies show that the policy improved the economic performance of firms eligible for tax breaks in the ICT sector (compared to firms in other high-tech knowledge-intensive services). Additionally, it led, to some extent, to the return of Romanian ICT professionals from abroad, precisely around the period of policy implementation. Presently, major ICT clusters are found around Bucharest, Cluj-Napoca and Timisoara.

Despite its success, the ICT promotion strategy also had some shortcomings that can be useful for drawing lessons for other countries of the region. Firstly, the implementation of the tax break for ICT professionals was not accompanied by an evidence-based evaluation mechanism, nor was the programme phasing-out discussed in a strategic manner. In a context of increased budgetary constraints, tax deductions might become more difficult to sustain. Secondly, the lack of coordination with other complementary policies could widen digital divides. For instance, the policy targets the increased prevalence



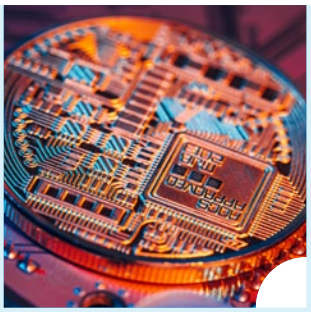
of ICT professionals in the labour market without much-needed accompanying measures to cultivate a wider digital economy.

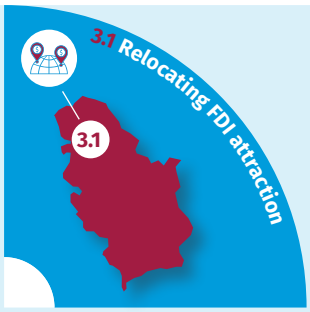
Consequently, low connectivity and lack of digital skills in some regions may increase disparities and polarization between rural and urban areas. Thirdly, the policy relied significantly on MNEs, with only a limited role for domestic players. While a strong MNE presence in the sector has allowed Romania to integrate into global production networks, an industrial strategy ought to simultaneously target spillover and linkages with domestic firms for economic gains to be widespread. This underlines the importance of a dynamic approach to industrial policymaking, whereby policy objectives and instruments are continuously adapted to suit different stages of sectoral development.

Similarly, where highly competitive domestic firms have emerged, the challenge remains in creating an industrial ecosystem around them. In this regard, strengthened local networks between key agents of the innovation system, including universities, firms and regional governments are needed. A promising development in this direction is found in newly emerging multi-stakeholder initiatives, such as the Transilvania Digital Innovation Hub (a member of the European Digital Innovation Hubs Network), which focuses on network creation, skills and financing in the northwestern region of Romania.

Source: Background paper prepared by Zavarská et al. (2024), building on Fan et al. (2019), Manelici and Pantea (2021), OECD (2022b), and Zavarská et al. (2023).

Box 7.5 **Serbia: stimulating domestic investment and innovation through science and technology parks**





Like many other Eastern European countries, Serbia initially based its post-socialist development strategy on attracting FDI. The country was relatively successful and ranked high in the region in terms of FDI inflows as a percentage of GDP. However, over time, it became apparent that most of the foreign investment was in low-tech, low-skill, low-wage and low-value-added sectors. Additionally, foreign companies operated as isolated islands, producing very few spillovers into the rest of the economy. As a result, domestic investment remained low and economic growth did not improve significantly.

To address this issue, Serbia began focusing on attracting innovative, high-tech, high-skill foreign investment, while also trying to stimulate domestic innovation and investment. A key part of this strategy are the science and technology parks, commonly called "technoparks", which the country established in 2015. The Serbian technoparks are modelled after large science and technology parks in other countries, such as the Stanford Research Park in Palo Alto, California, which is part of Silicon Valley. Serbia and Silicon Valley share some similarities with the industrial zones that played (and continue to play) a pivotal role in the FDI attraction policy. Like Silicon Valley, the Government of Serbia provides various benefits to companies that operate in the technoparks, including ready-to-use infrastructure.

Different from the industrial zones, the technoparks target only high-tech companies and prioritize innovation. They provide specialized benefits tailored to the needs of these companies, including access to advanced machinery and facilities, opportunities for research collaboration, networking resources, etc. Furthermore, the technoparks accommodate foreign companies and support domestic ones that make up the majority of stakeholder companies operating in them. They are open to technology development companies and start-ups, further promoting innovation in the country. Finally, the technoparks foster a tripartite partnership between the government, industry and the academic sector, which is not the case with industrial zones that exclude partnerships with academia.

The technoparks were first envisioned in the 2010-2015 Strategy for Scientific and Technological Development, and the Government of Switzerland supported their establishment and operation. Technoparks play a notable role in the latest Serbian industrial policy strategy (2021-2030), where they are mentioned as a key industrial infrastructure facility which the government provides support to facilitate the upgrading of production processes in the country.

The first park was established in 2015 in Belgrade through a collaboration between the Government of Serbia, the City of Belgrade, the University of Belgrade, with support from the Government of Switzerland. Around $15 million has so far been invested in the park, making it the most developed park in the country with the largest number of companies. It currently hosts around 90 companies, 50 start-ups, 40 growing companies, and a business incubator. These companies specialize in diverse fields such as artificial intelligence, green technology, Internet of Things, agricultural and food technology, robotics and automation, medical technology and pharmaceuticals. Most companies are domestic, but there are also foreign companies that typically locate their R&D centres in the park while keeping their production facilities close by.

Building on the success of the Belgrade technopark, three additional parks were subsequently opened in Novi Sad, Niš and Čačak. The Novi Sad park hosts 20 start-ups, 15 technology development companies and the National Institute for Artificial Intelligence, whilst the Niš technopark hosts around 20 start-ups and 18 technology development companies. The Čačak technopark is the smallest and hosts 15 companies. The government has also announced plans to open a new park in Kruševac and expand the parks in Niš and Čačak.

The Belgrade technopark's website states that in 2020, the companies operating there exported to more than 40 countries and generated half of their revenue abroad. In the context of global reshoring trends, where companies are increasingly looking to bring production and services closer to their primary markets or home countries, technoparks can help countries in Eastern Europe capitalize on this trend. By offering a supportive environment for innovation and development, they appeal to technologically advanced companies for which the value of a supportive network and a dynamic ecosystem often outweigh the importance of lower production costs.

Source: Background paper prepared by Zavarská et al. (2024).

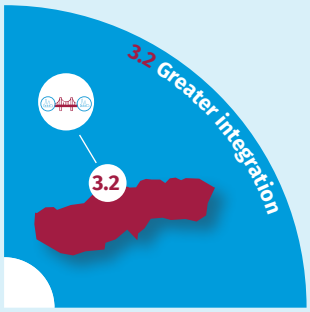
7.3.4 Regional integration

Cross-regional industrial policy initiatives can help stimulate domestic capabilities and drive innovation. With a projected gap of 66 per cent to the target by 2030, economic growth presents a major challenge for the region. Policy actions focusing on revitalizing key industries, enhancing productivity and fostering market diversification could be instrumental in closing this gap. Leveraging cross-country industrial policy partnerships can enable knowledge transfer, technology diffusion and access to larger markets, propelling industrial growth and competitiveness among the less developed members.

Eastern Europe can leverage its closeness to the EU to be strategically inserted into regional supply chains, leading to the transfer of technology and best practice. While state aid rules and competition policy prevent the full use of industrial policy levers, EU membership and candidate status can be utilized for accelerated industrial development and innovation. Promoting greater representation in joint research networks, and striving for the more effective use of EU funds to finance the transition towards the SDGs are particularly important. This is all the more so in the present age, when the EU has been taking a more assertive stance towards industrial policymaking and expanding the financial and policy space dedicated to industrial policy. Box 7.6 illustrates this type of opportunity for Slovakia's engagement with the EU IPCEI initiative.

Multilateral development banks can foster deepened regional cooperation in industrial policy. In addition to supporting the financing of industrial development projects, platforms for sharing best practices, conducting feasibility studies for investment projects, and providing expertise in areas such as renewable energy, digitalization and sustainable manufacturing are also beneficial for regional cooperation. Notably, multilateral development banks can support regional governments with technical assistance concerning best practices and the set-up of institutions, all conducive to sustainable and innovative industrial development.

Box 7.6 **Slovakia: linking up to regional industrial policy initiatives for value chain upgrading**



Slovakia is deeply embedded in cross-border production networks and has a wide presence of MNEs, particularly in the automotive and electronics sectors. However, spillovers to the domestic economy have been limited and as such, the positive impacts of GVC integration resulting from FDI have been fading.

To achieve SDG 9, moving towards higher value added economic activities and improving the country's innovation capacity is needed. The country's recent commitment to participate in regional industrial policy initiatives might support this type of upgrading. As Slovakia has a small domestic market, scarce financial and human resources, and an underdeveloped national innovation system, the intensified involvement of the country in international research collaboration networks can help spur knowledge and technology absorption.

Such framework initiatives are particularly abundant in the EU context. The flagship policy instrument, Horizon Europe, will allocate over $100 billion from 2021 to 2027 to fund excellent research and innovation in the EU. In addition to boosting the EU's competitiveness, a core objective pursued by this programme is the facilitation of cross-country collaborations and the achievement of the SDGs. Through the IPCEI, EU member states can support projects that would otherwise be underfunded (if left to the market), and have the potential to contribute to the region's industrial competitiveness. The IPCEI represents a major vertical industrial policy instrument of the EU, as eligible research, innovation and infrastructure projects in targeted sectors (e.g. hydrogen technologies, batteries and microelectronics) are entitled to direct subsidies from member states without being limited by the EU's competition policy. These projects are grouped into value chains to connect companies so they can exchange experiences and collaborate.

Yet, these industrial policy frameworks are rarely picked up by the less economically advanced parts of the EU, reflecting the differing capabilities of individual member states. The degree of uptake of EU framework programmes is highly correlated with a country's economic strength. This challenge also applies to Slovakia.

Slovakia has recently adopted several policies targeting increased economic participation after recognizing that without public support, it is difficult to reap the benefits offered by EU initiatives, such as Horizon Europe and IPCEI. The policies aim to stimulate the participation of Slovak institutions in cutting-edge projects within the EU framework programmes, which allows Slovak researchers and companies to participate in an international consortia and support the enhancement of the long-term potential of Slovak science, research and innovation. Slovakia's Recovery and Resilience Plan explicitly sets out the promotion of international cooperation and involvement in Horizon Europe and IPCEI projects as one of the main investment priorities.

This policy design illustrates the importance of harmonizing and aligning national strategies and efforts to EU-wide priorities. In turn, the EU strategies offer promising opportunities to enhance the positioning of Slovak entities in emerging European value chains and cross-border partnerships. Cultivating a conducive international network is particularly important for small, open economies. The alignment of priorities across these different geographic layers of industrial policy allows the pooling of scarce resources towards the same goal, and the effective use of shared European infrastructure and learning from more advanced economies.

Through its newly established innovation agency (VAIA), Slovakia has introduced measures such as financial and technical assistance to top-up research financing (from Horizon Funds), and assist the application process and matching of grants. When it comes to IPCEI, promising cases are emerging. So far, a number of firms originating from Slovakia have successfully joined the research consortia focused on state-of-the-art value chain development, including two firms in the field of hydrogen, four firms in battery system development and production, and four firms in microelectronics and communications technologies. In addition to these direct participants benefitting from international collaboration, IPCEI engages with a range of innovation system actors, particularly local and foreign universities. Furthermore, the public support channelled to IPCEI is anticipated to spur private investment in R&D.

Source: Background paper prepared by Zavarská et al. (2024), building on Landesmann and Stöllinger (2020), Plan Obnovy (2021), OECD (2022b), VAIA (2022) and Zavarská et al. (2023).

7.4 LESSONS LEARNED FROM EASTERN EUROPE

Despite being ahead of other developing regions, Eastern Europe needs to accelerate SDG progress in certain areas. Eastern Europe presents better results than other developing regions examined in achieving SDGs 7, 8 and 9. In all dimensions but one, the scores for 2021 are equal or higher than other developing countries' average. Comparisons aside, the assessment stresses that by 2030, the region will be far from the targets related to economic growth, clean energy and innovation.

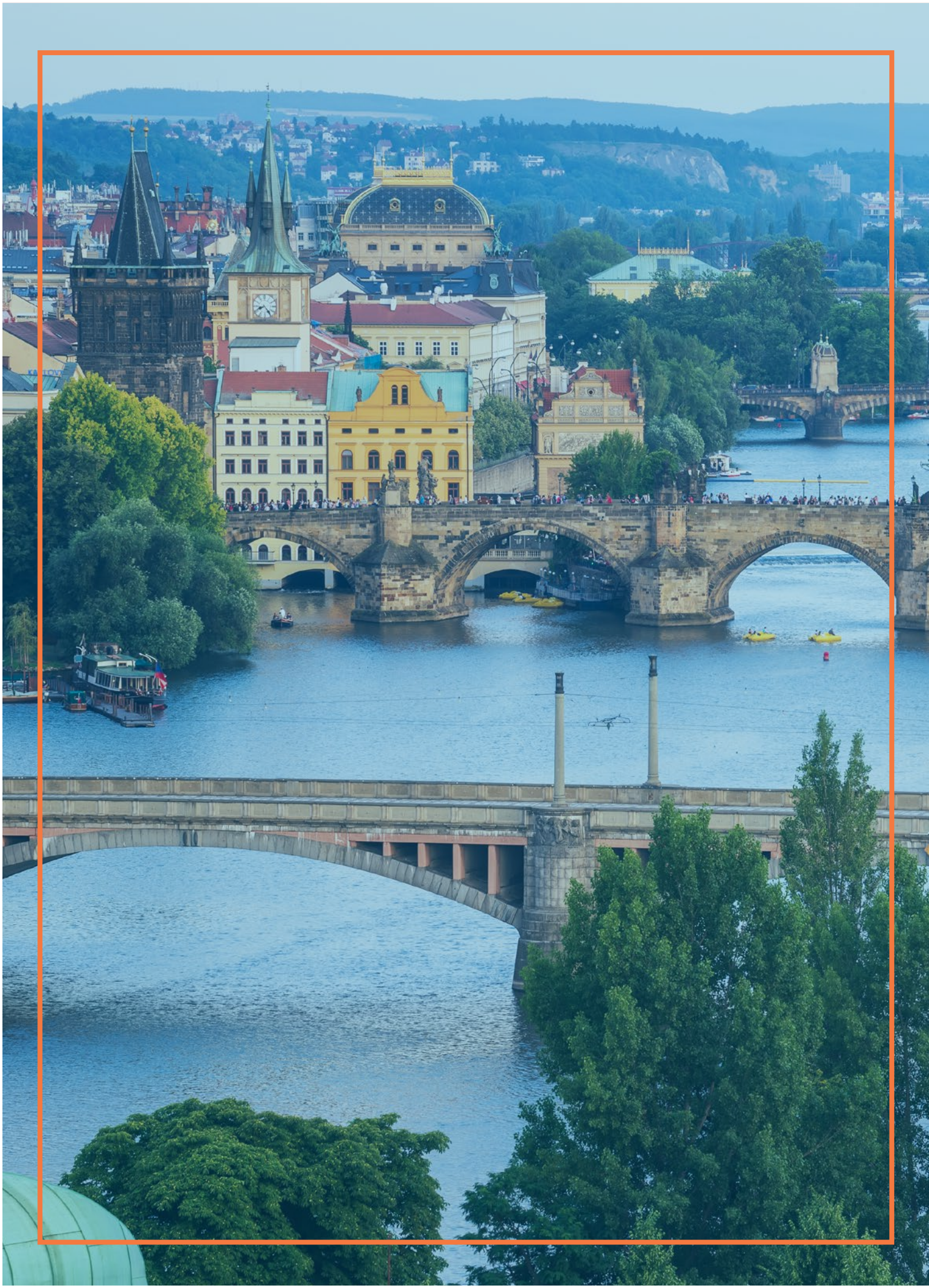
Targeted industrial policy efforts can help accelerate progress in the region. To accelerate the region's progress towards SDG dimensions, Eastern Europe, like all other developing regions, needs effective industrial policy efforts. The emerging shift towards active industrial policy interventions in some parts of the region points to a renewed consensus around the importance of industrial development. Numerous challenges still hinder the successful formulation and deployment of industrial policies conducive to SDG attainment.

Industrial policy continuity is a key ingredient of success, although often elusive in the region. One major obstacle is the continued apprehensive stance towards industrial policy. Therefore, cultivating wider societal consensus in Eastern Europe regarding the usefulness and need for industrial policy represents a foundation for success in modern industrial policy. While increased discussions around industrial policy in Europe are translating into greater policy awareness, the political will to move away from predominantly broad, untargeted policies is still needed. At the same time, political will with a firm commitment to institutional capacity development and industry improvements should aim to mitigate the risks of distortive, inefficient policies.

Governments need not and should not do this alone. Collaboration with relevant stakeholders is vital for a successful industrial policy set-up. As the cases of Serbia's technoparks (see Box 7.5), or South Moravia's innovation landscape (see Box 7.3) have shown, good practices emerge when academia, private firms and the public sector all come together to pursue shared objectives.

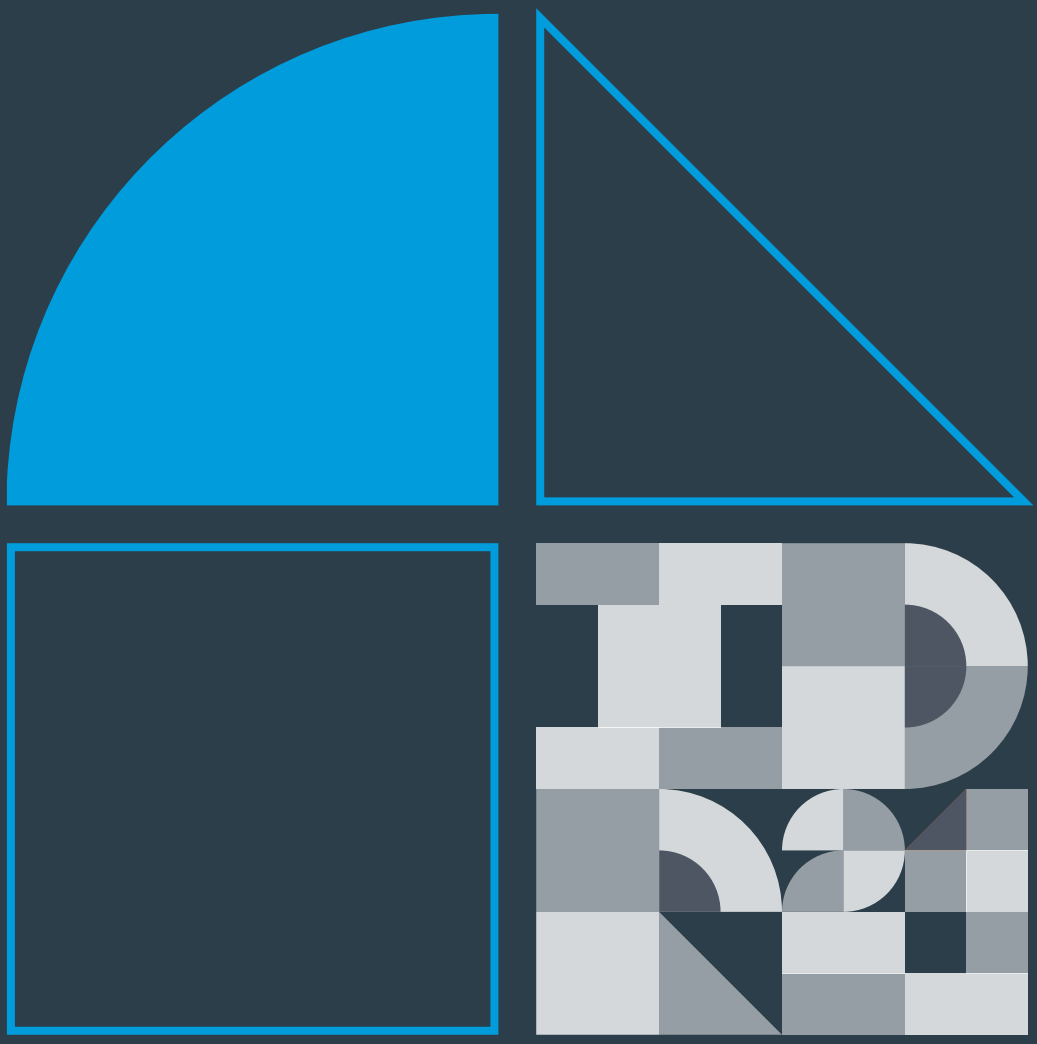
Industrial policymaking in a globalized world can benefit from international collaboration and regional coordination. This is particularly relevant for Eastern Europe, given its tight embeddedness with other economically advanced European countries, whether through EU membership, candidate status or close trade and investment linkages. Participation in cross-regional industrial policy initiatives with countries of different development levels can stimulate learning, augment domestic capabilities and drive innovation. Therefore, seeking the alignment of priorities across different geographic layers (i.e. supranational, national and subnational) of industrial policy allows for the pooling of scarce resources towards the same goal, and makes effective use of shared infrastructure (as exemplified by the recent progress in Slovakia documented in Box 7.6).

If industrial policies are to bring Eastern Europe closer to achieving the SDGs, then the SDGs need to be recognized as the end goal of industrial policymaking. Certain Eastern European countries have already made some strides in integrating ecological objectives into their industrial strategies (such as in the case of Montenegro documented in Box 7.2), representing a good starting point. From a "mission-oriented approach", the success of an industrial policy would be evaluated from the lens of bringing the country closer to the SDGs, and various conditionalities and incentives could be implemented to steer policymaking towards the desired social and economic outcomes.

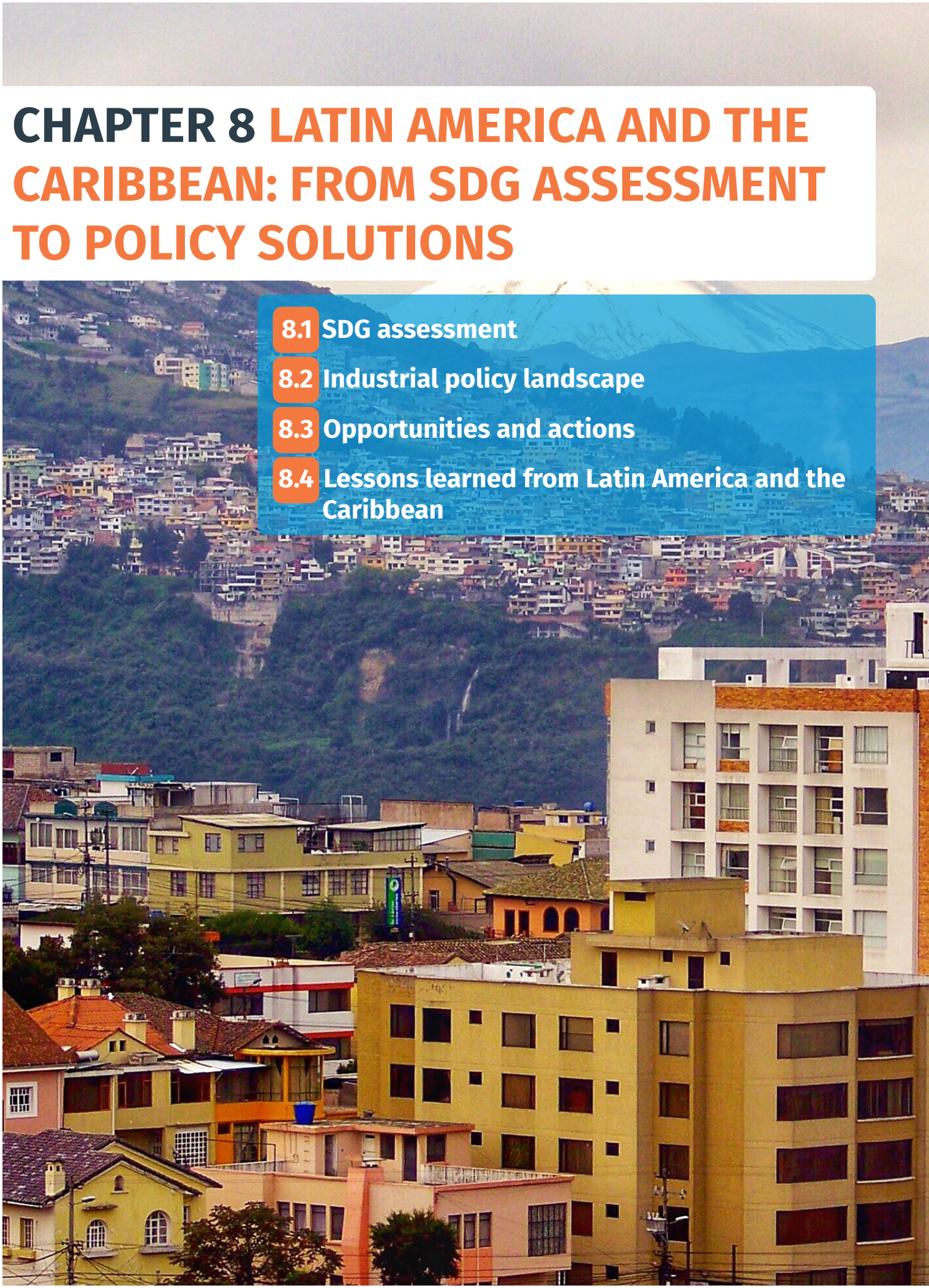


ENDNOTES

[1] The analysis of this chapter focuses on all Eastern European States listed in the corresponding United Nations regional group of the General Assembly (see https://www.un.org/dgacm/en/content/regional-groups).
[2] CEE includes Belarus, Bulgaria, Czechia, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia and Ukraine.
[3] NEE includes Estonia, Latvia and Lithuania.
[4] SC includes Armenia, Azerbaijan and Georgia.
[5] SEE includes Albania, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia and Slovenia.
[6] Sections 7.2 and 7.3 build on the background report prepared by Zavarská et al. (2024) and regional consultations organized with UNIDO Member States and regional experts in June 2023.
[7] Terzi et al. (2022).
[8] Peneder (2017).
[9] European Commission (2020, 2021).
[10] Eurasian Economic Commission (2018).
[11] Zabanova (2019).
[12] European Council (2022).
[13] Jovanović and Vujanović (2023).
[14] Hunya et al. (2017).
[15] Zabanova (2019).
[16] Mazzucato and Rainer (2023).
[17] Jovanović (2021).



CHAPTER 8 LATIN AMERICA AND THE CARIBBEAN: FROM SDG ASSESSMENT TO POLICY SOLUTIONS



The assessment of progress towards achieving Sustainable Development Goals (SDGs) 7, 8 and 9 in Latin America and the Caribbean (LAC) reveals mixed results. Although LAC's performance in energy-related SDG targets is positive and surpasses that of other developing regions, the region lags behind in socioeconomic targets related to economic growth and job creation (SDG 8). One major reason for this is the underachievement in SDG 9 dimensions, which are related to industry and innovation, the two engines of economic development. LAC is the only region where the gap in SDG 9-industry has been rising over the past decade, suggesting premature deindustrialization. Targeted actions are needed to reverse this trend while simultaneously promoting other SDGs. This chapter explores how industrial policy can support this process and showcases examples of effective policies across the region, focusing on opportunities related to energy transition, digitalization, global rebalancing and the growing demand for food and well-being. The policy cases reviewed in this chapter highlight the importance of establishing long-term policies to mitigate seasonal fluctuations influenced by political cycles. This, in turn, requires strong capacity to design policies and mobilize relevant stakeholders.

Rebeca Grynspan

"There is no development without a diversified economy and without industry – in the ample sense of the word. In this new era of globalization, with industrial policy and open regionalisms on the rise, Latin America and the Caribbean has a great opportunity to diversify its economic structure and achieve the SDGs. However, there is great uncertainty in this new era, as rapid changes are putting in danger the rules-based international trade frameworks on which small and medium-sized countries depend. Deepening the intra-regional integration of Latin America and the Caribbean is undoubtedly an important pillar required to navigate this uncertainty, and a long overdue project in the region."

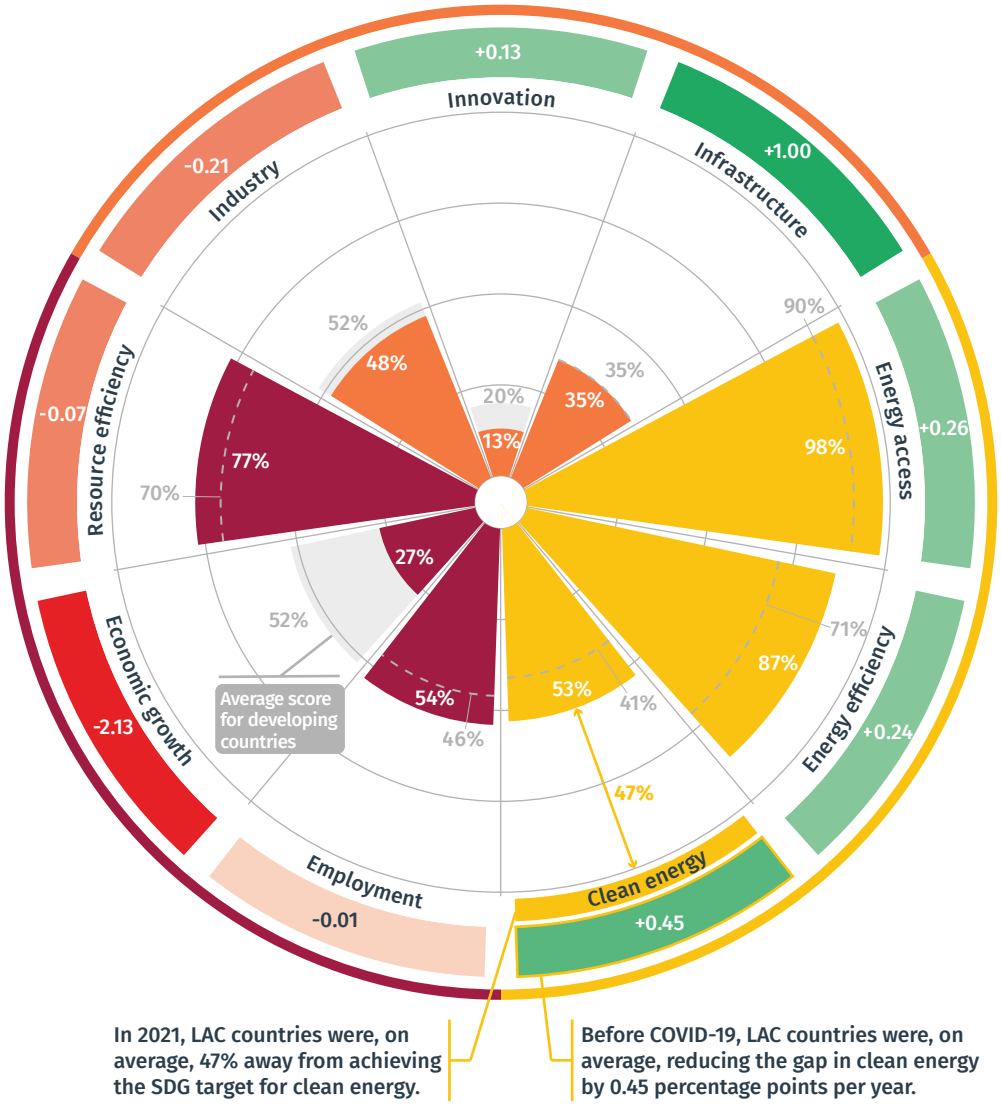
Secretary-General of United Nations Conference on Trade and Development (UNCTAD)

8.1 SDG ASSESSMENT

8.1.1 The current situation

The assessment of progress towards achieving SDGs 7, 8 and 9 in LAC[1] reveals mixed results with significant challenges ahead. LAC has made commendable strides in clean energy deployment and showcases a strong commitment to sustainable practices. The region is close to universal energy access to universal energy access is noteworthy and must be sustained. However, the region's performance in industry-related targets under SDG 9 indicates a trend of premature deindustrialization. This highlights the urgent need for targeted actions to reverse this trend while promoting other SDGs. Stagnant progress in employment and the sharp decline in economic growth stress the urgent need for transformative policies.

Figure 8.1 **Distance to SDG targets: LAC in 2021**



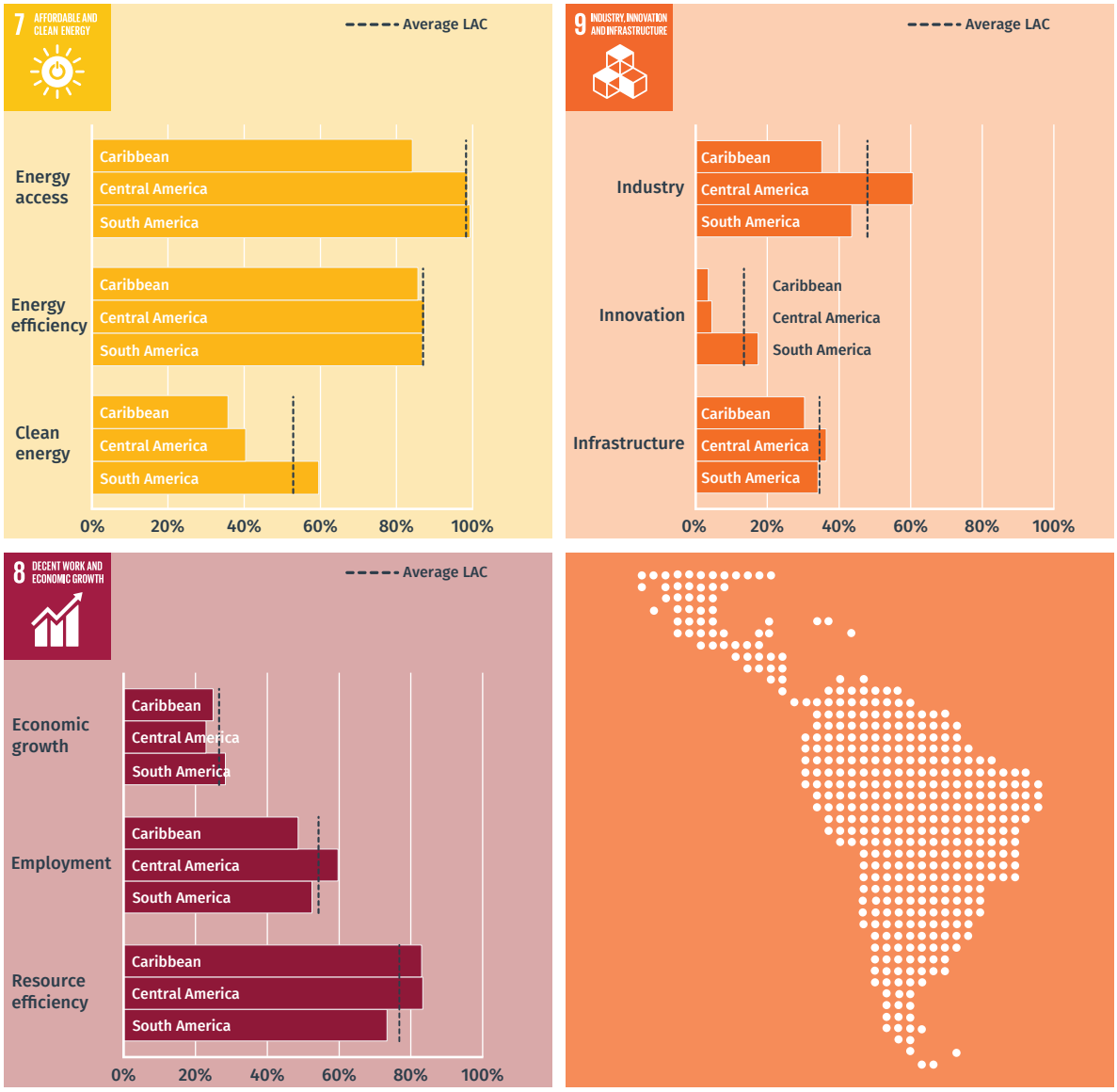
Note: The values represent the average level of SDG target achievement for each dimension in 2021, aggregated at the regional level using population weights. The grey areas represent the performance of all developing countries. The shaded rectangles on the outer side of the figure reflect the average annual convergence speed towards the target in the decade before the COVID-19 pandemic. This is calculated by subtracting the index values in 2019 from those in 2009, and then dividing the result by ten years.

Source: UNIDO elaboration based on UNSD (2023a).

The performance of SDG 7 in LAC presents a positive outlook. The region outperformed developing countries in the three dimensions of this goal, particularly in clean energy and energy efficiency. By 2021, the region had almost achieved universal energy access, a commendable milestone reflecting a solid commitment to sustainable energy practices. Despite improvements, the analysis shows that the transition to clean energy requires accelerated efforts to meet future demands.[2] While positive, the region's trajectory in this respect calls for more vigorous initiatives to bridge the remaining gap, which will be far from the target achievement in 2030, if the pre-COVID-19 trend is not accelerated.

The situation regarding SDG 8 is less optimistic and indicates deeper underlying challenges. Economic growth in LAC has been low, with only 27 per cent of the target achieved almost by 2021. This is particularly striking compared to the average performance of developing countries, which stands at 52 per cent of the economic growth target. The negative convergence speed (the annual gap increase of 2.13 percentage points) before COVID-19 suggests that these challenges existed before the pandemic began. These results underline the specific challenges LAC faces in fostering sustained and inclusive growth, and indicate that urgent, targeted actions are required in the region to reignite economic activity.

Figure 8.2 **Assessment of SDGs 7, 8 and 9: how far are different subregions in LAC from the 2030 targets?**



Note: The values represent the average level of SDG target achievement for each dimension in 2021 aggregated at the subregional level using population weights. The dotted lines show the performance of LAC as presented in Figure 8.1.

Source: UNIDO elaboration based on UNSD (2023a).

There is a pressing need for initiatives to create quality jobs. In terms of employment, LAC outperforms its developing counterparts in other regions. It achieved a score of 54 per cent in 2021 compared to 46 per cent in developing countries. The slow progress towards the target before the pandemic suggests the need for transformative economic strategies that foster job creation and address structural problems in the region.[3]

The persistent levels of informality and gender polarization in LAC hamper improvements in job quality. The structural heterogeneity of LAC economies, that is, the coexistence of a small number of dynamic industries with many low-productivity sectors, creates high levels of informality in the region's labour markets. This leads to highly segmented access to quality employment and social protection.[4] Moreover, strong gender polarization exists in LAC labour markets. Although significant progress has been made since the 1960s, with the participation rate of women in the labour force increasing from around 20 per cent to over 60 per cent in the early 2010s, the pace of growth has slowed down in the last decades, and the LAC gender gap of almost 25 per cent is among the world's largest. This scenario worsens in technology-intensive jobs and leadership positions, because women tend to be employed in lower-paying and lower-quality jobs compared to men due to occupational and educational segregation.[5]

SDG 9 presents the largest gaps in the region's performance. In 2021, the gap to the targets across all three dimensions of SDG 9 was higher than 50 per cent. The region's innovation performance is particularly low at only 13 per cent of the target, 7 percentage points behind the average of all developing countries. In the case of industry, the average score is closer to the developing country average. However, the pre-COVID-19 trends were negative, indicating that the gaps were increasing.[6] These disparities highlight the urgent need for LAC to intensify its focus on fostering innovation and supporting industrialization. This is crucial not only for meeting the SDG targets but also for ensuring that the region keeps pace with the developmental strides in other regions.

8.1.2 Subregional differences

Aggregate results mask important differences in the region. The analysis shows that varying performances and trends are visible between the Caribbean[7], Central America[8] and South America (Figure 8.2).[9] Each subregion's unique political, economic and social dynamics play a crucial role in their journey towards achieving SDGs 7, 8 and 9. Such specificities need to be considered when designing and implementing policy actions.

Progress towards SDG 7 is the most homogeneous across subregions. South America leads in clean energy, with a target achievement of 60 per cent in 2021, which is higher than the region's average of 53 per cent. As sustainability is increasingly valued, this progress could position South America as a leader in this field. Conversely, with a lower performance, Central America (at 40 per cent) and the Caribbean (at 36 per cent) present a slower pace in clean energy adoption, highlighting the need for more aggressive policy initiatives and investments to catch up with regional and global sustainability trends. On the other two dimensions, all subregions showed a similar performance with high levels of achievements in terms of both energy access and efficiency.

Performance in SDG 8 reveals more diverse outcomes across LAC. Central America has a target achievement of 60 per cent in employment performance, which is 5 percentage points higher than the regional average, however, these figures contrast with its economic growth trajectory. This suggests that although jobs may be available in these countries, the quality and sustainability of economic development might be areas to address. Similarly, South America struggles with employment and resource efficiency compared to the entire region, whereas the Caribbean shows good performance in resource efficiency but lags in employment. These patterns demonstrate the urgent need for policies to stimulate economic activity, ensure the efficient use of resources, and to translate these factors into productive and inclusive employment opportunities.

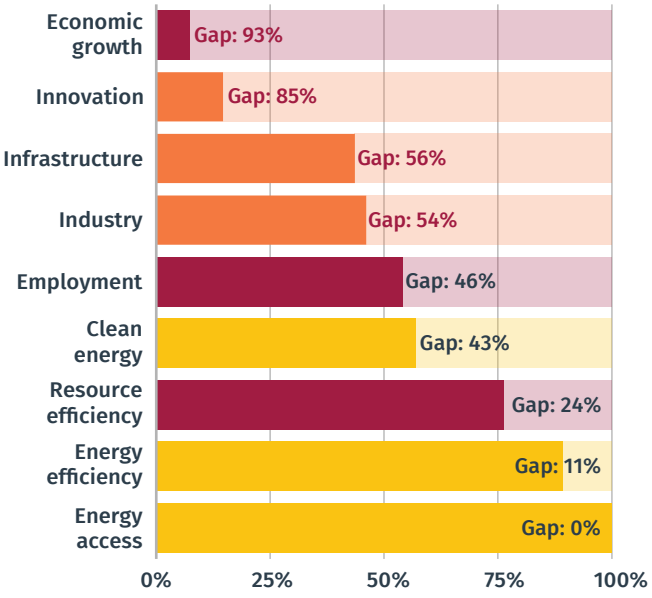
There are different trajectories in terms of industry and innovation targets. The low innovation performance across all subregions, particularly in the Caribbean and Central America, both at 4 per cent of the target achievements, indicates a significant lag in innovative solutions. This gap has profound implications for the subregion's capacity to adapt to rapidly evolving global technology and could hinder long-term economic competitiveness and growth. While South America shows better performance in innovation, the overall trend suggests a region-wide urgency to foster environments that nurture technological advancements and innovation. The opposite is true for industry-related targets. Notably, Central America shows a clear lead at 61 per cent of target achievement, which is 13 per cent higher than the LAC average. These data are primarily influenced by Mexico's strong industry. The subregion's industrial performance would stand at around 41 per cent if Mexico were excluded from

Central American data, indicating that other countries in the region face significant challenges in catching up. The close alignment in terms of infrastructure across the three subregions demonstrates comparable levels of progress in line with the regional average of 35 per cent of target achievement. It also suggests potential similarities in the policies, priorities and challenges countries have experienced.

8.1.3 Projections to 2030

Projections into the upcoming years reveal critical priority areas for the region. Projecting the achievements of SDGs 7, 8 and 9 by 2030 offers valuable insights into the areas that require immediate attention and strategic focus in LAC. These projections are based on a "business as usual" scenario, which assumes the continuation of pre-COVID-19 trends without additional interventions to improve performance. The methodology, explained in more detail in Chapter 3 of the report, applies the average annual speed of convergence towards the SDG target observed before the pandemic (from 2009 to 2019) to each year between 2021 and 2030. This exercise highlights the urgency for LAC to prioritize economic growth, innovation, infrastructure and industrial development (Figure 8.3).

Figure 8.3 **Projections and distance to targets by 2030 in LAC**



Note: The bars show the relative value for each dimension projected for 2030 and are ordered according to the projected distance to the target. Projections are based on pre-COVID-19 trends (average annual convergence speed between 2009 and 2019). Projected gaps greater than 50 per cent are marked in red.

Source: UNIDO elaboration based on UNSD (2023a).

Accelerating economic growth is a top priority for LAC. Economic growth is projected to have a staggering 93 per cent gap by 2030, indicating that without significant policy changes or interventions, the region is expected to fall considerably short of the SDG target. This underlines a pressing need for transformative economic policies to reignite and sustain growth more inclusively and equitably.

Technological gaps should be addressed to fuel economic growth. Innovation, with an expected gap of 85 per cent, emerges as another crucial area requiring urgent attention. Innovation drives economic growth, enhances competitiveness and facilitates sustainable development. The projected gap highlights a significant delay in the region's ability to generate and adopt new technologies. This emphasizes the need for policies that foster innovation ecosystems and entrepreneurship, support research and development (R&D), and enhance education and skills for the Fourth Industrial Revolution (4IR).

Framework conditions should be built to sustain industrial development and growth. Infrastructure, with a projected gap of 56 per cent, is also a key area to be addressed. Robust infrastructure supports industry, enables innovation and facilitates overall economic development. Countries in LAC can expand their infrastructure development to attract foreign direct investment (FDI) that may relocate to the region due to changes in the global production structures.

There is a need for strategic shifts in LACs future industrial strategies. The SDG assessment conducted for LAC suggests that policymakers in the region need to prioritize actions for economic growth, innovation, infrastructure and industry to bridge the significant gaps expected by 2030. This requires a recovery of pre-pandemic trends and a strategic shift towards more impactful and targeted interventions to accelerate progress in these critical areas. Without significant and targeted interventions in these areas, the region risks stagnation in industrial growth, technological advancements, and robust economic development.

The scope and ambition of future industrial strategies depend on the current industrial policy landscape and the emerging opportunities for the region. The following sections of this chapter describe the region's current industrial landscape and explore how industrial policy can accelerate progress in these priority areas.[10] These sections will showcase effective policies across the region and focus on the opportunities brought about by the megatrends discussed in Part A.

8.2 INDUSTRIAL POLICY LANDSCAPE

8.2.1 The current landscape

During the last 30 years, three policy approaches prevailed throughout the region. In Brazil, Mexico and some Caribbean countries, governments continued to design industrial policies which were often presented as policy agendas to be implemented in negotiations with the private sector. These agendas often included a set of policy objectives and policy instruments with little consideration for quantitative goals and the financial resources allocated to such efforts. Policies to improve economic competitiveness prevailed in the Andean countries, Central America and the Dominican Republic. As competitiveness is desirable in any sector, policies spanned beyond manufacturing. In these subregions, competitiveness was often promoted by developing local clusters or through negotiations between the government and private firms. The aim was to resolve bottlenecks in production chains. Finally, in some countries, particularly in the Southern Cone, the policy approaches focused on encouraging firms to seek human resources, technology or managerial consultancy rather than building institutions to meet such demands. Market mechanisms were expected to improve sectoral competitiveness without active interventions from governments.

In recent years, there has been a shift in industrial policy perception. After 30 years of market-oriented reforms, LAC has recently started to revive its industrial policies. This revival has gained momentum due to recent events and the renewed global consensus on the importance of industrial policy. The revival is visible in several industrial policy initiatives launched after the COVID-19 pandemic. Since 2021, eight countries in the region have introduced new industrial policy strategies. These strategies include areas that are common in many countries. They involve plans that repeatedly target the energy transition, digitalization, agro-industrialization and the health sector. However, each plan sets different priorities (see Table 8.1).

8.2.2 Differences by subregion

Vast intra-regional differences exist. LAC has over 650 million inhabitants and significant country-to-country differences in size, economic, social and cultural features. From an economic activity's structure perspective, three broad groups can be identified: South America, Central America (including the Dominican Republic) and the other islands of the Caribbean.

Natural resources are key for South American economies. Countries in this subregion are specialized in extracting, processing and exporting natural resources to global markets with significant demand from China. The Andean economies (e.g. Bolivia, Colombia, Ecuador and Peru), and countries such as Chile and Venezuela depend primarily on oil, gas and minerals, compared to the rest of South American countries that rely mostly on agriculture-based exports.

Assembly industries prevail in Central American countries. One distinguishing feature of Central America and the Dominican Republic is their specialization in assembly industries. Their main market is the United States of America (USA), and in some cases with low domestic value added.

The Small Island Developing States (SIDS) of the Caribbean face industrialization challenges. The subregion faces specific challenges in terms of industrial development, which are further exacerbated by its vulnerability to the impacts of climate change. The major economic challenges in this subregion include low and volatile growth and a lack of market competitiveness. The gaps in market competitiveness are strongly related to the deficiencies in education and infrastructure. Energy is another policy priority, as the high costs are hampering competitiveness. Two salient policy priorities in these countries are industrial restructuring and infrastructure modernization.[11]

The differences in countries matter for the design of industrial policies. The objectives, scope and organization of industrial policies need to be designed according to a country's development stage and business sectors. Consequently, recognizing the key productive features on subregional and country levels is crucial for identifying their opportunities and challenges.

Connecting industry and primary sectors is a key industrial policy priority in South America. Natural resource-based activities represent a major share of production and exports for the countries in this subregion. The effort to establish stronger connections between different sectors is particularly evident in areas where the region has substantial current or near-future competitive advantages, such as lithium refining, green hydrogen, food chains and biofuels.

Special policy attention is placed on export promotion in Central American and Caribbean countries. In industrial policy documents from Central America and the Caribbean, there is a shared focus on promoting exports, with an emphasis on upgrading, aggregating value and moving towards more technologically intensive activities. This effort aims to use the opportunities created by the digital revolution and to upgrade manufacturing activities by taking advantage of potential trends towards nearshoring from the USA.

Table 8.1 **Recently announced industrial strategies and industrial policy plans in LAC**

Country	Industrial strategy	Priority areas
Argentina	Productive Argentina 2030 (August 2021)[A]	The plan focuses on achieving macroeconomic stability while pursuing a productive transformation that addresses pressing social and environmental needs. It also emphasizes the need for technological development to improve productivity and environmental sustainability.
Brazil	New Industry Brazil (NIB) (January 2024)	The plan is based on six missions: (i) sustainable agroindustry and food security; (ii) resilience of health-related industries; (iii) sustainable mobility, sanitation and housing; (iv) digital transformation of industry; (v) decarbonization, energy security and bioeconomy; and (vi) strategic autonomy for national sovereignty and defence. $60 billion will be mobilized by public finance institutions between 2024 and 2026 and other industrial policy instruments (e.g. public procurement, industrial property rights, standardization, and carbon pricing, among others). NIB is designed as a responsibility-based network policy with different ministries implementing and coordinating actions in the National Industrial Policy Council.
Chile	Sustainable Development Programme (January 2023)	The plan aims to promote environmentally and socially sustainable economic growth, improve productivity, diversify the productive matrix and incorporate knowledge, human capital and innovation to generate opportunities in new productive areas. Moreover, the plan seeks to create quality employment and promote equitable development at the national level. It considers incentives such as financial intermediation instruments (e.g. guarantees, second-tier loans, investments that enable technologies for sustainable productive development, development and updating of information and study platforms, and the development of the strategic capacities necessary to implement these policies by the government).
Colombia	Reindustrialization Policy (February 2023)	The plan intends to foster a knowledge-based, productive and sustainable economy. It aims to close productivity gaps, strengthen value chains and capital investment, diversify and upgrade industry capacity and deepen integration with other LAC countries.
Costa Rica	National Development and Public Investment Plan 2023-2026 (December 2022)	The industrial policy of Costa Rica is part of a broader, pluriannual national development plan. The sectoral objectives of the productive strategy are to increase the country's participation in the international economy, boost national productivity, create more formal jobs, and enhance competitiveness, particularly of small and medium enterprises (SMEs).
Mexico	Towards an Industrial Policy (September 2022)[B]	The plan has four main objectives: (i) promoting sustainable and inclusive development and prioritizing progressive actions; (ii) encouraging industrial competitiveness by transitioning from maquila to a knowledge-intensive industry; (iii) supporting micro, small and medium enterprises (MSMEs) with Industry 4.0 technologies; and (iv) strengthening the domestic market. Moreover, five strategic sectors are identified. In addition to this formal plan, important industrial policy actions have been taken by developing large infrastructural projects. These projects will leverage the country's strategic position and enhance its integration with North America.
Honduras	Honduras National Plan 2022-2026 (September 2021)	The industrial development plan in Honduras is part of the comprehensive development plan launched by the government in 2022. The main objective is to increase local value addition by modernizing and upgrading the manufacturing and agro-industrial sectors. It promotes strategic industries in industrial clusters, such as the food sector, biofuels and pharmaceuticals.
Peru	National Industrial Development Policy (November 2022)	The policy sets four priority areas: (i) productivity; (ii) complexity of manufacturing exports; (iii) industrial infrastructure and specialized services; and (iv) institutional and regulatory environment.

Notes: (A) Status unknown after the change of government in December 2023. (B) No further information is available after the resignation of the Secretary of Economy (in October, 2022), who presented this policy.

Source: UNIDO elaboration based on background report produced by Ferraz and Peres (2024).

8.2.3 Emerging issues

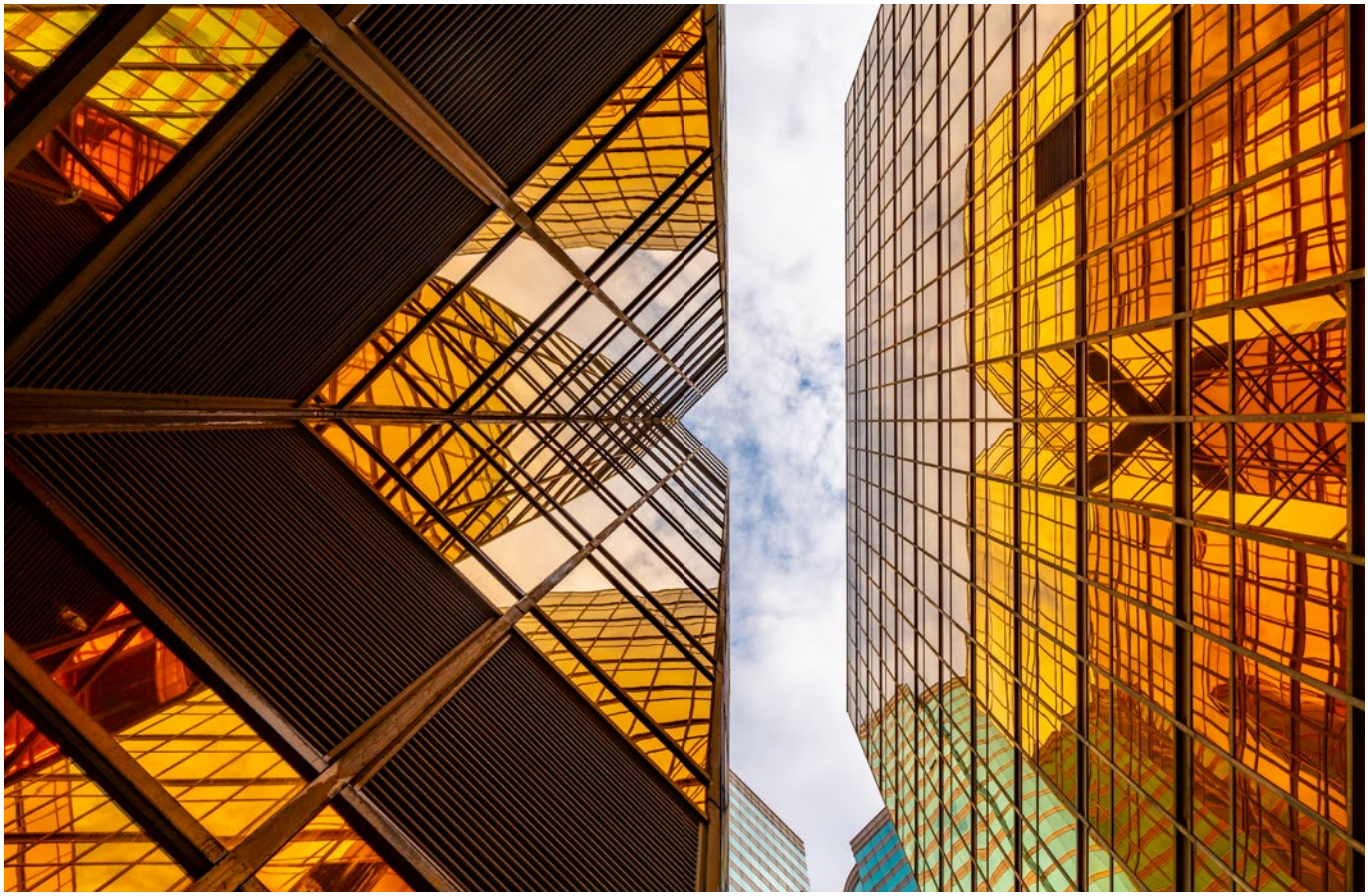
Emerging global issues emphasize new challenges for industrial policy in the region. Increased international competition in industrial production and technological leadership, the COVID-19 pandemic, armed conflicts, the growing threats of climate change, the emergence of potentially disruptive technologies such as synthetic biology, and the rapid progress of digital technology have brought new challenges for the development of nations worldwide and in the LAC region. To address these challenges, some countries in the region are experimenting with new forms of industrial policy.

New and old challenges coexist. Regional development issues such as the importance of fostering innovation, efficiency, technical vocational training and MSMEs' productivity persist. New country priorities and common strategic interests are working towards addressing these challenges. More recently, the need to address climate change, digitalization, energy, food and health security is increasingly recognized in regional industrial strategies.

Climate change and the energy transition are being integrated into industrial strategies. Emerging development challenges require a broader perspective on agriculture, mining and service-related sectors. Moreover, there is a need to reorganize production chains from a policy perspective. For example, recent strategies around electromobility aim to change manufacturing industries while recognizing the need for new energy sources, raw materials and urban development policies.

Digitalization of economic activities is a common objective in the region. All countries in the region place emphasis on the digitalization of industry. However, digitalization processes should be regulated by each specific country's context and digital development stage while considering different types of economic agents (sector, size, location).

During and after the COVID-19 pandemic, health-related industries became the top priority in public policies. The development of health-related industries, including pharmaceuticals, medical equipment, health devices and health services, has gained particular attention in the regional industrial policy design since the COVID-19 pandemic. Countries recognize the economic importance of these activities and how they can generate positive effects beyond the traditional industrial policy, such as efficiency and competitiveness. Moreover, it became clear that the public sector can boost health-related industries by using public procurement instruments and providing direct financial support to R&D.



8.3 OPPORTUNITIES AND ACTIONS

8.3.1 Energy transition

LAC is well-positioned to play a leading role in the global energy transition. The region has an abundance of energy and mineral resources and a history of clean energy leadership. Countries have different endowments of renewable energy sources that may allow them to thrive in the clean energy transition. Biofuels can be produced in Brazil, and hydropower is abundant in Brazil, Venezuela, Mexico, Colombia, Argentina and Paraguay. There are high-quality solar and wind resources in Brazil, Mexico, Chile and Argentina.[12] Moreover, minerals that are essential to clean energy technologies are abundant in many LAC countries. For instance, Chile, Peru and Mexico account for 40 per cent of the global production of copper. At the same time, the region supplies 35 per cent of the world's lithium, led by Chile (26 per cent) and Argentina (6 per cent). In addition, different countries have significant production potential in many other strategic minerals, such as graphite, nickel, manganese and rare earth elements.[13]

Despite good performance in clean energy, the region still relies heavily on fossil fuels. In the achievements made towards SDG 7 (Figure 8.1), LAC shows relatively good performance in clean energy generation. However, most LAC countries still depend heavily on fossil fuels to meet their energy needs, with oil accounting for 40 per cent of the region's total energy supply in 2022. On the other hand, LAC has one of the world's lowest electricity emissions. Renewables led by hydropower (45 per cent) accounted for about 61 per cent of electricity generation in 2022, a value that is twice the global average.[14]

Policy efforts to expand clean energy production are rarely connected with industrial development strategies. Although more policy efforts are needed to ensure the region can take full advantage of its remarkable energy potential, some countries are implementing policies that are promoting renewable energy generation. However, efforts to create or enhance industrial links in the clean energy value chain are slow, and a proactive approach is needed given the poor performance of LAC countries in realizing SDG 9 targets related to industry.

Some positive attempts to enhance industrial links around renewable energy generation are evident. One example is the National Renewable Cluster programme, launched by the Argentinian government in 2022 to increase clean energy generation and promote the local manufacture of components such as wind turbines, wind blades and photovoltaic (PV) modules. The policy aims to promote the installation of 750 megawatts of renewable generation over the next two years, and 300 megawatts annually from 2024. The project has an estimated investment of approximately $1 billion to develop and construct plants. To access financing, companies must meet specific requirements in relation to the share of national components in the equipment used to generate clean energy.[15]

Solar PV is one of the region's renewable energies with the greatest potential. Countries such as Argentina, Brazil, Chile, Mexico and Peru have some of the world's best solar resources, and solar PV energy generation stands out for its exceptional growth rates in recent years. In 2021, solar capacity in LAC grew by 44 per cent, totalling 9.6 gigawatts that year. However, the capacity and generation of PV energy are concentrated in Argentina, Chile, Brazil and Mexico and account for 85 per cent of the region's total.[16] From 2005 to 2022, solar energy was the main focus of renewable energy investments in the region, placing LAC as the third largest destination of FDI after Europe and Asia-Pacific. During this period, LAC received 15 per cent of all FDI directed globally to PV energy generation.[17]

Fiscal and implementation challenges persist. Despite the potential for further development and the generation of industrial links, expanding PV energy in LAC countries is challenging due to economic and financial difficulties, and insufficient planning and investment capabilities. Consequently, the region remains dependent on imported technology and products, mainly produced by China, Viet Nam, Malaysia, the Republic of Korea and Thailand. Targeted industrial policies are crucial in this market to overcome industrial and technological barriers and to develop the production chain locally.

A major area of opportunity for the region is the development of green hydrogen. The availability of competitive renewable resources can drive the production of low-cost and low-emissions hydrogen that can play a valuable role in decarbonizing heavy industry and freight transport domestically and internationally. The efficient production of green hydrogen and the deployment of positive industrial externalities is a complex process demanding well-coordinated actions on multiple fronts with the proactive involvement of all relevant economic actors. By 2020, most LAC countries were developing green hydrogen policy strategies and roadmaps, including more than 25 low-carbon hydrogen projects.[18] Box 8.1 illustrates this ambition by presenting the cases of three countries from South America.

The energy transition also creates opportunities to develop technological and productive capabilities around critical minerals. LAC countries have significant amounts of essential minerals for many clean energy technologies. The region contains around half of the world's lithium reserves and over one-third of copper and silver reserves. Moreover, LAC's clean electricity supply provides opportunities for sustainable mining and processing of these resources.

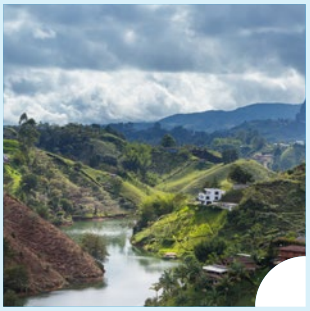
There are ample opportunities to develop industrial linkages around the extraction of these minerals. The suppliers of goods and services (upstream stages) and the production of processed products (downstream applications) can be developed based on the region's critical minerals. Industrialization around the lithium value chain is an opportunity to develop the lithium cell and battery manufacturing industry, particularly because of the increasing global demand for electric vehicles (EVs) that use these batteries.

Box 8.1 Brazil, Chile and Colombia: leveraging green hydrogen to fuel industrial development

Although still in the early stages, several countries are launching national strategies and specific actions in the region for producing green hydrogen (GH2). Three of these strategies are those of Colombia, Chile and Brazil.

In Colombia, the "National Hydrogen Strategy and Roadmap" published in September 2021 sets the ambitious target to achieve 1 gigawatt electrolysis capacity by 2030. The strategy allocated 40 per cent of low-carbon hydrogen for industrial use and plans to expand the GH2 infrastructure in the transport sector, focusing on long-haul heavy duty transport. Moreover, Ecopetrol and the Colombian Petroleum Institute announced a GH2 pilot project with an electrolyser capacity of 50 kilowatts at the Cartagena refinery in 2022. In addition, the government supports the private sector through the "+H2 COLOMBIA" initiative. This initiative, created by the Fund for Non-Conventional Energies and Efficient Energy Management, seeks to promote and encourage the knowledge and use of GH2 and blue hydrogen throughout the value chain. The project is supported by the Ministry of Mines and Energy and contributes to the development of a Hydrogen Roadmap.

In July 2023, the Chilean Ministry of Energy issued the "Measures to Boost the Green Hydrogen Action Plan 2023-2030". The Action Plan is being developed along three lines: investments and institutions; sustainability and local value; and infrastructure and territorial organization. The following incentives stand out: i) a financial facility with an initial size of $1 billion to reduce the financial risk of projects that comply with environmental and social requirements; ii) corporate tax credits for investments with multiplier effects



aimed at companies that develop projects promoting the transfer and development of new technologies and decarbonization; and iii) encouraging and promoting FDI through InvestChile's clean energy efforts. The initiative includes actions to reduce information gaps, assistance to international companies, services for market prospecting, project evaluation and facilitation during installation and start-up.

In August 2023, Brazil launched the "National Hydrogen Plan (PNH2)" initiative that proposed a GH2 strategy with three timeframes: (i) by 2025: dissemination of low-carbon pilot plants in all regions of the country; (ii) by 2030: consolidation of the country as an international competitive producer; and (iii) by 2035: consolidation of low-carbon hydrogen production hubs. To strategically target the actions, the National Energy Policy Council (CNPE) created the Management Council of the National Hydrogen Program (Coges-PNH2), comprising different ministries to focus on five thematic chambers: (i) strengthening the scientific and technological base; (ii) human resources training; (iii) energy planning; (iv) legal and regulatory frameworks; and (v) markets and competitiveness.

Source: Background report prepared by Ferraz and Peres (2024).

LAC has a significant amount of minerals that are essential for clean energy technologies. Industrial linkages can be developed around the extraction of these minerals.

The hosting of abundant reserves does not guarantee competitiveness in downstream production. Developing new industries around minerals is a challenging task, even for middle-income countries with an established automotive industry, such as Argentina or Brazil. The competitiveness of cell-producing firms heavily depends on production costs. Substantial capital investments are needed for battery manufacturing to ensure a consistent productive scale. Moreover, the required practical knowledge, which is based on extensive and very distinct chemical engineering skills, is concentrated in a few Asian countries that dominate the market as early technology adopters. It is clear that targeted industrial policies are crucial if the region is to capitalize on this area of opportunity. One requirement is the development of technological capabilities. In Argentina, the establishment of a national plant for the development of lithium cells and batteries illustrates the efforts already underway in the region (see Box 8.2).

Box 8.2 Argentina: building technological capabilities to move downstream in the lithium battery value chain

Argentina possesses 10.4 per cent of the world's lithium reserves, a key element for lithium-ion batteries. Over the past 12 years, it has received 22 per cent of global investment in lithium exploration. The country ranks as the fourth largest global lithium producer, with the potential to substantially increase its current production.

In 2021, the Argentine government started the construction of the National Plant for Technological Development of Lithium Cells and Batteries (UniLiB). This public policy initiative aims to develop downstream linkages by producing cells and batteries. The initiative is led by Y-TEC, a technology-based company that emerged as a joint venture between the state-owned energy company YPF and CONICET (the public institution responsible for the promotion of science and technology), in collaboration with the National University of La Plata, a public research university renowned for its strong tradition of scientific and technological engagement. The initiative is also supported by a network of national and subnational agencies and institutions.

The UniLiB initiative addresses the challenge of building technological capabilities to participate in the rapidly growing lithium-ion battery industry. The ultimate goal is to master the technology and production process required to manufacture cells and batteries locally. The initiative will harness the scientific capacities of the public innovation system and the managerial capabilities of YPF. The project is part of two broader government plans, "Argentina Productiva 2030" and the "National Plan For Science, Technology, and Innovation 2030", which promote lithium industrialization and the production of cells and batteries.

The UniLiB plant produces a pouch cell of 48 volts and 100 amperes with a graphite-copper anode and an LFP aluminium cathode. It has a demonstration-scale of 15 megawatts per hour. This translates into an annual production capacity of 50 batteries for buses or 1,000 batteries for stationary renewable energy storage. It required a total investment of $7 million.

Various policy tools were deployed to set up the UniLiB plant. On the supply side, three instruments were used: i) government-linked companies (Y-TEC and YPF) to move from the research scale to the industrial scale; ii) multiple sources of public financing to guarantee access to the necessary capital; and iii) agreements with foreign mining companies for the provision of lithium carbonate. On the demand side, two instruments were harnessed to promote the potential commercial uses of cells produced by the plant: i) public procurement either for military applications through the National Ministry of Defense (i.e. radars), or the Renewable Energy Project in Rural Markets (PERMER) of the Province of Buenos Aires to provide energy to isolated communities; and ii) potential agreements with private domestic electromobility companies in the bus and city car segment.

Since its inception, UniLiB has successfully developed technical skills in human resources and transferred know-how from Chinese equipment and machinery suppliers. Moreover, the transition to an industrial scale has allowed for the identification of all cost components, the provision of goods, inputs and services involved in production, and the identification of niche opportunities and potential bottlenecks in future plant setups. Additionally, it positions the company and the country to negotiate terms with potential foreign battery manufacturers and investors for domestic integration. However, beyond these current and potential achievements, a significant leap in production scale would require integration with the EV sector, which can be challenging.

Source: Background note produced by Delbuono et al. (2024), building on Cochilco (2023), Freytes et al. (2022), Obaya and Céspedes (2021) and interviews with relevant stakeholders.

8.3.2 Digitalization

The adoption of new technologies plays a major role in firms' performance and countries' economic development. The advanced digital production (ADP) technologies associated with the 4IR, including artificial intelligence (AI), cloud computing, big data analytics, Internet of Things (IoT) and advanced robotics represent the forefront of industrial production. These technologies have the potential to enhance the productivity of manufacturing firms, and their adoption is positively associated with the industrial competitiveness of countries.[19]

In the last decade, LAC countries have made significant efforts to universalize internet access, with notable progress being made. The level of connectivity observed for LAC's firms is comparable to that of more advanced countries.[20] Therefore, despite substantial subregional differences, the region is well-positioned to take advantage of the opportunities created by this latest wave of technological transformation.

Heterogeneities in digital adoption are evident in the different countries. In the LAC region, there are considerable differences in the level of adoption of ADP technologies by large firms and MSMEs.[21] Although MSMEs account for a quarter of the region's gross domestic product (GDP) and around 60 per cent of formal employment, their productivity may be up to seven times lower than that of the most efficient large firms.[22] 4IR technologies provide important competitive advantages, but MSMEs are falling behind digital adoption. Consequently, existing performance gaps may widen further.

MSMEs have a huge opportunity to use digital technologies to reduce productivity gaps. The increasing number of public initiatives in promoting the adoption of 4IR technologies among MSMEs proves that public institutions in LAC are very much aware of this opportunity. Table 8.2 reviews recently adopted digitalization policy initiatives for MSMEs in the region.[23] It includes 438 initiatives mapped against their main policy objective.

Policy focus is placed on supporting firms in their early stages of digital technology adoption. Most policy initiatives focus on raising awareness and encouraging effective assimilation of digital technologies. The focus areas are facilitating access to digital technologies, capacity building, and providing technical and financial assistance. Environmental and digital objectives are rarely targeted together. This is only observed in eight cases of the table (green cells), and most sustainability-related initiatives are found in Brazil. They target digitalization, resource management and waste reduction.

Table 8.2 **Digitalization policy initiatives for MSMEs in LAC countries**

	Procedures simplification and information access	Awareness raising and digital literacy	Access to digital technology facilitation	Capacity building	Technical and financial assistance for digitalization	Improved management, efficiency and quality of processes	New business opportunities development	Incentives for ICT sectors	Supporting the formation of digital businesses	Digital integration of supply chains and providers	New business model development
Argentina	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Bolivia					✓						
Brazil	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Chile		✓	✓	✓	✓	✓	✓				✓
Colombia		✓		✓	✓		✓		✓	✓	
Costa Rica		✓	✓								
Dominican Republic			✓			✓			✓		
Ecuador					✓						
Guyana			✓								
Honduras					✓						
Mexico		✓	✓	✓	✓	✓	✓				✓
Peru	✓			✓					✓		
El Salvador					✓						
Uruguay			✓		✓	✓					✓

Note: The colour intensity shows how often each instrument presented in the columns is used in the digitalization initiatives reviewed for each country that is presented in the rows. The darker the cell, the more often that instrument has been used in that country. The green cells represent digitalization initiatives with a focus on sustainability. 438 initiatives were reviewed.

Source: Background report prepared by Ferraz and Peres (2024).

The MSMEs' digitalization initiatives are rarely embedded within industrial strategies in the region. Out of all the policy initiatives mapped, only 17 strictly target manufacturing MSMEs. Of these policies, the majority consist of awareness programmes, initiatives for promoting access to basic digital solutions and capacity-building activities. Only a few policies aim at developing a deeper transformation of technological and strategic capabilities, which is achieved through the promotion of digital integration with supply chains, or by supporting the creation of new business models. Most of the policies analysed are not connected to any formal industrial policy of their country. Peru is an exception, as its public actions towards developing the digitalization of MSMEs are explicitly associated with an industrial policy (Box 8.3).

An obstacle to industrial digitalization in the region is the lack of skills. The successful adoption of digital and other new technologies largely rests on a workforce capable of understanding and using them effectively. There is still a lack of qualified workers in LAC because educational systems in the region have not provided the human resources necessary for businesses to thrive and grow. There is a rising demand and need for new skills and for strengthening education and training programmes. A recent study conducted in ten LAC countries shows that over 30 per cent of workers are not sufficiently qualified for their positions. In some countries, more than 50 per cent of workers are unqualified. Similarly, 50 per cent of formal companies reported difficulties filling job vacancies allegedly due to the lack of essential skills among job candidates.[24]

Technical and vocational education training (TVET) systems can play a key role in addressing the lack of skills. Historically, TVET programmes have been the region's most important career development sources, and in the context of longstanding and new challenges, vocational training institutions (VTI) have an important role to play. However, they need to reconsider their function and strengthen their connection to national needs and priorities, which requires increasing the involvement of a broad range of stakeholders and aligning education and vocational training policies with industrial policies. In light of the emerging challenges associated with climate change and the digital transition, an inclusive, sustainable, efficient and competitive development path requires breaking down institutional and policy silos.

Various strategies are used to identify the demand for new skills. One challenge experienced by VTI is how to respond to the increasing demand for skills required by the digital economy while implementing

Box 8.3 Peru: increasing industrial competitiveness of MSMEs through digitalization policies

Peru is one of the few Latin American countries with a formal industrial policy, the Industrial Development National Policy (PNDI), launched in November 2022.

To enhance the competitiveness of manufacturing firms, the PNDI places considerable emphasis on firms' digitalization. The policy introduces actions to strengthen traditional and alternative financial instruments, according to the needs and size of firms. It also supplies education and job training.

The "Digital Route Strategy" has been designed as part of the PNDI. The strategy runs over the 2022-2026 period and aims to increase the adoption of digital technologies by MSMEs to boost their productivity and competitiveness. The policy informs companies about the benefits of digital technologies they may be unaware of and uses a diagnosis to identify their level of digitalization. Moreover, it seeks to enhance the digital capabilities of MSMEs, tailored to the firm's self-diagnosis. Finally, the policy encourages the involvement of public and private partners to facilitate access to services that promote digital adoption.

By June 2023, 446 MSMEs had participated in informative forums, and 405 in one of the 13 webinars. Furthermore, 312 MSMEs joined one of the five training workshops arranged as part of the policy implementation.

Source: Background report prepared by Ferraz and Peres (2024), building on OGEIEE (2022) and inputs submitted by the Government of Peru for the regional consultations organized with UNIDO Member States and regional experts in June 2023.

its own digital transformation. Some tools currently used to identify the demand for new skills in specific occupations include labour market and prospective studies and technical roundtables that involve representatives from academia, the business sector and labour organizations. Based on the information collected in these studies, VTIs are updating their professional profiles and curriculum design, specifically focusing on the most impacted occupations. Training in software development, IoT, AI and cybersecurity is becoming common in all institutions.

To be successful, VTIs in LAC need to be dynamic and future-oriented. Vocational training institutions must continuously adapt their curricula to match the changing economies, technological progress and learning needs in the LAC region. The Dominican Republic's VTI is an excellent example of a pro-active, future-oriented, consultation and policy-oriented institution that is boosting the green and digital revolution (Box 8.4).

8.3.3 Global rebalancing

The structure of global production is undergoing a reconfiguration. Since the beginning of the 21st century, there has been a global rebalancing of economic power and production, with Asian countries emerging as a new pole of the global economy, while other developing regions, including LAC, are progressing slowly or even falling behind. Recent supply chain disruptions and rising geopolitical tensions are putting pressure on current global value chains (GVCs) configurations, which could potentially lead to the reshoring of some economic activities. This situation may bring new opportunities for LAC.

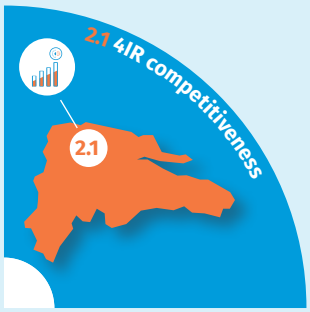
Recent FDI trends suggest a change in the direction of capital flows. Asian countries, particularly China, are losing ground as both the source and the host of FDI. On the other hand, some LAC countries, such as Costa Rica and Colombia, are receiving higher productive capital flows.[25] Reshoring, and particularly

Box 8.4 Dominican Republic: boosting TVET to prepare industry for the twin transition

The Dominican Republic National Institute of Technical Vocational Training (INFOTEP) is a well-established VTI. Like many of its regional peers, it has a tripartite governance model, a stable source of funding (1 per cent levy on workers' wage bill, along with resources allocated from the national budget) and a diverse portfolio of services. In 2019, it trained around 480,000 people, corresponding to almost 10 per cent of the total workforce.

The Institute has developed a quality management system with monitoring and evaluation mechanisms for continuous improvement. It is aligned with national policies and consults with stakeholders to address their current and future training needs. The training interventions are shaped to address gaps and reflects the Dominican Republic's commitment to the SDGs, the 2030 National Development Strategy, the National Pact for Education Reform and the Digital Transformation and Industrial Development Policies.

In 2014 and 2021, the institute conducted a national consultation exercise on the future of technical and vocational training, involving over 5,000 relevant stakeholders. One important message from the consultations was that INFOTEP should address changes in the labour market resulting from climate change and the digital revolution. The curricula must be redesigned to ensure that technical and vocational



training is competitive, innovative, equitable, flexible, open and permanently available. The consulted stakeholders suggested that the Institute include advanced simulation and experimentation laboratories in its training programmes to ensure learning is aligned with the latest technological advances. Additionally, they also indicated the need to update and expand the infrastructure necessary to develop the teaching and learning processes needed by the productive sectors, especially those linked to Industry 4.0.

The consultation and alignment with policy provided the basis for developing INFOTEP's long- and short-term strategic plan. With the new Institutional Strategic Plan (including 4IR, the green economy and environmental concerns) in place, it will offer quality services to meet the challenges of technical and vocational training in the current and future society until 2050.

Source: Background report prepared by Ferraz and Peres (2024), building on INFOTEP's institutional documents and interviews with relevant stakeholders.

nearshoring from MNEs and lead firms based in the USA, is a great opportunity for LAC countries to attract new investments and stimulate production.

Evidence of nearshoring to LAC remains scant. Data limitations make it difficult to assess the extent to which nearshoring is prevalent in LAC. Available evidence suggests that in recent years, Mexican production has been playing an important role in meeting the USA's domestic demands, which suggests that some nearshoring from the USA to Mexico may have occurred. However, these trends are not accompanied by parallel increases in value-added contribution, indicating that even if nearshoring has occurred, it has not led to significant improvements in Mexican production thus far.[26]

Benefiting from possible relocations of industrial production requires improving readiness for "reshoring". Several old and new factors require attention from policymakers to enhance opportunities in relation to relocating FDI and to benefit from these opportunities by upgrading production. The decisions on firms' location depend heavily on the macroeconomic and regulatory context and assets prevailing in each country, which determine their "reshoring readiness".[27] The quality of logistics infrastructure plays a crucial role because it affects the value chain, shipment ease and costs of reshoring.

Infrastructure development can serve as a tool to invigorate industrial development. As shown in Figure 8.3, infrastructure development is one of the areas that requires special attention in the region. Improving the quality of infrastructure, logistics services and transport efficiency in the region will be increasingly important to maintain competitiveness in international production networks and to benefit from the opportunities created by reshoring. Infrastructure projects can also support the development of industrial capabilities in sector areas that are lagging behind. The case of Mexico and the construction of the Isthmus of Tehuantepec Inter-Oceanic Corridor (CIIT) illustrates how regional policies can harness opportunities (Box 8.5).

Box 8.5 **Mexico: strategic infrastructure and productive clusters to foster industrial development in regions lagging behind**

Industrial development in Mexican regions that are lagging behind have been hindered by the lack of quality infrastructure. However, the country's geographic position opens opportunities to attract FDI and strengthen industrial clusters. The Isthmus of Tehuantepec Inter-Oceanic Corridor (CIIT) is a logistics hub covering 90 municipalities (in the southern states of Oaxaca, Veracruz, Chiapas and Tabasco), and aims to create the appropriate infrastructure conditions to develop industrial clusters in strategic industries.

The CIIT is planned in the National Development Plan 2019-2024, and its objectives are aligned with the country's industrial policy and the strategy "Towards an Industrial Policy", presented in September 2022.

The corridor entails the construction of a 303 kilometre railway connecting the two strategic ports of Salina Cruz in Oaxaca and Coatzacoalcos in Veracruz, as well as three airports and highways. The new infrastructure will connect Mexico to six destinations in the USA and reduce travel time and costs to destinations in South America, Asia and Europe.

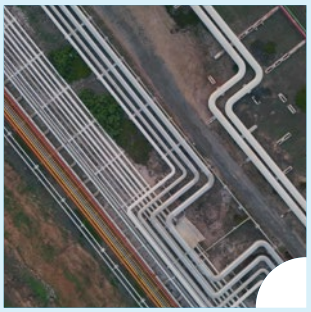
Additionally, the corridor will host ten industrial parks called the Development Poles for Well-being. The Development Poles are designed to host strategic industrial productions in line with the specific industrial focus areas. They aim to become industrial clusters in electronics, semiconductors, automotive, medical devices, pharmaceuticals, and ICT, among other sectors.

Additional infrastructure, such as a gas pipeline and fibre optics to ensure broadband connectivity, are being built as part of the project and to attract productive activities in the Development Poles.

In November 2023, the first round of the bidding process for the construction of the industrial parks was closed, and five Development Poles were awarded to Mexican companies and MNEs. The remaining five Poles will be awarded subsequently.

An investment of $7 billion is expected to result from the construction of the first five Poles. This amount is equivalent to 8.5 per cent of the GDP of the states of Veracruz and Oaxaca, and 37 times more than all the FDI received by those states in 2021.

Given the slow economic development of the targeted Mexican states, the project's main goal is to improve the conditions of populations living in extreme poverty in the South-Southeast region of the country by promoting industrial development to reduce inequalities.



The strategy to attract industrial activities in the Development Poles relies on several instruments, not just the construction of strategic infrastructure. It also includes fiscal incentives and technical education initiatives. Fiscal incentives include tax deductions for investments in new fixed assets and training expenses. In terms of skills formation, several higher education institutions have announced the opening of new facilities and programmes. For example, the National Polytechnic Institute invested over $2 million to open the National Telecommunications and Antennas Laboratory. Moreover, the Interdisciplinary Professional Unit of Engineering Campus Palenque was created to accommodate a new engineering curriculum and a Bachelor's degree to address the demand for professional roles in the construction of the Development Poles and the Corridor. Other national universities, in collaboration with the government, are offering colloquiums, seminars, certification programmes and professional internships.

Actors from the public sector, private sector and academia are collaborating to ensure the project's success. In March 2023, the dedicated CIIT's decentralized public agency was created in the Marine Secretary to coordinate the implementation of the project with multiple ministries and support from universities and other higher education institutions.

For the implementation of the project, the federal government committed more than $3 billion over 2019-2022, mainly for the modernization of telecommunications and transportation infrastructure. In 2024, public investment will continue to grow to complete the infrastructure projects, including those aimed at transportation and connectivity, electricity generation and transmission, and the construction of solar and industrial parks. So far, the project has already achieved the construction of electrical substations, distribution lines and a solar farm that provides electricity to many local areas. In addition, many new municipalities were granted access to telecommunication services, and a pilot project for telemedicine was implemented, among other achievements.

Source: Background note prepared by Ruiz Durán (2024), building on official documents, newspaper articles and interviews with relevant stakeholders.

8.3.4 Growing demand for food and health

Global demographic trends open important opportunities for LAC. The demographic transition is a global phenomenon that differs between regions in its characteristics. At the world level, it implies that demand for food will increase as the global population continues to grow. In parallel, an ageing society and higher standards of living worldwide will require more robust capabilities in health systems. These population dynamics create opportunities in at least two areas: food processing and health-related industries.

Food systems worldwide are changing. Demand for food products, coupled with the integration of digitalization and new genetic innovations (e.g. gene editing, precision fermentation and synthetic biology) is leading to a wave of revolutionary product innovations (e.g. plant-based food alternatives to animal proteins) in food processing industries, both globally and in the LAC region.

Sustaining industrial competitiveness in the food sector requires high degrees of innovativeness. In LAC, the food industry plays a significant role in manufacturing gross value added and generating employment. Therefore, the countries in the region are faced with challenges and opportunities to adjust their food products to remain competitive in new situations. To do this, they need to adapt existing institutional, regulatory, research and productive structures to new innovation models. Targeted industrial policies can support this process by supporting advanced research that can lead to revolutionary product innovations in this industry. A few virtuous initiatives in the region stand out. For example, the Araucária Foundation's project supports research in alternative proteins and is helping the Paraná State of Brazil position itself as a leading player in cultivated meat products for the food industry (Box 8.6).

The COVID-19 pandemic demonstrated the importance of having well-developed health-related industries. During the pandemic, countries with stronger scientific and industrial capabilities in health-related industries were better able to manage the health crisis. They also showed stronger economic resilience and recovered faster.[28] This is particularly important in the LAC region where a high population density, particularly in urban areas, and an ageing, vulnerable population accelerate disease transmission. More generally, even without epidemic or pandemic events, the ageing populations in the region will create increased demand for medical devices and related industries.

Technological and industrial capabilities in pharmaceuticals and medical supplies are becoming increasingly strategic. The rising global and regional demand provides opportunities to tap into new industries in the health sector. Some of these industries, which were particularly important during the COVID-19 outbreak and are likely to remain important in the future, include test-and-tracing systems, personal protective equipment (PPE), personal hygiene products and ventilators, vaccines, immunobiological drugs and intensive care equipment.

Entering health-related industries is challenging but can lead to significant developmental benefits. Health-related industries vary substantially in complexity. In general, it is not easy to quickly move ahead in these industries, even for less complex health-related products, because achieving international competitiveness requires significant scientific and industrial capabilities. Yet, the value of investing in these sectors is high, not only because of the implications for public health but also due to the multitude of backward and forward linkages that can be established with supplier or processing industries.[29] The case of Costa Rica, which developed a medical device sector, illustrates how targeted policies can support a country entering into these industries when relevant capabilities are already in place (Box 8.7).

LAC countries need to adapt to new innovation models to capitalize on the opportunities opened by increasing the global demand for food.

Box 8.6 **Brazil: fostering a regional ecosystem for alternative proteins and food innovations**

Paraná, a state in southern Brazil, is a leading producer of animal protein, accounting for 33 per cent of the country's chicken, 21 per cent pork, 13.6 per cent milk, 9 per cent eggs, 10 per cent cows and ox herd, and produces 358.000 tons of beef every year.

In 2022, the Araucária Foundation, the state's principal financer of research and innovation, approved a three-year project for alternative proteins in the "New Arrangements for Research and Innovation Programme". Its strategic objective is to bring the state of Paraná and Brazil to a higher level in research, cultivated meat products and human capital formation.

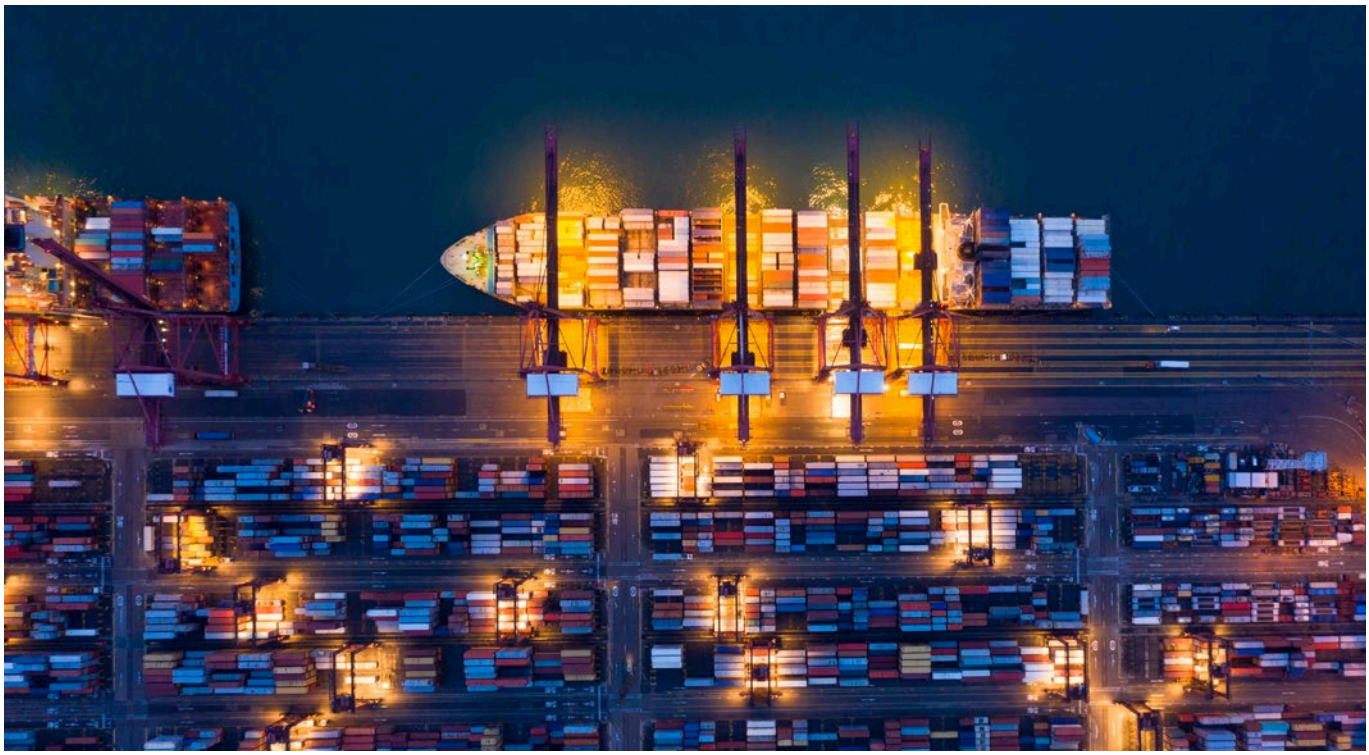
This ambitious project involves three higher education institutions in the state: the Federal University of Paraná (UFPR), the Pontifical Catholic University of Paraná (PUCPR) and the State University of Maringá (UEM). It has strong international cooperation programmes, such as with Bath and Leeds universities in England, the University of Colorado in the United States and Curtin University in Australia.

The project treats alternative proteins and cultivated meats as a natural continuation of the state's protagonist role in animal proteins. Alternative proteins are produced for human consumption by innovative methods. They are combined with traditional food production methods and provide a solution to the challenges faced by animal food production.

The project investment of around $1.1 million will fund the establishment of a new laboratory at UFPR and the upgrading of additional laboratories at UFPR, PUCPR and UEM. The project's aim is to accelerate progress at all stages of the production chain, such as the use of local genetic cell lines, agricultural inputs, culture mediums, the production of different meats in two-litre and ten-litre bioreactors, and the subsequent dimensioning of production for 500 and 5,000 litres.

Similar attention is given to the provision of new courses for undergraduate and graduate programmes, the production of textbooks, and the publication of peer-reviewed international articles. A graduate course on cellular protein has been offered for three successive terms to 111 students. The undergraduate course currently underway has 54 students and will be replicated in the other institutions of the project.

Source: Background report prepared by Ferraz and Peres (2024), building on institutional documents from the Araucaria Foundation and newspaper articles.



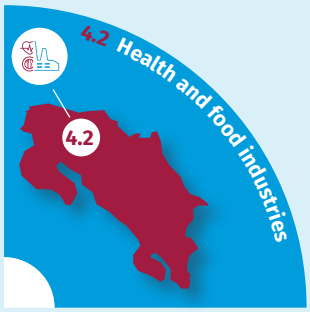
Box 8.7 **Costa Rica: developing and upgrading a medical devices industry**

In the 1980s, Costa Rica emerged as a global medical device centre, with over 70 specialized firms, including leading multinationals such as Baxter and Medtronic. The medical device industry has expanded, diversified and upgraded substantially since then, transitioning from focusing on Class I medical devices (such as disposables) to Class III medical devices (such as surgical instruments). Costa Rica has thus transitioned from a low-tech manufacturing hub to an R&D and advanced manufacturing ecosystem. Between 2007 and 2018, medical device exports tripled to become Costa Rica's largest and most dynamic high-tech export cluster. Simultaneously, Costa Rica diversified its export destinations by expanding beyond the USA towards new markets such as Europe and Japan.

Industrial policy has played an essential role in shaping this sector. Since the late 1980s, the Government of Costa Rica has explicitly targeted FDI in high-tech industries. During the 1990s, the medical equipment firm Baxter set up a plant in Costa Rica, and Intel established one of its three locations in Costa Rica to manufacture microprocessors. Shortly afterwards, the government and investment promotion agency (CINDE) decided to move away from electronics, given the volatility of the industry and the low margins. Building on the experience with Baxter and Intel, the medical device industry was targeted, and in response, the government developed an incentive policy with accompanied investment to develop capabilities in the sector.

Over the years, the government's emphasis on ensuring investment in technological upgrading established the country as a leading research centre. Various waves of FDI shaped this development. The companies that invested in the first wave, pre-2000, were predominantly in the low-tech, cost-driven disposables category. However, in each successive wave, companies with higher-level technology entered Costa Rica, with several firms expanding their capabilities through reinvestments. These FDI waves established pipelines to MNE headquarters and other knowledge centres outside of Costa Rica and facilitated the rapid diffusion of new technologies and knowledge spillovers. The participation of many diverse MNEs focused on multiple end markets created more opportunities in Costa Rica. It pushed the country to upgrade and advance up the technology ladder across market segments, and to fill value chain gaps with relatively high-value manufacturing-related services such as product sterilization.

Two key factors allowed Costa Rica to harness FDI for successful upgrading: human capital and efforts from CINDE and the Ministry of Foreign Trade (COMEX).



The medical devices industry relies on a relatively small but highly skilled workforce. The shift to a more diverse and sophisticated product portfolio was accompanied by more highly skilled workers and better-paid jobs. Human capital development policies were key to enhancing skills with local educational institutions providing industry-specific training. Examples include the development of an introductory course for medical device regulation for operators by the National Technical Institute, a six-month international training programme for packaging technicians, and a postgraduate degree in regulatory affairs at the Costa Rica Institute of Technology. Experienced local management and skilled human capital increased Costa Rica's attractiveness and drove embeddedness.

The second crucial dynamic that facilitated firm upgrading in the sector was the identification of critical "GVC gaps" in Costa Rica's technical capabilities by leading firms, followed by the targeted FDI recruitment efforts of national development institutions (CINDE and COMEX). Additionally, Costa Rica's foreign trade promotor (PROCOMER) is responsible for supporting the growth of local firms and their access to international markets by matching the procurement needs of multinationals with local suppliers, and helping local firms identify areas of development. At the same time, CINDE's handholding service for foreign investors and free trade zones have been key to attracting MNCs to Costa Rica.

Costa Rica leveraged capability development and institutional strength rather than scale to drive growth in the medical devices sector, as these assets are essential to ensuring quality and regulatory compliance in the sector. Equally important was the institutional coordination between CINDE and COMEX in implementing the country's industrial policy and attracting the right kind of FDI to support export-oriented growth. This inter-agency cooperation is a selling point across industries, as this approach can facilitate more extensive forms of public-private sector coordination in the future.

Source: UNIDO elaboration based on Andreoni (2021), Gereffi et al. (2019) and WEF (2016).

8.4 LESSONS LEARNED FROM LATIN AMERICA AND THE CARIBBEAN

LAC is making good progress in energy but is lagging in industry and innovation. The SDG assessment conducted for this report highlights significant differences in the region. The performance in energy-related SDG targets is positive and ahead of other developing regions, but the socioeconomic targets related to economic growth and job creation under SDG 8 are falling behind. A major reason for this negative trend is the underachievement in SDG 9 dimensions related to industry and innovation, the two engines of economic development. The gap in SDG 9 industry has been increasing during the past decade, showing signs of premature deindustrialization, and needs to be addressed. This is the only developing region where such a negative trend is observed, revealing an urgent need for targeted actions to reverse this direction while simultaneously promoting other SDGs.

LAC countries should make the most of the renewed global consensus around industrial policy. In a time of growing interconnected and multidimensional challenges, LAC countries should leverage the renewed global support for industrial policy to seize the open opportunities and narrow the economic and innovation gaps with more advanced countries. As the concrete experiences presented in this chapter have shown, several factors must be considered to design modern and effective industrial policies for sustainable development.

Existing industrial policy instruments should be revamped and renewed. Three areas where industrial policy is already gaining ground need to be strengthened: support for MSMEs, attracting FDI and development finance.

MSMEs deserve particular attention and support. MSMEs continue to be a crucial yet fragile component of LAC economies and should continue to receive specific support. Production development programmes, including training, must be formulated and implemented with that specific beneficiary profile in mind. There are many opportunities to help MSMEs overcome their productivity, competitiveness and sustainability challenges. However, to seize these opportunities, it is necessary to promote the scalability of the initiatives that are still often scattered across different institutional settings.

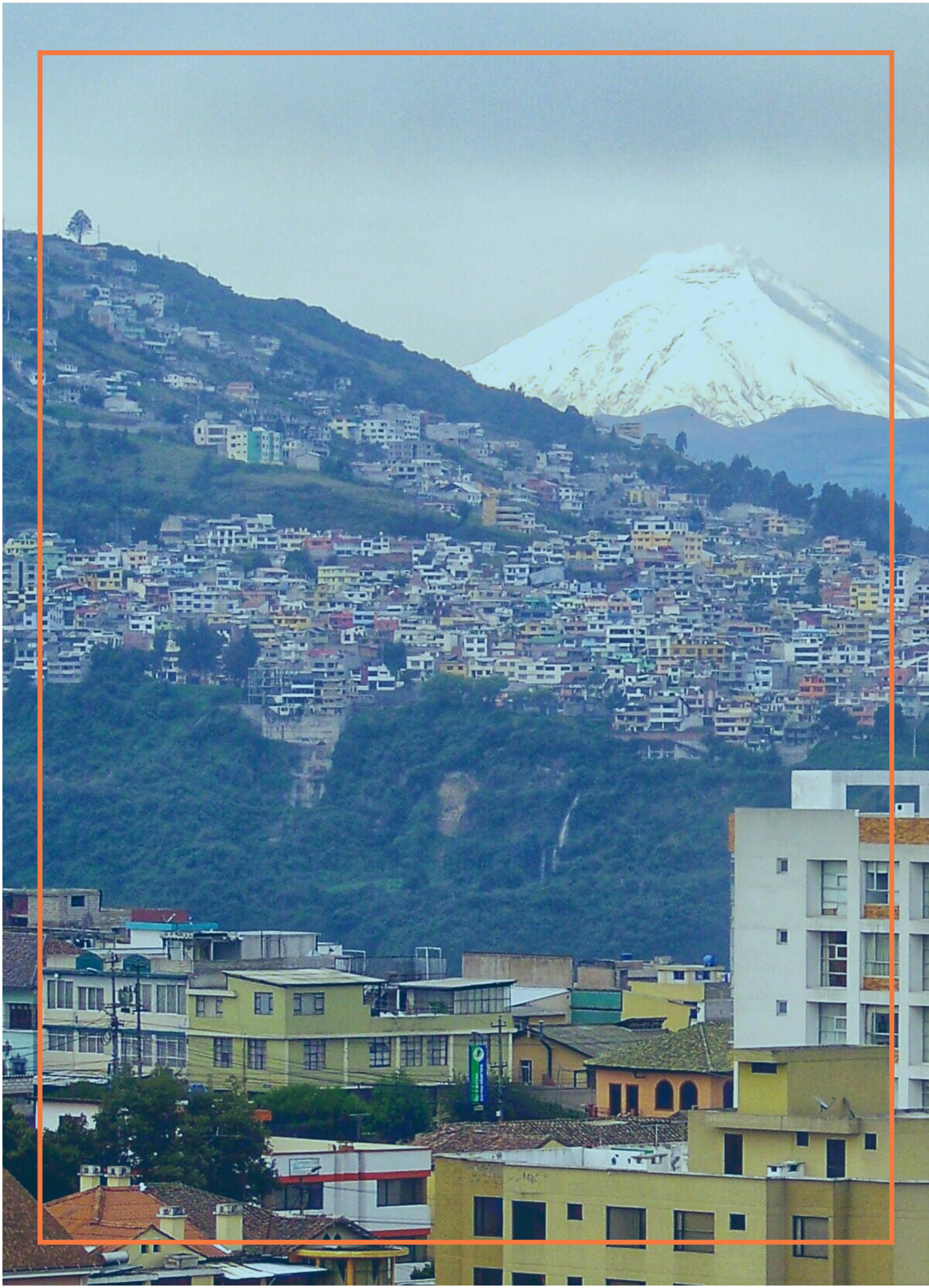
FDI inflows remain an important driver of industrial development in the region. Governments should continue to promote FDI attraction, but stronger emphasis should be placed on local industrial development. In this regard, new opportunities to establish connections with domestic economies have emerged with the rise of digital and genetic technologies, as well as the requirements of the energy transition.

Development finance should be leveraged to overcome tight fiscal space. Development finance can take a more prominent role at a time of increased debt distress and tight fiscal space. It should be considered along with other policy instruments, as it plays a key role in easing the tight fiscal space governments face and making more resources available for bolder policy actions.

Investing in policymaking capabilities is crucial to make industrial policy work. Implementation challenges have hindered industrial policy achievements in the region for a long time. Urgent efforts are needed to improve implementation and evaluation to ensure that planned industrial policies are not just "good-will declarations of intention". A policy framework with a realistic set of goals should be defined. The potential beneficiaries must be closely associated with mobilizing policymaking capabilities and resource availability.

Concerted political focus on industrial policy is fundamental. As demonstrated by some of the successful cases reviewed in this chapter, policy continuity is key to achieving success. The challenge is establishing a permanent industrial policy that can overcome seasonal fluctuations defined by political cycles. Five combined features determine the extent to which an industrial policy can evolve towards a permanent track: (i) the scope, quality and pertinence of the demand for intervention; (ii) the extent to which a problem or challenge-oriented policy is deeply embedded in local realities, and its ability to mobilize relevant stakeholders; (iii) the political ambitions and available resources and capabilities of the state and the policy beneficiaries; (iv) the explicit imposition of conditionalities to policy benefits to enable efficient use of public resources and the effective engagement of policy beneficiaries in the execution of intended projects; and (v) the tenacious vision of political leaders.

Countries should foster industrial policy learning through international and regional cooperation. An effective dialogue could constitute a solid basis to accelerate the process of improving policy capabilities. Moreover, the longstanding networks of regional and international organizations can be the foundation for building learning platforms for best practices in industrial policymaking.

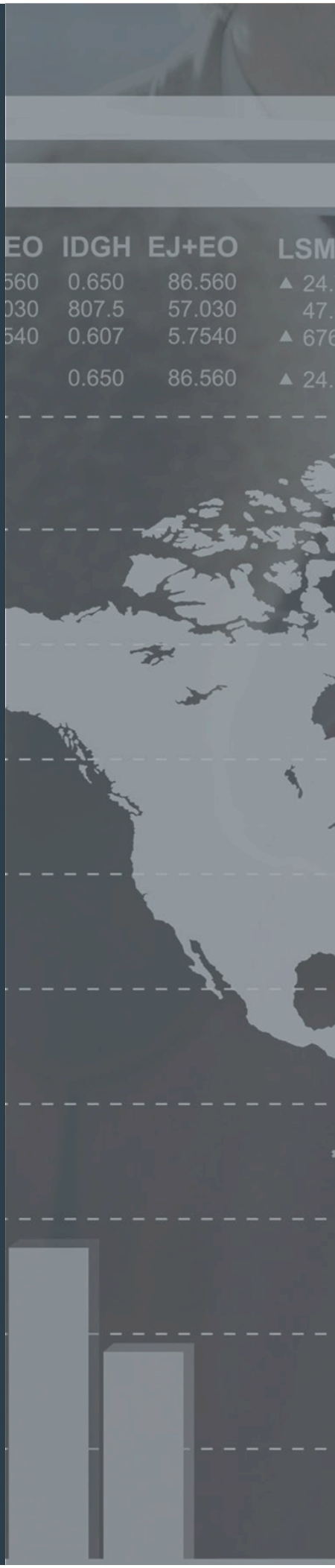


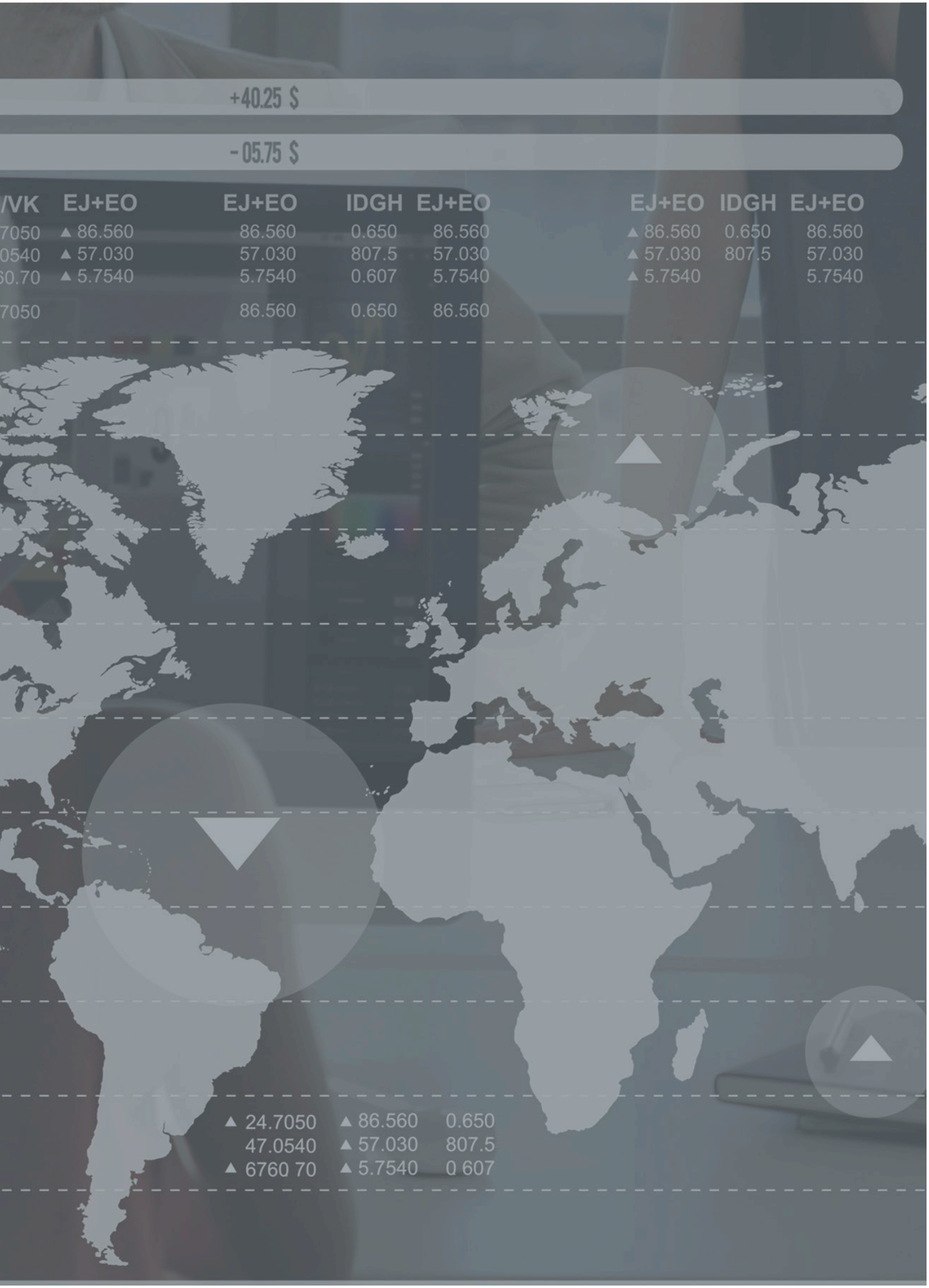
ENDNOTES

[1] The analysis of this chapter focuses on all Latin American and the Caribbean countries listed in the corresponding UN regional group of the General Assembly (see https://www.un.org/dgacm/en/content/regional-groups).
[2] The results of this assessment are in line with those reported by ECLAC (2023a), which also highlight the important achievements of the region in terms of energy access but raise concerns about slow progress in terms of clean energy targets.
[3] The concern about job creation in the region is also shared by ECLAC (2023b), which emphasizes that the current rates of annual employment growth will not be sufficient to close existing employment gaps and also raises concerns about the high prevalence of informal labour.
[4] Abramo (2022).
[5] Frisancho et al. (2023).
[6] ECLAC (2023c) also highlights the important gaps of the region in terms of industry and innovation. In the case of industry, the relative importance of manufacturing in the region's economy has decreased and, in 2021, the region recorded the lowest average share in two decades.
[7] The Caribbean includes: Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines and Trinidad and Tobago.
[8] Central America includes: Belize, British Virgin Islands, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. It is important to note that the results for this subregion are significantly influenced by Mexico, which represents more than two-thirds of the region's population.
[9] South America includes: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela.
[10] Sections 8.2 and 8.3 build on the background report prepared by Ferraz and Peres (2024) and regional consultations organized with UNIDO Member States and regional experts in June 2023.
[11] OECD et al. (2019).
[12] IEA (2023d).
[13] Bernal et al. (2023).
[14] IEA (2023d).
[15] Dirección Nacional de Promoción y Economía Minera (2022).
[16] OLADE (2022).
[17] ECLAC (2023d).
[18] IEA (2021b).
[19] UNIDO (2019a).
[20] Dini et al. (2021).
[21] Albrieu et al. (2019).
[22] Dini and Stumpo (2020).
[23] These initiatives were identified through a process of natural language text mining that searched for the co-occurrence of the terms "digitalization" and "small and medium enterprises" on websites of governments, ministries and agencies of LAC countries. See background report produced by Ferraz and Peres (2024) for the details.
[24] Gontero and Novella (2021).
[25] IMF (2023).
[26] Pietrobelli and Seri (2023).
[27] Pietrobelli and Seri (2023).
[28] UNIDO (2021a).
[29] Andreoni (2021).

PART C

Annexes and references

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ANNEXES


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Chart Title
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Leaf 10
Leaf 16
Stem 5
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Leaf 15

A.1 SDG ASSESSMENT

IDR24 introduces a novel approach to assessing the progress of developing regions towards achieving relevant targets of SDGs 7, 8 and 9. This methodology goes beyond traditional analyses, offering a detailed examination of progress and challenges tailored to regional perspectives. The assessment is based on the global indicator framework of the 2030 Agenda for Sustainable Development, developed by the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs), adopted by the United Nations General Assembly (UNGA) in 2017, and further refined in subsequent years.

A.1.1 Data selection

The data used in this analysis are sourced exclusively from the SDG Global Database,[1] which is maintained by the Statistics Division of the United Nations Department of Economic and Social Affairs. The SDG Global Database compiles data provided by the UN system and other agencies, including UNIDO, which act as the custodians of specific indicators. Using the most recent data available as of September 2023, the dataset spans from 2000 to 2021 and covers all countries with available data.

The analysis focused on 20 indicators from the 34 official unique indicators included in SDGs 7, 8 and 9. These 20 indicators met the following two criteria (see Table A.2 at the end of the Annex for details):

1. **Country coverage**: The indicator should contain available data for at least one year between 2015 and 2021 in countries representing 50 per cent or more of the total population in each of the four analysed developing regions.[2]

2. **Analytical relevance**: The indicator should be related to one of the nine analytical dimensions used in the analysis (see Table A.1).[3]

A.1.2 Setting of targets

For each indicator included in the analysis, the next step was to establish a quantitative and fixed target for the year 2030. This was achieved in accordance with the following rules:

1. **Ideal target:** Whenever possible, the target was set based on the ideal outcome outlined in the 2030 Agenda. This typically represents a fixed value identified in the wording of the target (for instance, indicators such as "population with access to electricity" have a clear goal of 100 per cent coverage, reflecting the universal objectives of the SDGs).[4]

2. **Best observed performance:** If there is no ideal value, the target was defined based on the best performance observed in the dataset, excluding outliers. This method considers the directionality of indicators and sets realistic and achievable targets by avoiding anomalous values that could distort the objective:

   a. Positive direction indicators: For indicators where higher values represent better outcomes, the target was set at the value of the 95th percentile of the distribution of all values observed during the period covered by the data.

   b. Negative direction indicators: Conversely, for indicators where lower values denote better performance, the target was set at the value of the 5th percentile of the distribution of all values observed in the period covered by the data.

The complete list of indicators with the defined quantitative target and the type of target is available in Table A.2.

A.1.3 Data gap imputations

After setting the targets, any missing data points in the official SDG dataset were filled using standard imputation techniques. This process followed a three-step algorithm designed to apply the most appropriate imputation method given the data's characteristics and the pattern of missing data:

1. The linear interpolation method was used whenever there were missing values between two years with data;

2. The automatic ARIMA (auto regressive integrated moving average)[5] model was used to impute forward values whenever there were at least five consecutive years with available data;

3. The last Observation Carried Forward approach was used to impute missing data forward in time, and the Next Observation Carried Backward method for backward imputation, whenever the previous two methods could not be applied.

A.1.4 Normalization

After filling all possible gaps in the country-level series, the resulting data were normalized to ensure comparability across all indicators, countries and years. Each indicator was normalized on a scale from 0 to 100 per cent using a min-max normalization technique. This method adjusts the data points so that a score of 100 per cent directly corresponds to the achievement of the predefined fixed target. A value of 100 per cent, consequently, reflects optimal target achievement. The normalization is applied universally across all countries and years included in the analysis. This ensures that each data point is comparably scaled, making it easier to evaluate progress.

For indicators where a higher value indicates better performance (positive direction), normalization directly scales the values towards the defined target, with the target representing the maximum (100 per cent) on the scale. Conversely, for indicators with a negative direction, where lower values are better, the transformation is on the inverse so that lower values approach the maximum normalized value (100 per cent).

A.1.5 Clustering by dimension

To conduct the assessment of SDGs 7, 8 and 9, the indicators included in the analysis were clustered into three analytical dimensions for each SDG.[6] Table A.1 provides an overview of the indicators included in each dimension. The data was aggregated into these dimensions by calculating a simple average of the normalized values of the indicators in each dimension. This method provides a composite score for each dimension, reflecting the collective performance of the indicators it encompasses.

Table A.1 **Official indicators included in each dimension of SDGs 7, 8 and 9**

SDG	Dimension	Indicators
7	Energy access	7.1.1
	Energy efficiency	7.3.1
	Clean energy	7.1.2, 7.2.1, 7.b.1
8	Employment	8.3.1, 8.5.2, 8.6.1, 8.8.2
	Economic growth	8.1.1, 8.2.1
	Resource efficiency	8.4.2
9	Industry	9.2.1, 9.2.2, 9.4.1, 9.b.1
	Innovation	9.5.1, 9.5.2
	Infrastructure	9.1.2, 9.c.1

Note: See Table A.2 for a detailed description of the indicators and targets used in the assessment.

Source: UNIDO elaboration.

A.1.6 Regionalization

After clustering the normalized indicators into the three analytical dimensions for each SDG, the next step was to aggregate these data points at the regional and subregional levels. For this, country-level data for each dimension were aggregated into the defined regions and subregions using population weighted averages. The list of countries included in each region and subregion is presented in Annex A.2, Boxes A.1-5.

This regional approach allows for a better understanding of the unique economic context and stage of development in each area. In Africa and Asia-Pacific, the regional aggregate includes all economies that are not classified as high-income industrial economies in the UNIDO classification of countries by stage of industrial development.[7] For Eastern Europe and Latin America and the Caribbean (LAC), this covers all states listed in their respective United Nations regional groups of the General Assembly.

A.1.7 Assessment

The values obtained through this approach were used to assess regional and subregional progress towards the SDGs under analysis along three dimensions:

1. **Current situation:** The final composite index, ranging from 0 to 100 per cent (where 100 per cent denotes optimal target achievement), served to evaluate the status in 2021 (the latest year with data) across regions and subregions. This index indicates the percentage of target achievement and can also be used to quantify the gap towards the target (calculated as 1 minus the index value).

2. **Pre-pandemic trends:** To capture the dynamics of progress made in recent years, the average annual speed of convergence towards the SDG targets during the decade before the COVID-19 pandemic were calculated. This was done by calculating the difference between the index values in 2019 and 2009 and then dividing it by ten.[8] The exercise offered insights into the trajectory of each region's efforts in narrowing the gaps in SDG achievement and indicates whether current trends need to be reversed or accelerated to meet the 2030 targets.

3. **Projections to 2030:** By building on the data estimated in the previous two steps, it is possible to derive simple projections to the year 2030, assuming that the pre-pandemic trends are restored. This was done by extrapolating the 2021 values with the annual speed of convergence observed before the pandemic. This projection is based on a "business as usual" scenario. It anticipates the index values for each SDG dimension in 2030 and identifies the expected gaps in achieving the targets.

Table A.2 **Official SDG indicators and targets used in the assessment**

Goal	Indicator	Short description	Dimension	Included	Indicator series used	Target type	Target value
SDG 7	7.1.1	Access to electricity	Energy access	YES	*Proportion of population with access to electricity (%)*	Ideal	100
	7.3.1	Energy intensity	Energy efficiency	YES	*Energy intensity level of primary energy (megajoules per constant 2017 PPP GDP)*	Best performer	2.0
	7.1.2	Reliance on clean fuels and technology	Clean energy	YES	*Proportion of population with primary reliance on clean fuels and technology (%)*	Ideal	100
	7.2.1	Renewable share in energy consumption	Clean energy	YES	*Renewable energy share in total final energy consumption (%)*	Ideal	100
	7.b.1	Installed renewable energy-generating capacity	Clean energy	YES	*Installed renewable electricity-generating capacity (watts per capita)*	Best performer	1,260
	7.a.1	International support for clean energy R&D and production	Other	NO[b]	-	-	-
SDG 8	8.3.1	Informal employment	Employment	YES	*Share of informal employment, ILO harmonized estimates, 13th ICLS (%)*	Ideal	0.0
	8.5.1	Earnings of employees	Employment	NO[a]	-	-	-
	8.5.2	Unemployment	Employment	YES	*Unemployment rate, 13th ICLS (%)*	Best performer	1.8
	8.6.1	Youth not in education, employment or training	Employment	YES	*Proportion of youth not in education, employment or training, 13th ICLS (%)*	Best performer	5.5
	8.7.1	Child labour	Employment	NO[a]	-	-	-
	8.8.1	Occupational injuries	Employment	NO[a]	-	-	-
	8.8.2	National compliance with labour rights	Employment	YES	*Level of national compliance with labour rights (freedom of association and collective bargaining) based on ILO textual sources and national legislation (0 = best, 10 = worst)*	Ideal	0
	8.b.1	National strategy for youth employment	Employment	NO[a]	-	-	-
	8.1.1	GDP per capita growth	Economic growth	YES	*Annual growth rate of real GDP per capita (%)*	Best performer	7.5
	8.2.1	GDP per worker growth	Economic growth	YES	*Annual growth rate of real GDP per employed person (%)*	Best performer	6.7
	8.4.1	Material footprint	Resource efficiency	NO[a]	-	-	-
	8.4.2	Material consumption	Resource efficiency	YES	*Domestic material consumption per unit of GDP (kg per constant 2015 $)*	Best performer	0.1
	8.10.1	Commercial bank branches and ATMs	Other	NO[b]	-	-	-
	8.10.2	Adults with bank accounts	Other	NO[b]	-	-	-
	8.9.1	Tourism share in GDP and in growth rate	Other	NO[b]	-	-	-
	8.a.1	Aid for Trade	Other	NO[b]	-	-	-
SDG 9	9.2.1	Manufacturing value added	Industry	YES	*Manufacturing value added (constant 2015 $) as a proportion of GDP (%)*	Best performer	24.5
					Manufacturing value added per capita (constant 2015 $)	Best performer	7,044
	9.2.2	Manufacturing employment	Industry	YES	*Share of manufacturing employment in total employment, 13th ICLS (%)*	Best performer	22.4
	9.3.1	Small-scale industries share in total industry	Industry	NO[a]	-	-	-
	9.3.2	Small-scale industries with a loan or line of credit	Industry	NO[a]	-	-	-
	9.4.1	CO_2 emission	Industry	YES	*CO_2 per unit of manufacturing value added (kg of CO_2 per constant 2015 $)*	Best performer	0.1
	9.b.1	Medium and high-tech industry value added	Industry	YES	*Proportion of medium and high-tech manufacturing value added in total value added (%)*	Best performer	54.4
	9.5.1	R&D expenditure	Innovation	YES	*R&D expenditure as a proportion of GDP (%)*	Best performer	3.1
	9.5.2	Researchers	Innovation	YES	*Researchers (in full-time equivalent) per million inhabitants (per 1,000,000 population)*	Best performer	8,714
	9.1.1	Rural population living close to all-season roads	Infrastructure	NO[a]	-	-	-
	9.1.2	Passenger and freight volumes, by mode of transport	Infrastructure	YES	*Container port traffic, maritime transport (twenty-foot equivalent units, per capita)*	Best performer	1.2
					Passenger volume (passenger kilometres per capita)	Best performer	7,660
	9.c.1	Mobile network coverage	Infrastructure	YES	*Proportion of population covered by at least a 3G mobile network (%)*	Ideal	100
	9.a.1	International support to infrastructure	Other	NO[b]	-	-	-

Note: a) Excluded due to lack of data availability for all regions; b) Excluded because the indicator is not relevant for the analytical dimensions used in the assessment. CO_2 = Carbon dioxide emissions; ICLS = International Conference of Labour Statisticians; PPP = Purchasing power parity; R&D = Research and development; GDP = gross domestic product.

Source: UNIDO elaboration.

A.2 COUNTRY AND ECONOMY GROUPS

A.2.1 Country/area classification by geographical regions

Box A.1 Africa

Central Africa
Angola[a]
Cameroon
Central African Republic[a]
Chad[a]
Congo
D.R of the Congo[a]
Equatorial Guinea
Gabon
Sao Tome and Principe[a]

Eastern Africa
Burundi[a]
Comoros[a]
Djibouti[a]
Eritrea[a]
Ethiopia[a]
Kenya
Madagascar[a]
Malawi[a]
Mauritius
Mozambique[a]
Rwanda[a]
Seychelles
Somalia
South Sudan
Uganda[a]
United Republic of Tanzania[a]
Zambia[a]
Zimbabwe

Northern Africa
Algeria
Egypt
Libya
Morocco
Sudan
Tunisia

Southern Africa
Botswana
Eswatini
Lesotho[a]
Namibia
South Africa

Western Africa
Benin[a]
Burkina Faso[a]
Cabo Verde
Côte d'Ivoire
Gambia[a]
Ghana
Guinea
Guinea-Bissau[a]
Liberia[a]
Mali[a]
Mauritania[a]
Niger[a]
Nigeria
Senegal[a]
Sierra Leone[a]
Togo[a]

Note: a) Least developed countries (LDCs).
Source: UNIDO elaboration.

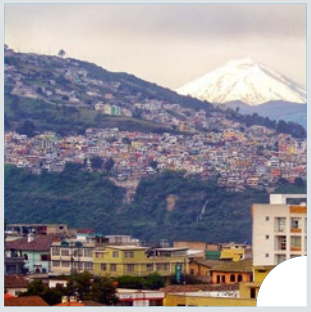
Box A.2 Americas

Latin America and the Caribbean

Caribbean
Anguilla
Antigua and Barbuda[b]
Aruba
Bahamas[b]
Barbados[b]
British Virgin Islands
Cayman Islands
Cuba[b]
Curaçao
Dominica[b]
Dominican Republic[b]
Grenada[b]
Haiti[a,b]
Jamaica[b]
Montserrat
Puerto Rico
Saint Kitts and Nevis[b]
St. Lucia[b]
St. Vincent and the Grenadines[b]
St. Maarten (Dutch part)
Trinidad and Tobago[b]
Turks and Caicos Islands

Central America
Belize[b]
Costa Rica[b]
El Salvador[b]
Guatemala[b]
Honduras[b]
Mexico[b]
Nicaragua[b]
Panama[b]

South America
Argentina[b]
Bolivia (P. S.)[b]



Brazil[b]
Chile[b]
Colombia[b]
Ecuador[b]
Guyana[b]
Paraguay[b]
Peru[b]
Suriname[b]
Uruguay[b]
Venezuela (B.R of)[b]

Northern America
Bermuda
Canada
Greenland
United States of America

Note: a) LDCs; b) Members of the LAC regional group of the UN General Assembly.
Source: UNIDO elaboration.

Box A.3 **Asia-Pacific**

Asia

Central Asia
Kazakhstan
Kyrgyzstan
Tajikistan
Turkmenistan
Uzbekistan

Eastern Asia
China
China, Hong Kong SAR
China, Macao SAR
China, Taiwan Province[b]
D.P.R of Korea
Japan[b]
Mongolia
Republic of Korea[b]

South-eastern Asia
Brunei Darussalam
Cambodia[a]
Indonesia
Lao P.D.R.[a]
Malaysia
Myanmar[a]
Philippines
Singapore
Thailand
Timor-Leste
Viet Nam

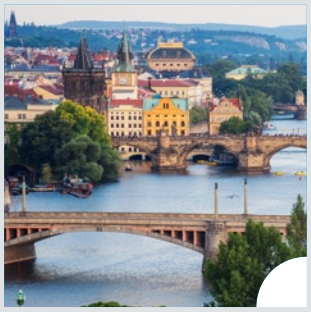
Southern Asia
Afghanistan[a]
Bangladesh[a]
Bhutan
India
Iran (I.R. of)
Maldives
Nepal[a]
Pakistan
Sri Lanka

Western Asia
Bahrain
Cyprus
Iraq
Israel[b]
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
State of Palestine
Syrian Arab Republic
Türkiye
United Arab Emirates
Yemen

Pacific
Cook Islands
Fiji
French Polynesia
Kiribati[a]
Marshall Islands
Micronesia (F.S of)
Nauru[b]
New Caledonia[b]
Palau
Papua New Guinea
Samoa
Solomon Islands
Tonga
Tuvalu[a]
Vanuatu

Note: a) LDCs; b) High-income industrial economy according to the UNIDO classification (see Box A.6).
Source: UNIDO elaboration.

Box A.4 **Europe and South Caucasus**



Europe

Central Eastern Europe
Belarus[a]
Bulgaria[a]
Czechia[a]
Hungary[a]
Poland[a]
Republic of Moldova[a]
Romania[a]
Russian Federation[a]
Slovakia[a]
Ukraine[a]

Northern Europe
Denmark
Estonia[a]
Finland
Iceland
Ireland
Latvia[a]
Lithuania[a]
Norway
Sweden
United Kingdom

Southern Europe
Albania[a]
Andorra
Bosnia and Herzegovina[a]
Croatia[a]
Greece
Italy
Kosovo
Malta
Montenegro[a]
North Macedonia[a]
Portugal
San Marino
Serbia[a]
Slovenia[a]
Spain

Western Europe
Austria
Belgium
France
Germany
Liechtenstein
Luxembourg
Monaco
Netherlands
Switzerland

South Caucasus
Armenia[a]
Azerbaijan[a]
Georgia[a]

Note: a) Member of the Eastern Europe regional group of the UN.
Source: UNIDO elaboration.

Box A.5 **Oceania**

Australia
New Zealand

Source: UNIDO elaboration.

A.2.2 UNIDO classification by stage of industrial development

Box A.6 High-income industrial economies

Australia
Austria
Belgium
Brunei Darussalam
Canada
China, Taiwan Province
Croatia
Czechia
Estonia
Finland
France
Germany
Hungary
Ireland
Israel
Italy
Japan
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Nauru
Netherlands
New Caledonia
New Zealand
Panama
Poland
Puerto Rico
Republic of Korea
Romania
San Marino

Singapore
Slovakia
Slovenia
Spain
Sweden
Switzerland
Trinidad and Tobago
United Kingdom
United States of America
Uruguay

Source: UNIDO (2023c).

Box A.7 High-income industrializing economies

Andorra
Anguilla
Antigua and Barbuda
Aruba
Bahamas
Bahrain
Barbados
Bermuda
British Virgin Islands
Cayman Islands
Chile
China, Hong Kong SAR
China, Macao SAR
Cook Islands
Curaçao
Cyprus
Denmark
French Polynesia
Greece
Greenland
Iceland
Kuwait
Monaco
Montserrat
Norway
Oman

Portugal
Qatar
Saint Kitts and Nevis
Saudi Arabia
Seychelles
Sint Maarten (Dutch part)
Turks and Caicos Islands
United Arab Emirates

Source: UNIDO (2023c).

Box A.8 Middle-income industrial economies

Argentina
Belarus
Brazil
Bulgaria
China
Colombia
Costa Rica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eswatini
Indonesia
Jordan
Malaysia
Mauritius
Mexico
Paraguay
Peru
Philippines
Russian Federation
Serbia
South Africa
Sri Lanka
Suriname

Thailand
Turkmenistan
Türkiye
Viet Nam

Source: UNIDO (2023c).

Box A.9 **Middle-income industrializing economies**

Albania
Algeria
Angola
Armenia
Azerbaijan
Bangladesh
Belize
Benin
Bhutan
Bolivia (P.S. of)
Bosnia and Herzegovina
Botswana
Cabo Verde
Cambodia
Cameroon
Comoros
Congo
Cuba
Côte d'Ivoire
Djibouti
Dominica
Fiji
Gabon
Georgia
Ghana
Grenada
Guatemala
Guyana
Haiti
Honduras
India
Iran (I.R. of)
Iraq
Jamaica
Kazakhstan
Kenya
Kiribati
Kosovo
Kyrgyzstan
Lao P.D.R.
Lebanon
Lesotho
Libya
Maldives
Marshall Islands
Mauritania
Micronesia (F.S. of)
Mongolia
Montenegro
Morocco

Myanmar
Namibia
Nepal
Nicaragua
Nigeria
North Macedonia
Pakistan
Palau
Papua New Guinea
Republic of Moldova
Saint Lucia
St Vincent and the Grenadines
Samoa
Sao Tome and Principe
Senegal
Solomon Islands
State of Palestine
Tajikistan
Timor-Leste
Tonga
Tunisia
Tuvalu
Ukraine
United Republic of Tanzania
Uzbekistan
Vanuatu
Venezuela (B.R. of)
Zimbabwe

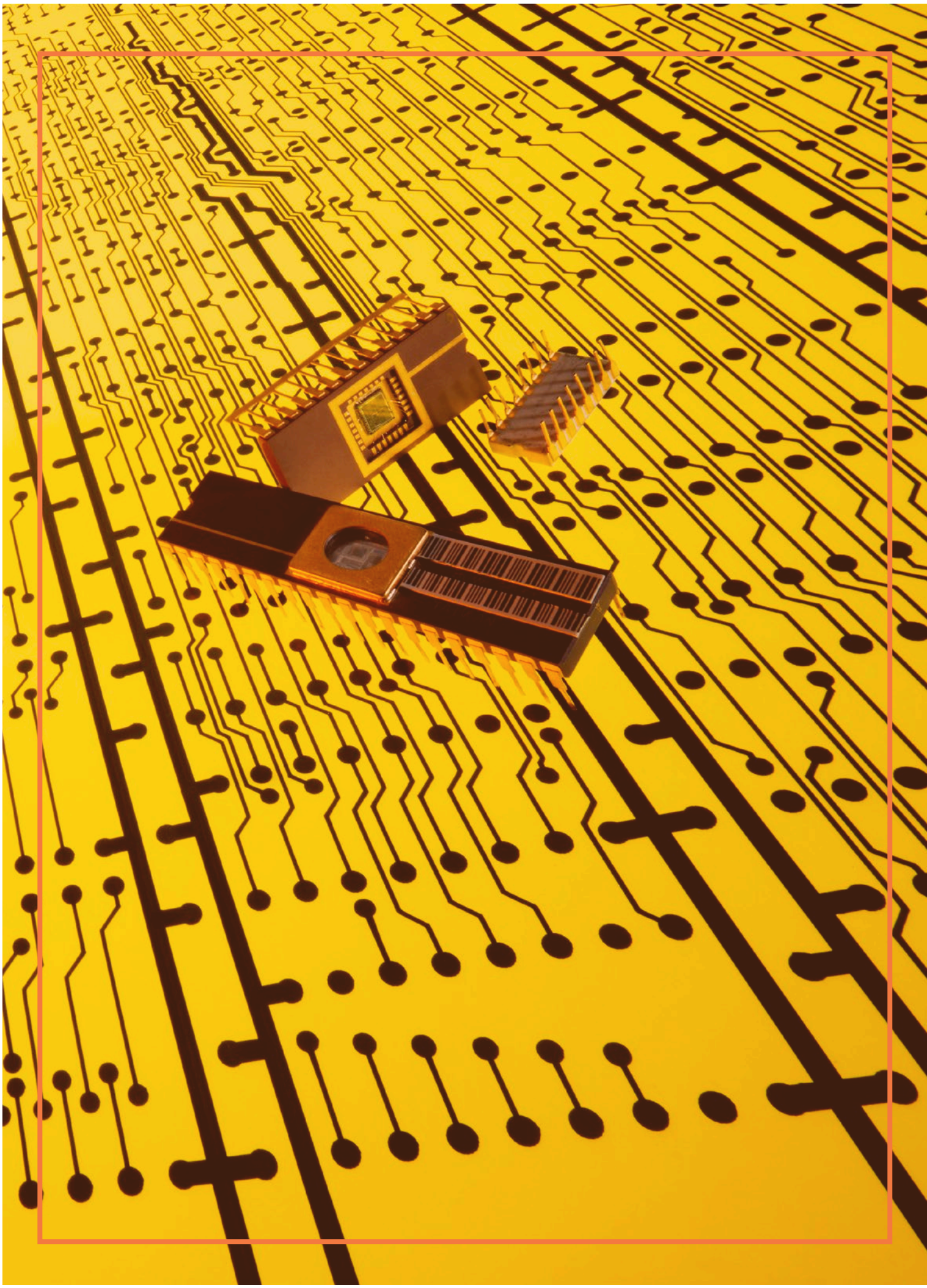
Source: UNIDO (2023c).

Box A.10 **Low-income**

Afghanistan
Burkina Faso
Burundi
Central African Republic
Chad
D.P.R of Korea
D.R. of the Congo
Eritrea
Ethiopia
Gambia
Guinea
Guinea-Bissau
Liberia
Madagascar
Malawi
Mali
Mozambique
Niger
Rwanda
Sierra Leone
Somalia
South Sudan
Sudan
Syrian Arab Republic

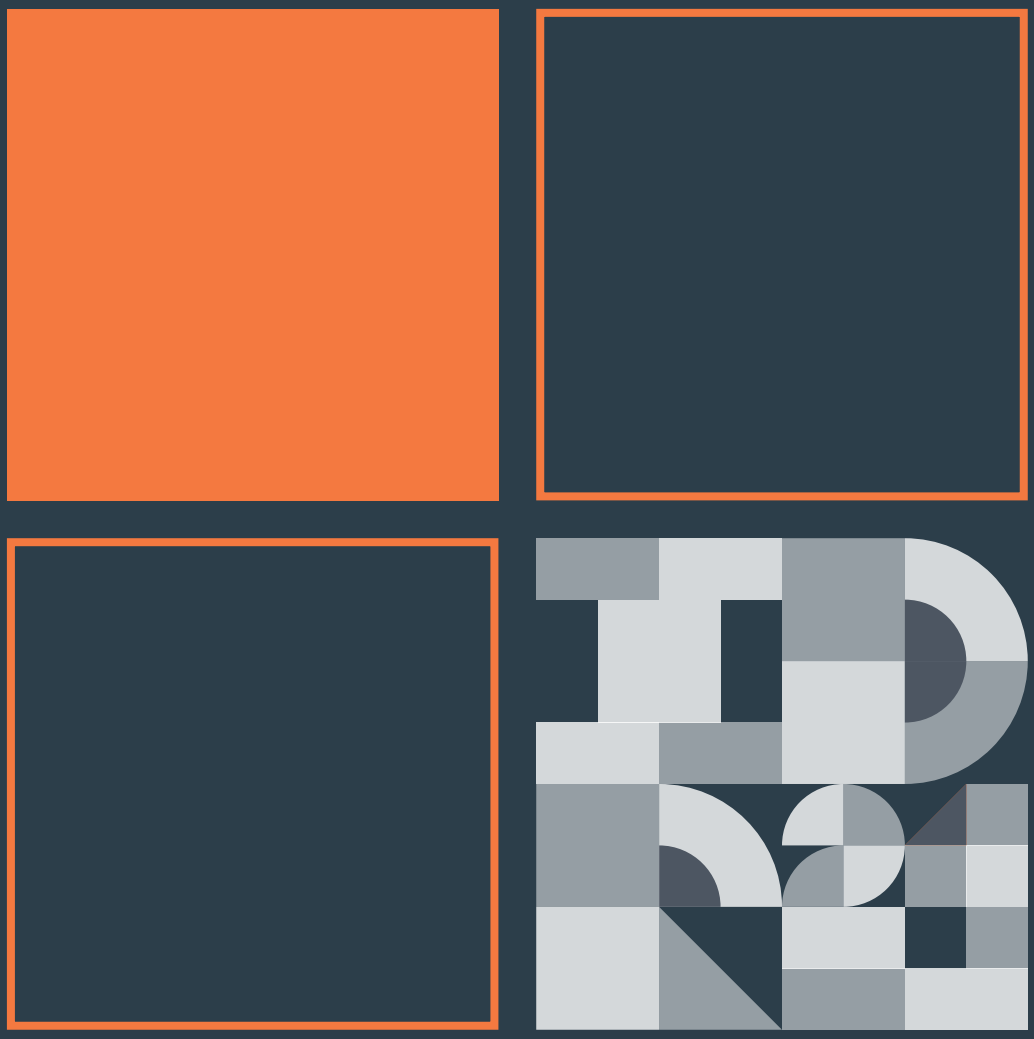
Togo
Uganda
Yemen
Zambia

Source: UNIDO (2023c).



ENDNOTES

[1] UNSD (2023a).
[2] Eight indicators were dropped for not meeting this criterion. The only exception to the country coverage criteria is the indicator for informal employment in Eastern Europe, where the coverage is about 30 per cent of the population due to lack of data for the Russian Federation.
[3] Six indicators were dropped for not meeting this criterion.
[4] Unfortunately, the SDGs and their indicator framework frequently lack clear numeric objectives: out of the total 169 SDG targets, only 30 per cent have specific (implicit or explicit) target values according to Bidarbakhtnia (2020). In the 20 indicators considered in this analysis, only six have specific target values.
[5] This technique leverages the past values of the time series to predict future observations but does not impute data backwards to preserve the chronological integrity of the dataset.
[6] This methodological approach is also used in ILO (2019), which evaluates progress towards SDG 8 by clustering its indicators with other SDGs into three dimensions: sustained growth; social inclusion and decent work; and environmental integrity. It then assesses the distance to the SDG targets in these dimensions. The approach highlights the interlinkages between SDGs and allows the evaluation of regional progress towards specific aspects of each SDG.
[7] UNIDO (2023c).
[8] The average rate of convergence is calculated over the period 2010-2019 to minimize possible noise in the data due to the extraordinary circumstances of the COVID-19 pandemic.



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United Nations Industrial Development Organisation (UNIDO)
Vienna International Centre
Wagramer Str. 5, P.O. Box 300,
A-1400 Vienna, Austria

+43 1 26026-0

www.unido.org

unido@unido.org

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