





SDG 9

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

A. Introduction

A significant shift towards sustainable and inclusive industrialization is urgently needed in the Arab region. Infrastructure development is crucial in a context of rising unemployment, the inefficient and unsustainable use of natural resources, increasing debt and protracted crises. Infrastructure projects continue to face serious challenges, including financing constraints, limitations in institutional capacity and crises.

Despite recent strides in R&D, a persistent gap remains between scientific research and the demands of industries and local markets. The volume of research and publications is disconnected from practical technological applications and has little significant impact on economies and societies. There are notable attempts to mainstream technology and seize opportunities from digitalization in various economic sectors, yet the integration of technologies into manufacturing processes is either limited or non-existent. In cases where greater engagement with technologies exists, countries tend to be users instead of developers or exporters. This is especially problematic given the march of the fourth industrial revolution globally, which is leaving the region behind.

Inclusive and sustainable industrialization drives sustained economic growth and increases opportunities for decent jobs (SDG 8). Accordingly, it helps reduce poverty (SDG 1), hunger (SDG 2) and inequalities (SDGs 5 and 10). It can also improve health and well-being (SDG 3), increase resource and energy efficiency (SDGs 6, 7, 11 and 12), and reduce greenhouse gases and other polluting emissions, including from chemicals (SDGs 13, 14 and 15).

The growth of the manufacturing sector is essential for industrial development and usually generates innovations. If it is not sustainably planned, however, industrial development imposes trade-offs in terms of the SDGs due to increased emissions (SDG 13) and consumption of natural resources (SDGs 6, 7, 12 and 15).

Reliable, inclusive and sustainable infrastructure has a key role in improving rural and urban livelihoods (SDG 11). Improvements in transport can strengthen logistics and supply chains for food, boost agricultural productivity (SDG 2) and facilitate access to services such as health (SDG 3) and education (SDG 4).

R&D can make contributions to most, if not all, of the SDGs. It may be a precondition to achieving some goals. While R&D is necessary to advance agricultural production (SDG 2), produce vaccines (SDG 3) and develop clean energy (SDG 7), SDG 9 addresses the overall scientific research system.

Sources: UNIDO, 2021b; Mantlana and Maola, 2019.



What the data say

Data included in this section are from the *ESCWA Arab SDG Monitor*, unless otherwise indicated (accessed in December 2023).



Manufacturing remains weak despite progress after the COVID-19 pandemic. **Manufacturing value added as a proportion of GDP** was 10.3 per cent in the Arab region in 2022 compared to a world average of 16.7 per cent.



Manufacturing value added per capita was \$621.80 in 2022, around one third of the world average. Alarming, the regional value has regressed since 2015; it was further negatively impacted by the pandemic. At the subregional level, manufacturing value added per capita was significantly higher in Gulf Cooperation Council countries (\$2,898.50 in 2022). It has returned to and even exceeded its pre-pandemic level.



In a context of de-industrialization, **manufacturing employment** in the region has regressed since 2000 and was 10.3 per cent in 2021, compared to a world average of 13.6 per cent.



Small-scale industries lack financial support. Only one in seven **small manufacturers benefited from a loan or line of credit** in 2023, which was half the global value.



Carbon dioxide emissions per unit of manufacturing value added have decreased in the region since 2015, reaching 1.1 kilograms per dollar in 2020, but they are still around double the world value. Carbon dioxide emitted from fuel combustion in the region is low compared to other regions and constituted 4.6 per cent of the amount emitted globally in 2020.



Innovation remains underfunded and underprioritized. In 2021, the region had 630 **full-time researchers per million inhabitants** compared to a world average of 1,353. Only 0.61 per cent of GDP was spent regionally on R&D; the world average was 1.93 per cent.



The proportion of **medium- and high-tech manufacturing value added** reached 32.4 per cent of total value added in 2020. Although the share has fluctuated over the years, it has seen an overall increase of 1.2 per cent since 2000. The global trend has regressed.



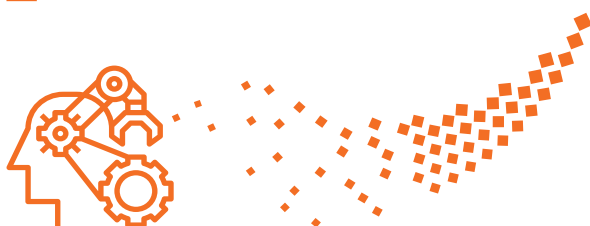
Across the region, **2G mobile network coverage** exceeded 96 per cent in 2022, almost equal to the world average. The percentage was the same for **3G coverage**. Yet **4G coverage** was 76 per cent compared to a world average of 88 per cent.



The **volume of passengers travelling by air** increased regionally and globally from 2017 to 2019 but dropped substantially worldwide due to the COVID-19 pandemic. By 2021, recovery in the Arab region was slow and had reached only one third of pre-pandemic figures.



Freight volume transported by air (ton kilometres) dropped by approximately 14 per cent in 2020 due to the pandemic. It fully recovered and exceeded its pre-pandemic values in 2021, reaching over 33 billion ton kilometres or 15 per cent of the global value. Most of this value is transported by high-income countries in the region, which rank third after Europe and North America and East and South-East Asia.



For an up-to-date view of SDG 9 data at the national and regional levels and an analysis of data availability, please visit the *ESCWA Arab SDG Monitor*.

On the road to 2030 – suggested policy approaches to accelerate progress on SDG 9

- Improve the alignment of infrastructure strategies with national and regional trade strategies, and strengthen horizontal and vertical coordination within governments on infrastructure planning, public investments, public procurement and public-private partnerships.
- Prioritize manufacturing as a means for economic diversification and job creation while focusing on niche markets, utilizing technology and integrating the principles of sustainable development.
- Integrate innovation within public policy planning at the national level and enhance collaboration on innovation projects between academia and industry to encourage innovation across sectors.
- Support the science-policy interface and develop regulations that help channel scientific advice to policymakers. Establish national frameworks or observatories dedicated to industrial data collection to support the monitoring and analysis of industrial performance and to feed information into decision-making and policy design.
- Strengthen regional cooperation and develop policies, processes and structures for the effective transfer of technology, at the intra- and interregional levels, particularly for manufacturing.
- Invest in building human capacities for establishing and operating innovative, technology-focused start-ups, including through upskilling and reskilling, and push for a cultural shift in favour of entrepreneurship.
- Diversify financing instruments available to small and medium enterprises (SMEs), including small-scale industries, and facilitate their access to such financing. To that end, it is important to remove structural barriers related to business registration, licensing, permits, taxes and other relevant processes.

B. The policy landscape on SDG 9

SDG 9 is a composite goal that is difficult to fully trace through the policy landscape. This chapter addresses two core policy areas relevant across the Arab region.

The first area encompasses **sustainable industrialization policies**, with a focus on the manufacturing sector and the development of SMEs. Industrial strategies geared towards economic diversification are means to build sectors that are independent from oil and gas. Policies can focus on accelerating the development of the industrial sector, improving its competitiveness and promoting investments, while encouraging clean production and environmental considerations with clear linkages to SDGs 12 and 13.

The second area entails **scientific R&D and innovation**, with an emphasis on national strategies and means of implementation, monitoring and funding. Effective R&D strategies translate scientific research into practical applications that respond to the demands of the marketplace. Such strategies are coupled with monitoring frameworks and nationally relevant indicators that go beyond counting the number of researchers or amounts of funding allocated.¹

Infrastructure analysis is approached from a plans and projects viewpoint. Traditionally, the definition of infrastructure has focused on large physical systems and networks necessary for nations to function, including transport, energy, water and sanitation, and telecommunications. The expansion of this understanding to include institutions providing health care, education and governance confirms infrastructure development as a priority for achieving the SDGs.

For information on each infrastructure type, refer to the corresponding SDG chapters: health-care infrastructure (SDG 3), school infrastructure (SDG 4), water infrastructure (SDG 6), energy infrastructure (SDG 7), urban infrastructure (SDG 11) and ICT infrastructure (SDG 17).



◆ **Infrastructure development in the region is mainly undertaken by governments and financed through public funding and multilateral and bilateral lenders.** Despite overall progress in developing physical infrastructure in the region, performance across countries and infrastructure types is not uniform. For example, while ICT infrastructure is relatively developed, transport infrastructure is limited in terms of connectivity and logistics, a major challenge to trade and productive sectors such as manufacturing.² Despite this backdrop, major infrastructure projects with sizeable investments have been launched in several countries, ranging from new cities to transport schemes and nuclear plants.

The Quality Infrastructure for Sustainable Development (QI4SD) Index was launched in 2022, covering 137 countries. Out of 16 Arab countries included in it, only the **United Arab Emirates** ranks in the top 25 countries globally, followed by **Tunisia** (39), **Saudi Arabia** (45), **Egypt** (56) and **Morocco** (68). The ranking does not correlate to income level; several Arab middle-income countries rank above high-income countries in the region.

The private sector plays a limited but important role through public-private partnerships. Political support to such partnerships is growing with countries taking measures to foster environments that incentivize businesses to provide expertise and help alleviate burdens on public budgets.³ Fifteen Arab countries⁴ have issued public-private partnership laws or updated existing ones in the past 10 years. The attributes and effectiveness of these laws vary according to national contexts and each country's legal framework.

- ◆ **Saudi Arabia** has launched real estate and infrastructure projects worth \$1.25 trillion⁵ as part of implementing its Vision 2030 and fulfilling an overall objective of economic growth and diversification as well as increased employment. The Government has invested in the construction of airports, ports, highways and new industrial and tourism zones. Notable megaprojects include NEOM and the Red Sea development project.
- ◆ As part of its Vision 2030, the Government of **Egypt** has acknowledged that strong infrastructure is a lever for social and economic development. By the end of 2023, infrastructure projects in construction, energy, water and transport were valued at \$400 billion.⁶ The Government is also implementing megaprojects budgeted at more than \$10 billion⁷ for housing, industrial complexes, railways, and undertakings such as the Suez Canal development and the New Administrative Capital.



- ◆ Between 2001 and 2017, **Morocco** invested between 25 and 38 per cent of its GDP⁸ in infrastructure development, one of the highest rates globally. Infrastructure projects in transport, water and sanitation, irrigation, ICT and electricity have significantly improved access rates, thus diminishing the gap between rural and urban areas. Factors that have contributed to progress include partnerships with the private sector, strengthened public procurement and facilitation of mixed ownership with state-owned enterprises. Morocco continues to invest mostly in energy, transport and construction, with a current allocation of around \$150 billion.⁹
- ◆ **Several Arab countries are planning or designing industrial policies to increase the share of manufacturing in GDP and exports as a sector with better prospects for economic diversification and growth** (see the chapter on SDG 8). Industrial policies have been complemented with measures that include identifying niche areas of manufacturing, improving the business environment, strengthening links with scientific research, integrating new technologies, facilitating access to global value chains, promoting exports to global markets and trade negotiations.
- ◆ **Bahrain, Qatar** and the **United Arab Emirates** have specified key performance indicators to assess the increased contribution of the industrial sector to

GDP.¹⁰ **Tunisia** plans to elevate the contribution of manufacturing to GDP to 20 per cent by 2035.¹¹

- ◆ As part of its structural reform, **Egypt** seeks to boost industrialization through targeted interventions in manufacturing, agribusiness and ICT. These measures are expected to increase the collective GDP contribution of these sectors to at least 30 per cent by 2024.
- ◆ **Oman** plans to increase the percentage of industrial exports in total exports from 16 per cent in 2015 to 28 per cent in 2040.
- ◆ The Saudi Advanced Manufacturing Hub was launched in partnership with the World Economic Forum and aims to make **Saudi Arabia** a global hub for industrial innovation and advanced manufacturing. As a result, factories for pharma, aircraft components, metal forming and other industries have been set up, and multinational companies are establishing facilities.
- ◆ The shift in **Morocco** to targeted industrial policies over two decades has positioned the country as a leader in some industries. For example, reforms to the state-owned phosphate corporate put Morocco in the top five global manufacturers of fertilizers.¹²

Measurement gaps

Global indicators have been useful in presenting an overall measurement and comparability framework for the region's industrial performance. For example, the Index of Industrial Production for the Arab region was higher than the global average prior to 2019. Since then, it has dropped and not recovered fully. At a subregional level, the Competitive Industrial Performance Index of high-income countries (0.065) was less than half the value measured globally (0.131) in 2021.

Globally calculated indices may not be sufficient, pointing to a need to develop measurement frameworks and statistical monitoring systems customized to national and regional needs. As a good practice for measuring impact, the [Industrial Observatory of Jordan](#) produces evidence-based industrial analysis. It provides data sets on employment, energy, trade and industry, and includes links to regional and international databases.

Sources: UNIDO calculation of the 2021 values for both indexes; UNIDO, 2024.

- ◆ **To support the implementation of industrial policies, middle- and high-income countries are establishing industrial clusters.** Established or planned industrial clusters, complexes, parks, poles or cities are evident in at least 13 countries.¹³ The concentration of resources (infrastructure, funding and human capacities) in industrial clusters has cultivated a conducive environment for growth and integration into global value chains. Clusters have also brought together different stakeholders, including businesses, government actors and research institutions, although collaboration with academia is still generally weak.

- ◆ **Saudi Arabia** had established 36 industrial cities by 2021 through its Saudi Authority for Industrial Cities and Technology Zones (Modon), which employs over 570,000 workers and has attracted aggregate private sector investment of over \$100 billion.¹⁴

Industrial policies can be complemented with instruments and measures to support local manufacturing. For example, Arab countries are adopting the "Made in" label (**Bahrain, Egypt, Lebanon, Morocco, Saudi Arabia** and the **United Arab Emirates**).

- ◆ **Morocco** has established 149 industrial zones covering a variety of sectors and helping the automotive sector become the first exporting sector providing over 220,000 job opportunities (see the chapter on SDG 8).¹⁵

Patenting activities

Patents are a useful tool for stimulating technology and industry development. They are also relevant as a proxy for measuring innovation. The share of patents in the region compared to the world remains very low, although it has slightly improved since 2018. Patent applications in the region comprised a mere 0.5 per cent of patents worldwide in 2022, with a total of 17,260 applications and only 5,786 patent grants. The top countries, by order of contribution, were **Saudi Arabia, Morocco, the United Arab Emirates, Egypt** and **Algeria**.

Sources: WIPO, 2023. For more information, see ESCWA, 2024.





◆ **There are some promising efforts to make industries more sustainable.** Although industrial policies in the region are generally sector-specific and focused on economic growth, at least eight Arab countries¹⁶ have integrated some elements of sustainable industrial development in their policies and considered social and environmental components.

Net-zero commitments present opportunities for developing industrial infrastructure and ecosystems, and strengthening linkages with the energy and agriculture sectors.

- ◆ The Ministry of Industry and Advanced Technology in the **United Arab Emirates** seeks to increase the efficiency and sustainability of production cycles and supply chains by driving R&D, setting standards for industrial infrastructure, and implementing policies to reduce resource consumption and support carbon neutrality efforts.
- ◆ The most recent industrial strategy of **Bahrain** promotes the circular economy, environmental and social governance, and net-zero carbon emissions.
- ◆ **Morocco** plans to enhance the use of green energy and has a policy package including environment laws and financial incentives for reducing industrial pollution.

◆ **Efforts are underway to strengthen the role of SMEs and improve their competitiveness through focused measures to foster innovation.** SMEs in the region account for more than 90 per cent of businesses across different economic sectors, a share that may reach 99 per cent in **Algeria**.¹⁷ To counter barriers to SME growth, national measures are no longer limited to grants or tax exemptions but extend to providing digital transformation services, advice, mentoring, capacity-building, access to funds and links to global value chains. Sixteen Arab countries¹⁸ support SMEs through strategies and institutions, or have passed or updated laws to facilitate access to funding, relax restrictions on establishing small firms or simplify business procedures.

SME growth and success depends on removing structural barriers in the business environment. Establishment of a fund to support SMEs, for example, will not lead to successful results if firms continue to face obstacles such as cumbersome regulations and the limited availability of skills.

SME digitalization efforts are lagging even as digitalization is key for innovation and will help SMEs reduce costs, improve efficiency, and access markets and resources such as training opportunities, talent recruitment networks and financing. While there are studies on digitalization in SMEs, a gap persists in formally measuring digitalization based on indicators such as access to and use of e-payment gateways and e-commerce.

- ◆ The Tamkeen government agency of **Bahrain** assists the development of the private sector, offers skills-building services and facilitates access to finance. It focuses on SMEs, start-ups and entrepreneurs, particularly high-potential and innovative ones. In 2022, Tamkeen contributed over \$259.95 million to the economy of Bahrain and supported more than 18,400 employment and training opportunities.¹⁹
- ◆ **Oman** has been shaping and sustaining an enabling environment for SMEs to operate. The Government allows 100 per cent foreign ownership and has set up a one-stop-shop across ports and free trade zones to reduce red tape and speed the establishment of enterprises.²⁰ On the financing side, Sharakah is a closed joint stock company in Oman that offers a range of services and financial support for SME development. Over 180 SMEs have been assisted in manufacturing, services and trading. Support is planned for transformative industries such as hydroponic farms, fish processing, logistics, tourism, technology and innovation.²¹



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C. Policy trends by subregion

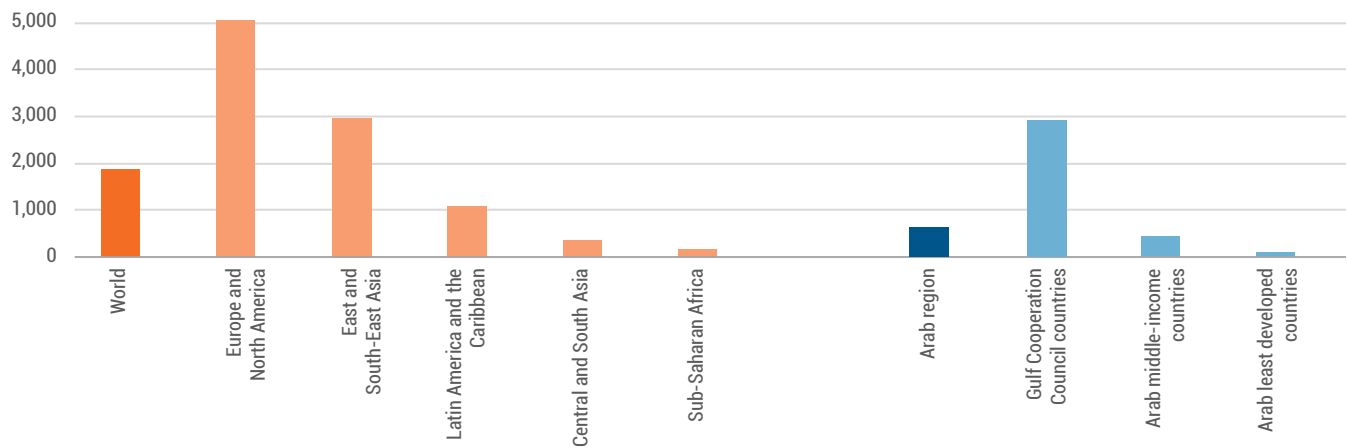
1. Gulf Cooperation Council countries

Gulf Cooperation Council countries led the Arab region in the 2023 Logistics Performance Index, particularly the infrastructure component, in which all 6 countries are in the top 50 globally.²² The Gulf Cooperation Council countries have a manufacturing value added per capita in dollars that is around four times higher than the Arab average

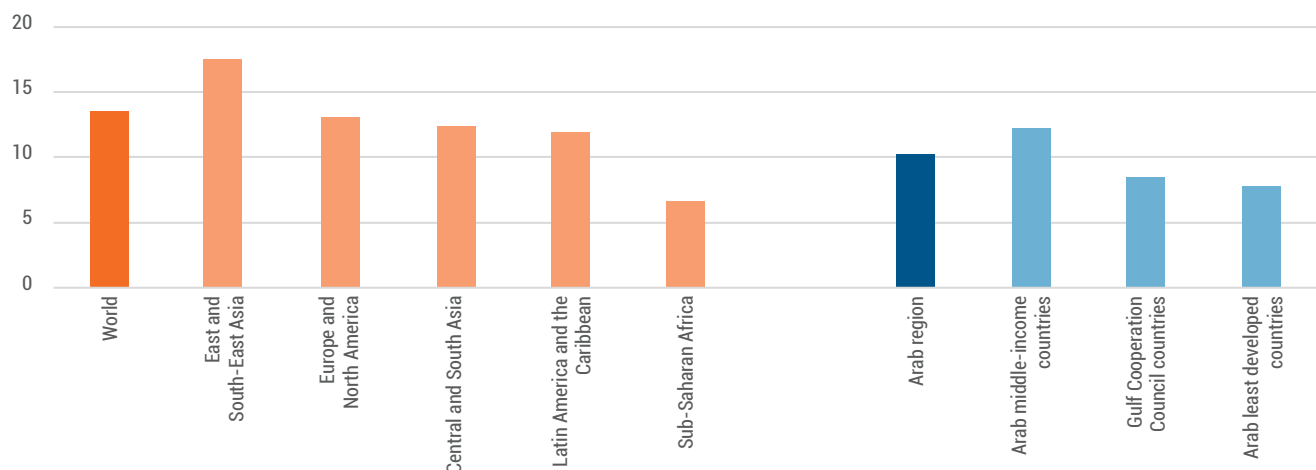
and is comparable to other regions globally, coming in third after Europe and North America and East and South-East Asia. See figure 9.1(A). They also have the highest proportion of medium- and high-tech industry value added in total value added compared to other Arab subregions. In contrast, manufacturing employment as a percentage of total employment is less than the regional average and the average for Arab middle-income countries. See figure 9.1(B).

Figure 9.1
Manufacturing value added and employment

A. SDG indicator 9.2.1: manufacturing value added per capita, 2022 (Dollars)



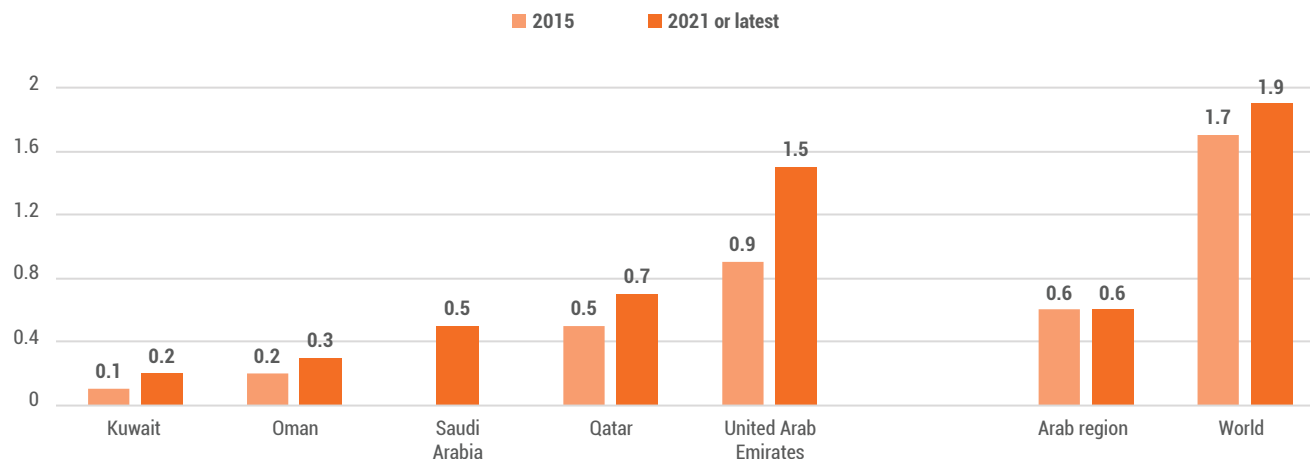
B. SDG indicator 9.2.2: manufacturing employment as a percentage of total employment, 2021



Source: Based on data from ESCWA, 2023b.

Figure 9.2

SDG indicator 9.5.1: research and development expenditure as a proportion of GDP, 2015 and 2021 or latest (Percentage)



Source: Based on data from ESCWA, 2023b, as of December 2023.

While gross domestic expenditure on R&D in high-income Arab countries has improved since 2015, it remains less than the global average (figure 9.2), despite important amounts allocated and spent. Gulf Cooperation Council countries are allocating large sums for scientific research, more than \$1 billion in **Qatar** and around \$5.12 billion in **Saudi Arabia**,²³ but they may not have sufficient absorptive capacity. While such countries have sophisticated infrastructure and facilities for R&D, expenditure as a share of GDP is small compared to other countries and regions. Another gap, which applies to the region, is that **public spending is more focused on research than product development**, with limited spending by the private sector.

◆ **Industrial strategies integrate industry 4.0 (4IR) technologies.** Gulf Cooperation Council countries lead the region on 4IR transformation: four are in the third and fourth quartiles of the best performers on the Global Innovation Index. Most countries in this group do quite well on the institutions and infrastructure pillars of this index.²⁴ **Bahrain, Oman, Saudi Arabia** and the **United Arab Emirates** are focusing their industrial strategies on 4IR technologies as levers to advance industries and boost productivity. **Saudi Arabia**, for example, is piloting the conversion of industrial plants to modern 4IR technologies²⁵ as part of a wider vision of harnessing technology for economic diversification. A dedicated Saudi Data and AI Authority established in 2019 provides services to integrate AI into all economic sectors.



A skills gap in industrial and engineering fields

Digitization, green transition and sector advancements have spurred a rising demand for new skills. The vast majority of engineering organizations in the Gulf Cooperation Council countries^a face difficulties in recruitment due to a lack of skills or qualifications. Addressing this gap starts with quality STEM education in schools and improvements in specialized university and vocational education to match industry needs. Greater collaboration between higher-education institutions and industry on practical and research projects is also recommended.

^a Ninety-seven per cent of organizations in **Oman** and 93 per cent in the **United Arab Emirates**, according to The Institute of Engineering and Technology, 2022, 2023.

◆ **The Gulf Cooperation Council countries are conducting free trade negotiations with China, the Republic of Korea and the United Kingdom to strengthen integration into global value chains and expand the export base beyond the traditional oil and gas sectors.** These talks seek to open avenues for economic diversification into non-oil industries such as manufacturing, technology, services and other sectors. This shift is expected to lead to the growth of local industries and development of high value-added manufacturing sectors, and encourage the creation of a skilled workforce. Free trade agreements can attract foreign direct investment, fostering innovation, productivity and technological advancements in manufacturing. Although the Gulf Cooperation Council countries work as a bloc, the outcomes will depend on the provisions and conditions of the agreements, including tariff reductions, non-tariff barriers, rules of origin and investment facilitation measures. This policy direction is not exclusive to the Gulf Cooperation Council countries in the region.

◆ **R&D priorities in the Gulf Cooperation Council countries are mainly focused on the technologies of the future, namely, digital technologies,** such as AI, robotics and others. These receive higher R&D funding and are integrated into innovation and other ecosystems to boost progress. R&D expenditure as a percentage of GDP remains less than the global average, however, ranging from 0.1 per cent in **Bahrain** to 1.5 per cent in the **United Arab Emirates**. The latter was the only Arab country allocating more than 1 per cent of its GDP to R&D in 2021. These countries have also increased the number of full-time researchers per million inhabitants so that it is well above the world average.²⁶ Unlike most Arab countries, where researchers are predominantly employed in higher education and government, 75 per cent of research employment in the **United Arab Emirates** is in the business sector.²⁷

◆ **National research and innovation councils are means for effective governance of R&D and innovation ecosystems.** Such councils facilitate sectoral coordination within various scientific disciplines as well as vertical coordination across levels of government. **Oman, Qatar, Saudi Arabia** and the **United Arab Emirates** have each established a council or authority for research and/or innovation. **Bahrain** and **Kuwait** have considered the establishment of similar structures.



2. Arab middle-income countries

The Arab middle-income country group has the highest percentage of manufacturing employment (12.2 per cent) compared to other subregions. The percentage of female researchers in each of **Algeria, Egypt, Morocco** and **Tunisia** is higher than the world average (31.2 per cent).²⁸ The percentage of small-scale industries with a loan or line of credit (20.9 per cent) is higher than that of other subregions but the second lowest compared to other regions in the world. National research priorities are selected in a manner that maximizes the benefits of research investments and directs funds towards high-potential areas.

Increasing market share and accessing global value chains will require enabling industrial policies and political will. Between 2015 and 2020, the region's rate of growth of medium- and high-tech manufacturing value added in total value added (1.5 per cent) exceeded the global rate (0.3 per cent). The growth rate was highest in the region in middle-income countries (3.6 per cent).

Even so, medium- and high-tech manufacturing value added in total value added in middle-income countries (25 per cent) remains less than the regional value (32 per cent), demonstrating that medium- and high-tech industry is more developed in Gulf Cooperation Council countries. Low-tech industry still dominates in middle-income countries.

Source: United Nations, 2023a.

◆ **Middle-income countries are using industrial policies to increase job opportunities.** To achieve further impact, these policies need to be coupled with a proactive government role in building markets locally and for export, supporting enterprises, facilitating access to finance, building capacity and knowledge, removing infrastructure bottlenecks and encouraging the adoption of technology. Countries have included objectives or targets for increased employment in their industrial policies. For instance, **Egypt** specified a target of "3 million decent and productive job opportunities" in manufacturing.²⁹ **Jordan** emphasized increasing opportunities for women in factories and strengthening links between universities and industries to offer training and job opportunities to new graduates. The Faculty for Factory programme of Jordan is one modality to link universities to industry in practical terms.³⁰ The programme has explored areas of collaboration in packaging, chemical industries, food supply and others, and has uncovered challenges in communication between academia and industry and the availability of necessary skills. **Morocco** reported in 2020 that its industrial acceleration programme led to 405,000 employment opportunities.³¹ **Tunisia** aims to increase job opportunities to over 300,000 by 2035 and will improve its position in global value chains positioning through more productive sectors that require skilled labour.

◆ **Middle-income countries have connected research areas to national priorities that include renewable energy (Algeria, Egypt and Morocco), water (Egypt, Jordan and Tunisia), conservation of natural resources and social sciences.** They have also identified niche research areas, such as the pharmaceutical industry in **Jordan**. Specialized research centres and projects support priority scientific R&D areas. For instance, the Centre for the Development of Renewable Energies in **Algeria** comes first in terms of the number of patents filed compared with other research centres;³² the country has also launched plans for mega solar energy projects.³³ The Research Institute for Solar Energy and New Energies designed the Green Energy Park in **Morocco** and hosts specialized solar energy laboratories.³⁴ The gap between industry and academia remains, however; industries are focused on production development, market access, risk alleviation and profit-making, whereas academic research is in most cases scientific and not readily convertible into practical applications. Time is also perceived differently; scientific research is usually time intensive whereas in industry, the longer that development or production takes, the more costly it is.

An example from beyond the region: university-industry cooperation in Türkiye

Türkiye has implemented several types of university-industry cooperation to transfer knowledge and encourage its conversion into innovation and technology. The Government has adopted regulations and laws on mechanisms to guide the relationship between industrial firms and academic institutions. Examples include:

- A revolving capital system through which industrial firms express interest in acquiring (paid) academic services and advice for specific projects.
- Techno-parks regulated through the Law on Technology Development Zones that allow faculty members to conduct commercial activities to transform research and knowledge into innovative products.
- Technology transfer offices that match universities and project proposals. The Scientific and Technological Research Council of Türkiye has a programme to support such offices.

Research has found that the main barriers to collaboration are a lack of information on available mechanisms and insufficient financial support.

Sources: Yalcintas, Ciflikli Kaya and Kaya, 2015; Kleiner-Schaefer and Schaefer, 2022.



◆ **Extraregional collaboration has boosted scientific research funding and publishing, and introduced new mechanisms for regional cooperation.** Bilateral scientific collaborations with countries outside the region have been growing. The United Kingdom and the United States of America are among the top five collaborators for most Arab countries, including middle-income nations. China is becoming a close collaborator with some countries, such as **Egypt**. Middle-income countries are also keen to pursue research initiatives with the European Union through initiatives such as EU Horizon 2020.³⁵ These engagements have influenced how funding is allocated, with a shift from block transfers to research institutions to open, transparent competitions assessed through peer review for funding.³⁶

The European Union has been a scientific partner of many Arab countries over the years. Under the European Union's neighbourhood policy, collaboration has been facilitated by the Union for the Mediterranean's [Regional Platform on Research and Innovation](#). This has entailed policy dialogue and bilateral science and technology cooperation agreements between the European Union and its member States and Arab countries, including **Algeria, Egypt, Jordan, Lebanon, Mauritania, Morocco, the State of Palestine and Tunisia**.^a

Notable initiatives following the adoption of the Valetta Declaration on Strengthening Euro-Mediterranean Cooperation through Research and Innovation include: the Research and Innovation for Blue Jobs and Growth in the Mediterranean Area (BLUEMED initiative) and the Partnership for Research and Innovation in the Mediterranean (PRIMA), which has a European Union contribution of €220 million in addition to national funding sources.

Sources: European Commission, 2021, 2023.

^a Libya has observer status.

◆ **Countries are implementing policies and measures to facilitate links between scientific research and industry, towards overcoming barriers to collaboration.** Innovation policies in **Morocco** and **Tunisia** over the past two decades have focused on establishing innovative, industry-oriented enterprises by linking research institutes and universities to manufacturing. Techno-parks in both countries help implement these policies by connecting universities and enterprises to develop applications that respond to local needs and problems.³⁷ In **Egypt**, the national science, technology and innovation strategy includes an objective to support investment in scientific research and foster linkages with industry. As a result, law No. 23 of 2018 provides public universities and research institutions that establish start-ups with a legal framework to commercialize their research.³⁸ **Jordan** has placed considerable emphasis on building an ecosystem for entrepreneurs that leverages innovation. In its national policy on science, technology and innovation, Jordan has included several elements for supporting entrepreneurs and improving coordination between research and trade to facilitate the commercialization of innovative ideas.

One barrier to innovation and R&D is the stigma of failure; overcoming it will require a cultural shift, where taking risks and failing are understood as integral to innovating. Government and other relevant stakeholders have critical roles in pushing for this shift and considering ways to de-risk scientific research and discovery.

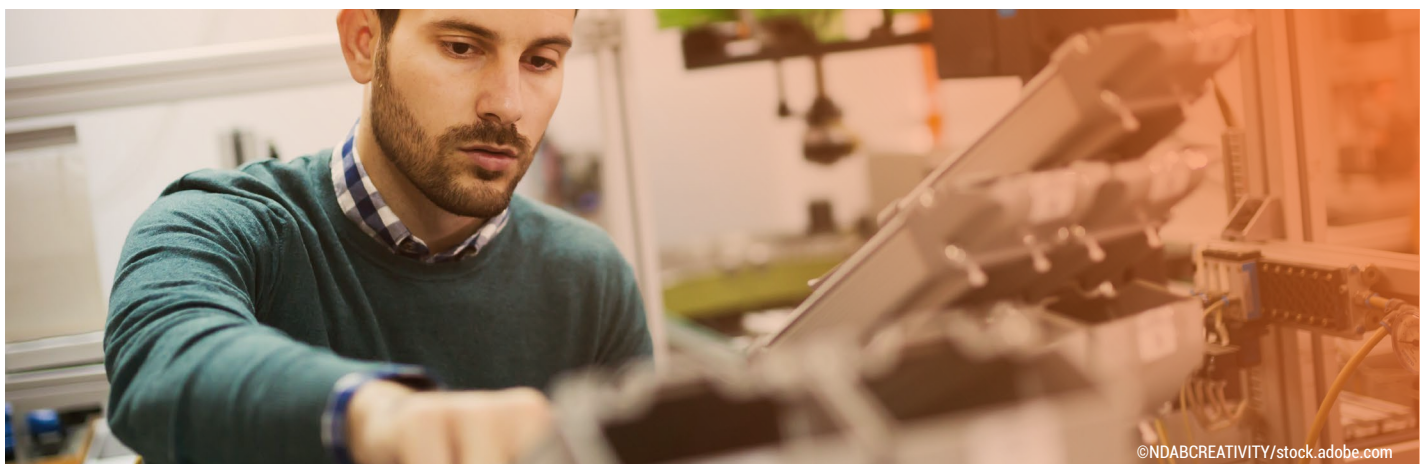


3. Arab least developed countries and countries in conflict

These two groups of countries have the lowest average in manufacturing value added as a proportion of GDP (4.3 per cent for countries in conflict and 6.7 per cent for the least developed countries in 2022). Manufacturing employment as a proportion of total employment in the least developed countries is the lowest in the region (7.82 per cent) although it comes close to the global average for this category of countries (7.96 per cent). Spending on R&D is low and data are missing for most Arab least developed and conflict-affected countries. They face a notable digital divide, ranking lowest globally in terms of the share of the population covered by a mobile network (figure 9.3). They remain largely unprepared to seize the opportunities of digitization and 4IR. Whether they have weak infrastructure in general or have suffered damaged infrastructure due to conflict, both groups face an uphill battle with reverberating consequences.

The least developed countries are in an embryonic stage of industrial development with limited or no dedicated policies.

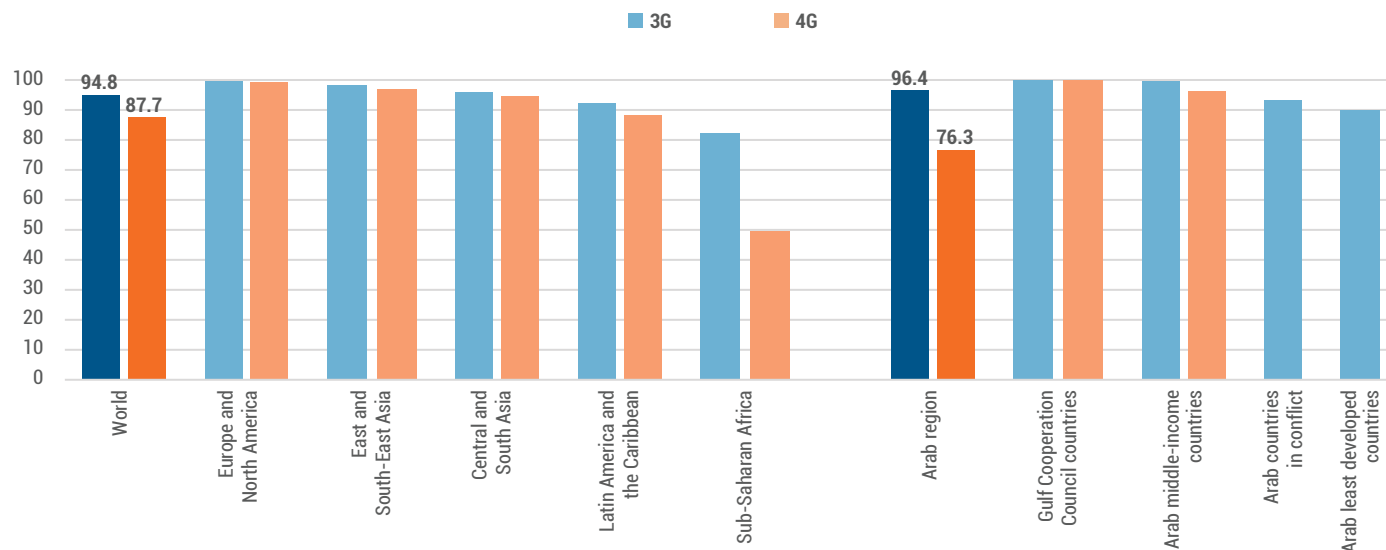
Infrastructure underdevelopment is among the barriers to the growth of industries, resulting in the limited availability of affordable electricity, inadequate transport systems, and insufficient access to supply and global value chains, among other consequences. Countries that have included industrial development in national policies or development plans focus mostly on the food industry (processing agricultural and fishing products) and small-scale, artisanal industries. The **Comoros** and **Djibouti** have included strategic objectives in recent development or SDG acceleration plans to increase the competitiveness of the agrifood, artisanal and construction industries as well as to improve value chains and boost trade. In its newly launched national strategy for manufacturing, **Mauritania** integrated a focus on the exploitation of its natural resources (agriculture, farming, fishing and renewable energy) for industrial development.



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Figure 9.3

Proportion of the population covered by at least a 3G mobile network, 2022 (Percentage)



Source: Based on data from ESCWA, 2023b, as of 28 December 2023.

The development of science, technology and innovation in the least developed countries will require support from the donor community and commitment from national governments to build human capacity, improve related governance frameworks and leverage digital technologies. Grass-roots, indigenous and cost-effective innovations need to be recognized for their potential benefits in responding to development challenges and producing social value. Technology transfer is a key tool and requires strong partnerships and legal frameworks.

The evolving policy landscape in the least developed countries shows rising awareness of the importance of science, technology and innovation, and the governance of its systems. For instance, **Mauritania** has developed a strategy for scientific research and established a supreme council for research, and is working on building a governance system for R&D and an innovation ecosystem.

Conflict has resulted in the breakdown of R&D systems, physical destruction of infrastructure and stalled manufacturing. It poses a major barrier to regional integration, affecting supply chains and impeding the movement of goods. The **Sudan** in 2017 issued a science, technology and innovation policy and had plans to increase spending on R&D. The resurgence of conflict in 2023, however, halted implementation and severely disrupted the functioning of educational institutions.

The Government of the **State of Palestine** has a dedicated policy to support the ICT start-up ecosystem.³⁹ This “early-stage ecosystem that is maturing”⁴⁰ is characterized by highly educated founders and one of the largest shares of female founders.

Countries in crisis have demonstrated interest in building industry as a key productive sector for the recovery phase. This is the case in **Iraq** and **Libya**, which also focus on innovation and ICT as levers for recovery and growth, and partnership with the private sector. Libya, for example, in 2021 established the Wadi Al-Harir Special Economic Zone and in 2022 set up an industrial technology pole. In other countries in crisis, physical destruction and infrastructure damage have been extensive. Estimates for reconstruction are in the hundreds of billions of dollars.

Sources: World Bank, 2020a; ESCWA and University of St. Andrews, 2020.

Considerable opportunities lie ahead for countries emerging from conflict, with a focus on infrastructure. **The rebuilding phase carries prospects for industrial development that can be connected from the onset to green and inclusive industrialization as well as technology.** This will require collective efforts by governments, non-state actors and the donor community to ensure that local talents and skills become part of the rebuilding process. The **Syrian Arab Republic** has already identified research priorities and conducted needs assessments during 2018–2020. Plans are underway for legal reforms, research units, and connections between researchers and investors.⁴¹

D. Policies to leave no one behind

Leaving no one behind in the context of SDG 9 is often considered through the lens of marginalization. This looks at those who lack access to technology, are digitally illiterate or require equity-based policies to integrate into the knowledge economy. Another dimension relates to geographical areas that are not connected to various infrastructure grids or networks, contributing to limited development in rural areas and to internal migration to cities. The majority of the poor cannot participate in technological development, due to the quality of education or lack of skills and infrastructure in their communities, even if some are benefiting through programmes in health or other services.

Leaving no one behind in the context of SDG 9 must be addressed through macro-level policies that target subnational inequalities, contribute to rural development, improve accessibility and address “last mile” challenges.

People with disabilities are at risk of being left behind if assistive technologies are not deployed and interface design overlooks their specific needs. Addressing these issues requires concerted efforts to prioritize accessibility in technology design and development, adherence to accessibility standards and guidelines, and engagement with persons with disabilities to understand their needs and preferences. Promoting awareness of digital accessibility can help foster a more inclusive technological landscape for all users. See the chapter on SDG 17 for more details and country examples.



◆ **Arab least developed and conflict-affected countries** that do not have science, technology and innovation policies or capacities to implement them are at risk of being left behind. Armed conflict creates additional obstacles by destroying infrastructure and factories.

- ◆ The United Nations Technology Bank for Least Developed Countries is conducting research on science, technology and innovation needs. It also aims to facilitate technology and knowledge transfer as well as resource mobilization. A technology needs assessment is currently underway in **Djibouti**. The bank also offers capacity-building programmes to researchers, students and entrepreneurs. A programme for strengthening and establishing national science academies has already led to the formation of new academies in least developed countries outside the Arab region; the bank has committed to providing similar support in North Africa.⁴²
- ◆ **Mauritania** recently launched innovation incubators that support and fund young entrepreneurs aiming to build innovative businesses. The most notable are the Kosmos Innovation Center and the Hadina RIMTIC. They operate within a wider national effort to improve the R&D and innovation ecosystem, including by establishing a national council and an innovation unit, and developing an R&D strategy.⁴³



◆ **Women:** Despite the rising number of female graduates in science and technology fields, women remain underrepresented in employment in these sectors. Further, the expected increase in automation and the integration of 4IR technologies will affect low-skilled and repetitive manual labour jobs where women often concentrate.

- ◆ In Oman, Bank Muscat offers services to support and encourage women entrepreneurs at different stages of business growth. It also collaborates with Riyada – the Public Authority for SME Development to provide leadership development opportunities and vital connections to help advance women’s businesses.⁴⁴
- ◆ In Egypt, the Micro, Small and Medium Enterprises Development Agency collaborated with the United Nations Development Programme to offer loans that have reached more than 520,000 of these businesses; 48 per cent of beneficiaries have been women.⁴⁵



◆ **Older employees/workers:** Increased overlap between technology and industries has accompanied a perception that older employees/workers may be unwilling to

embrace new technologies such as Artificial Intelligence. The speed at which digital technology is advancing will require the upskilling and reskilling of employees, an issue not yet widely addressed in the region. This is particularly important for employees over 55 years of age.

In **Saudi Arabia**, 47 per cent of employers are training staff to cover gaps in expertise. The Digital Government Authority launched a programme to develop digital skills in the public sector in partnership with local and global academic institutions.⁴⁶

E. The financing landscape

By one estimate, the Arab region needs to spend at least 8.2 per cent of GDP to meet infrastructure goals by 2030.⁴⁷ Financing for quality, reliable, sustainable and resilient infrastructure projects, however, cannot be adequately tracked. Some insights come from existing or emerging finance mechanisms and institutions that support SMEs as well as R&D to promote sustainable industrialization and foster innovation.

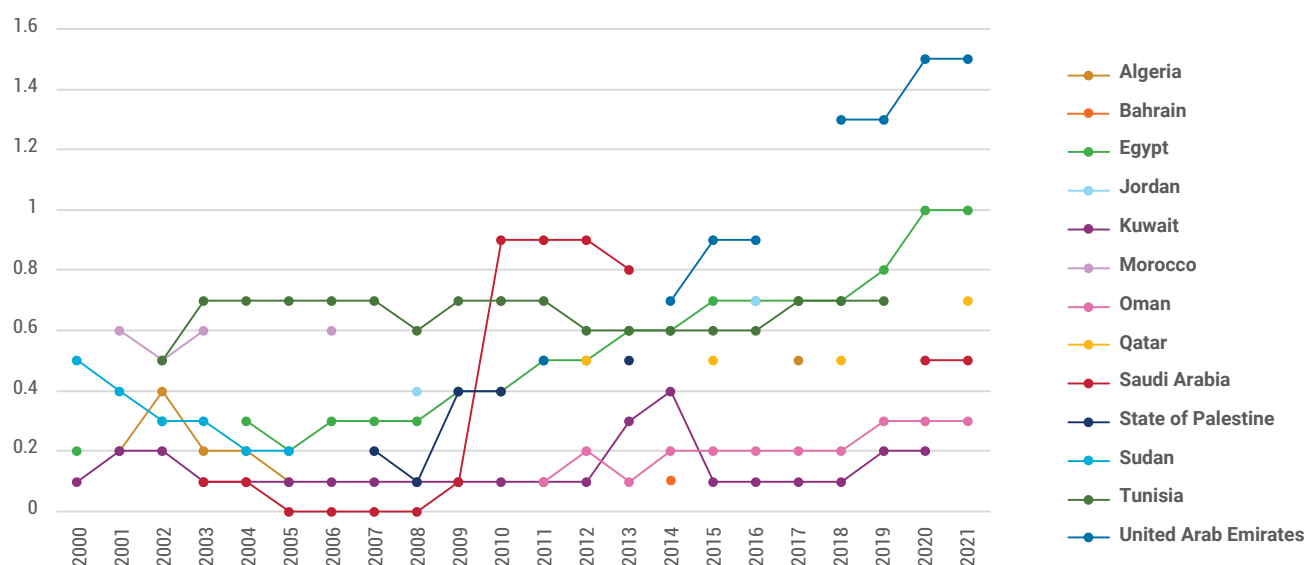
There are national efforts to support small-scale industries through dedicated funds or measures to facilitate access to finance. As an example, the Kuwaiti National Fund for SME Development was established in **Kuwait** with a capital of \$6.5 billion to cover up to 80 per cent of SME funding needs.⁴⁸ Governance restructuring, programme development and a review of regulations have taken place since the establishment of the fund with a view to improving impact.

Spending on R&D in the region remains low, at 0.61 per cent of GDP in 2021, with most coming from government resources. Figure 9.4 shows that for most countries, data are sparse and outdated. Disaggregation by the source of funding⁴⁹ and type of sectoral spending is also limited or unavailable. The low percentage of spending is partly attributed to limited absorptive capacity or a high GDP value in resource-rich countries. It also seems unaffected by the significant expansion in higher education in recent years and generous public funding for universities. In some cases, contract research from oil and gas companies has provided universities with substantial funding but with limited impacts or contributions to society. There should be an increased focus on funding effective research communities and interdisciplinary approaches to produce outputs that yield social returns.⁵⁰

The proportion of small-scale industries with a loan or line of credit is less than 50 per cent in Arab countries with data available. It is as little as 2.4 per cent in **Iraq** (2022) and the **Sudan** (2014), 3.4 per cent in **Yemen** (2013) and 4.1 per cent in **Egypt** (2020).

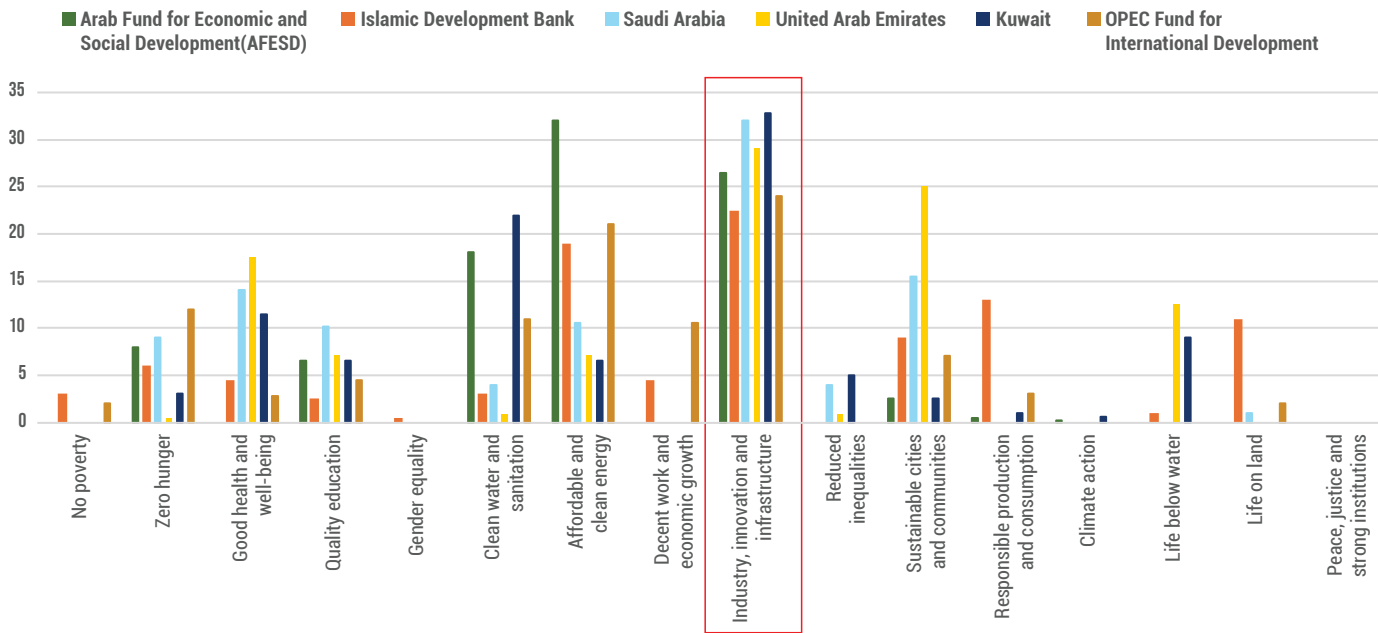
Source: ESCWA, 2023b.

Figure 9.4
Research and development expenditure as a proportion of GDP (Percentage)



Source: ESCWA, 2023b.

Figure 9.5
Official development assistance providers in the region per SDG (Percentage)



Source: OECD, 2017.

The investment needed to connect the unconnected to broadband in the region is estimated to be \$28 billion.⁵¹

Globally, the top 25 providers of official development assistance committed \$18.4 billion to SDG 9 as a whole in 2019. Among Arab providers of assistance, SDG 9 is the most funded of the global goals (figure 9.5).

Existing institutions and mechanisms to optimize financing for SDG 9

◆ **National development banks** can support economic agents to ensure the continuity of their operations in times

of economic turbulence. This will require developing human resources and building skills.⁵² The **Qatar** Development Bank has been investing in the SME ecosystem and has launched initiatives such as the Export Development and Promotion Agency, TASDEER, and the Qatar Business Incubation Centre; both support local production. The bank also has an SME equity fund and recognizes excellence through special awards.⁵³ The **Oman** Development Bank offers facilities to SMEs and microenterprises in a number of industrial sectors, including manufacturing, technology and logistics. In 2021, it approved OMR 54 million (\$140.3 million) for loans, with the highest allocation going to enterprises in the manufacturing sector.⁵⁴

Table 9.1
Functions of national development banks in post-pandemic recovery

Function	Description
Counter-cyclical	Ensuring investment flows despite the economic downturn spurred by the pandemic.
Resilience-building	Enabling increased capitalization and flexible lending conditions to support resilience-building projects and the formalization of business continuity planning.
Developmental	Providing long-term capital to stimulate investment in strategic infrastructure and industries, especially in industrializing countries.
Entrepreneurial	Supporting high-risk R&D-intensive start-ups and innovative projects, thereby contributing to spur innovation and new firm growth.
Challenge-led	Funding projects that address societal challenges such as climate change, thereby contributing to industrialization and the building of resilience.

Source: UNIDO, 2021a.

◆ **Specialized national funds:** The Saudi Industrial Development Fund supports competitive enterprises with a view to diversifying the economy of **Saudi Arabia**. Its mandate has been aligned with Saudi Vision 2030. In the past decade, the fund has approved 1,545 medium- and long-term loans for industrial projects amounting to SAR 107 billion (\$28.5 billion). The fund saw capital growth from SAR 40 billion in 2012 to SAR 105 billion in 2019.⁵⁵

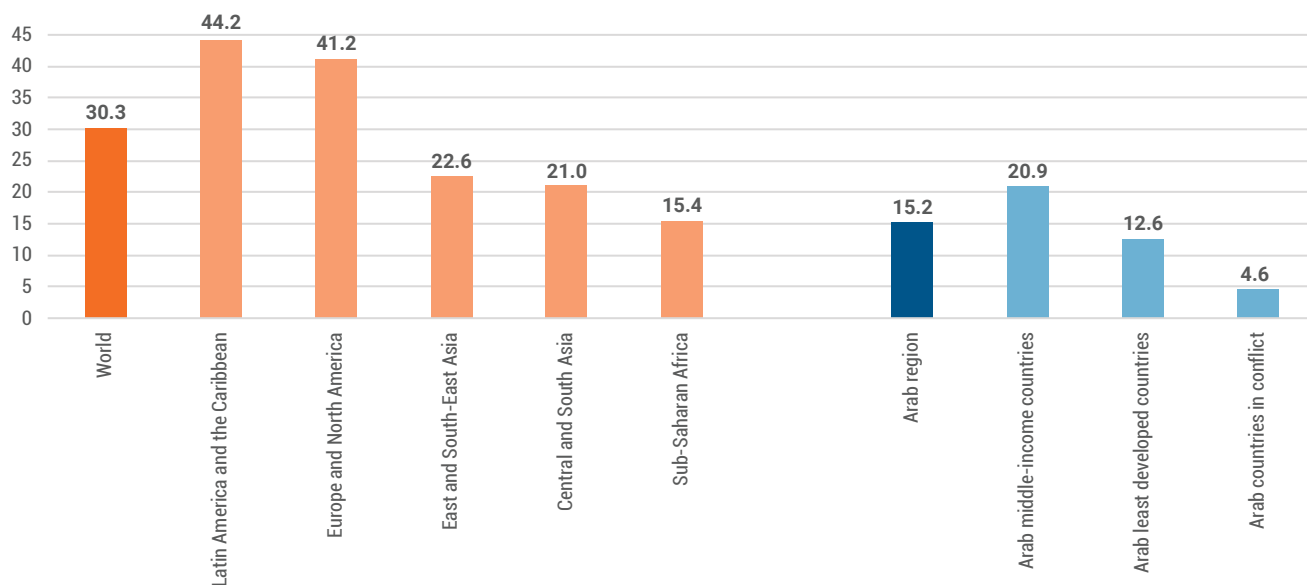
◆ **Regional development banks:** These banks secure and mobilize resources to support governments of developing countries with infrastructure and economic projects. They also focus on regional integration by backing joint country projects. The Arab Fund for Economic and Social Development has committed over \$36 billion in loans since its establishment. From 2019 to 2021, loans for infrastructure and productive sectors topped \$1.7 billion.⁵⁶ Over the same period, loans from the Islamic Development Bank to Arab countries for infrastructure and productive sectors exceeded \$310 million, with most going to **Lebanon** and **Mauritania**.⁵⁷

◆ **Attracting foreign direct investment:** In **Morocco**, foreign direct investment for industrial development is becoming more important. Morocco has attracted substantial flows by taking concrete actions that drew investors – namely, infrastructure upgrades, upskilling and ecosystem building – instead of pursuing subsidies or tax exemptions (see the chapter on SDG 8).⁵⁸

◆ **Financing sustainable industrial transformation:** This requires scaled-up, coordinated, and targeted public and private investments. On the public sector side, measures are needed to incentivize private investments using fiscal and financial instruments. Examples include enacting tax credits or spurring demand through public procurement that is innovative or green. Public development banks can assume a role in filling resource and knowledge gaps (market intelligence) and regulatory measures can incentivize commercial lending through risk-sharing. The proportion of small-scale industries with a loan or line of credit (15.2 per cent) is still around half the global value and less than any other region worldwide (figure 9.6).

Figure 9.6

SDG indicator 9.3.2: proportion of small-scale industries with a loan or line of credit, 2023 (Percentage)



Source: Based on data from ESCWA, 2023b, as of December 2023.



F. Regional dimensions

SDG 9 collaborations and partnerships in the Arab region have already seen fruition in certain cases, mostly on the subregional level. They are focused on industrial development and scientific research and take several forms within the region and beyond.

1. Rethinking supply chains

Prior to the COVID-19 pandemic, globalization led to the geographic diversification of supply chains; for Arab countries, it meant greater links to markets worldwide. Since the pandemic, there has been a reconsideration of supply chains towards more localization, in addition to an increased focus on digitization and modernization. The level of advancement is mixed. While Gulf Cooperation Council countries are developing state-of-the-art infrastructure for logistics and aiming to becoming international hubs for the movement of people and commodities, middle-income countries have made more limited progress. The pandemic highlighted the importance of **strengthening supply chain resilience** as key for manufacturing and industries. As such, **regional integration opportunities revolve around actions that streamline logistics and tariff systems, digitize supply chains, facilitate the mobility of people and goods, and promote an enabling environment for the integration of companies in supply chains.**

2. Intra-regional partnerships across some Arab countries

The Integrated Industrial Partnership for Sustainable Economic Development was established in 2022 to unlock industrial opportunities and achieve integration in resources, capabilities and experiences in several sectors: agriculture, food and fertilizers; pharmaceuticals; textiles; minerals and petrochemicals. Current members include **Bahrain, Egypt, Jordan** and the **United Arab Emirates**. The partnership started with an initial investment fund of \$10 billion. In early 2023, 12 agreements for 9 industrial projects were signed with an investment value exceeding \$2 billion.⁵⁹ **Bilateral collaborations include the Qatar-Oman joint venture;** its first phase served transportation needs during the 2022 FIFA world cup in Qatar, where 800 buses out of 4,000 were fully electric with zero carbon emissions.⁶⁰

3. Regional initiatives led by one or more countries

Saudi Arabia launched the Middle East Green Initiative to incentivize regional collaboration in meeting climate

targets and mitigating climate change impacts. It has set an ambitious target of collectively achieving a 60 per cent reduction in emissions regionally. Including many regional activities, the initiative provides a platform to accelerate the circular economy and its potential to transform the future of industries in the region. See more details in chapter on SDG 12.

4. Coalitions aim to mobilize commitment

Countries have joined coalitions to advance the production and use of low-carbon industrial materials. **Saudi Arabia and the United Arab Emirates are members of the Industrial Deep Decarbonisation Initiative, which is a global coalition of governments and private sector companies aiming to decarbonize heavy industries** (steel, cement and concrete) responsible for over 50 per cent of carbon emissions. The initiative includes a commitment to a Green Public Procurement Pledge. Members will work towards shaping a global framework of standards on low and near-zero emissions as well as an approach to data collection and reporting.⁶¹

The Arab Industrial Development, Standardization and Mining Organization has been collaborating with the ESCWA Technology Centre on regional integration in industrial research and links between universities and industries. The organization has several programmes that push regional integration and cross-sector collaboration in artificial intelligence, nanotechnology and sustainable mining.

For more information, see [AIDSMO](#).

5. Intra- and interregional scientific collaboration among countries

From outside the region, the European Union is a top collaborator with Arab countries in scientific research. Within the region, the largest number of co-authored papers is between **Egypt** and **Saudi Arabia**.⁶² With scientific research capacity largely locked inside universities and research centres, these collaborations could strengthen links to industry and commercialization.

Endnotes

1. The relationship between the number of researchers and amounts of R&D funding versus innovation output is not necessarily linear.
2. OECD, 2021.
3. Ibid.
4. The Comoros, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Mauritania, Morocco, Oman, the State of Palestine, Qatar, Saudi Arabia, the Syrian Arab Republic, Tunisia and the United Arab Emirates.
5. Zawya, 2023.
6. MEED, 2023a.
7. Egypt, 2021.
8. World Bank, 2022b.
9. MEED, 2023b.
10. See for example: Qatar Ministry of Commerce and Industry, 2018; United Arab Emirates, 2023.
11. Tunisia Ministry of Industry, Energy and Mines, 2022.
12. Tanchum, 2022.
13. Egypt, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, the State of Palestine, Tunisia and the United Arab Emirates.
14. Saudi Authority for Industrial Cities and Technology Zones – Modon, 2021.
15. Morocco Ministry of Industry and Trade, 2023; Zawya, 2021; Riera and Paetzold, 2020.
16. Bahrain, Jordan, Lebanon, Morocco, Oman, Saudi Arabia, Tunisia and the United Arab Emirates.
17. European Union, 2023.
18. Algeria, Egypt, Kuwait, Mauritania, Oman, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates have laws and Bahrain, Iraq, Jordan, Lebanon, Morocco, the State of Palestine and the Syrian Arab Republic have structures, strategies or initiatives to offer support or finance. For more information, visit ESCWA's [Arab SMEs Portal](#).
19. Tamkeen, 2023.
20. Zawya, 2020; Sohar, 2023.
21. Sharakah, 2023.
22. World Bank, 2023.
23. Invest Qatar, 2023; Saudi Arabia's General Authority for Statistics, 2022.
24. WIPO, 2022.
25. Arab News, 2021.
26. In 2020, the number of researchers (full-time equivalent) per million inhabitants in the United Arab Emirates was 2,489 compared to a global average of 1,353. ESCWA, 2023b, accessed December 2023.
27. UNESCO, 2021.
28. UNESCO, 2022.
29. Egypt Ministry of Trade and Industry, 2015.
30. Al Abdallat and Tutunji, 2012.
31. Morocco, 2020.
32. UNESCO, 2021.
33. Attaqa, 2022.
34. UNESCO, 2021.
35. European Commission, 2022.
36. Arvantis and Hanafi, 2019.
37. Dossou and Hanaa, 2020.
38. El-Sayed and Ghoneima, 2022.
39. Palestine Ministry of Telecoms and IT, 2019.
40. World Bank, 2018.
41. UNESCO, 2021.
42. United Nations, 2023b.
43. ESCWA, 2017; United Nations Technology Bank for the Least Developed Countries, 2022.
44. Bank Muscat, 2023; al Maskry, 2016.
45. Egypt, 2021.
46. Pwc, 2022; Alarabiya, 2021.
47. Numba Um, 2020.
48. The National Fund for Small and Medium Enterprise Development, 2023.
49. UNESCO defines five main sources for R&D funding as: business enterprise, government, higher education, private non-profit and the rest of the world.
50. UNESCO, 2021.
51. ITU, 2020.
52. UNIDO, 2021a.
53. Qatar Development Bank, n.d.
54. Oman Development Bank, 2021.
55. Saudi Industrial Development Fund, 2021.
56. Arab Fund for Economic and Social Development, 2022.
57. Islamic Development Bank, 2022.
58. Cherkaoui, 2023.
59. Hussein, 2023; Bahrain Ministry of Industry and Commerce, n.d.
60. The Peninsula, 2022.
61. UNIDO, 2023.
62. UNESCO, 2021.

References

- Riera, O., and P. Paetzold (2020). [Global value chains diagnostic – case study: automobiles made in Morocco](#). European Bank for Reconstruction and Development.
- Al Abdallat, Y., and Tutunji, T. (2012). [Faculty for Factory program: A University-industry link in Jordan](#).
- Arab Fund for Economic and Social Development (AFESD) (2022). [AFESD’s annual reports](#).
- Arab News (2021). [Saudi Arabia prepares 100 plants for the fourth industrial revolution](#).
- Alarabiya (2021). [Saudi Arabia – digital government authority launches capacity building programme Quadrat-Tech](#).
- Arvantis, R., and S. Hanafi (2019). [Research policy in Arab countries: international cooperation, Competitive Calls, and Career Incentives](#). In *The Transformation of Research in the South: Policies and Outcomes*. Marseille: IRD Éditions.
- Attaqa (2022). [Renewable energy by 2030. Algeria competes with Morocco for leadership in the region \(Arabic\)](#).
- Bahrain Ministry of Industry and Commerce (n.d.). [Industrial partnership](#).
- Bank Muscat (2023). [Al Wathbah](#).
- Cherkaoui, M. (2023). [Industrial and regional policies in MENA: survey of economists](#). *Economic Research Forum*.
- Dossou, L., and Hanaa, I. (2020). [Development of innovation policy: Case study of north and West African countries](#). SHS Web of Conferences 89.
- Economic and Social Commission for Western Asia (ESCWA) (2017). [National Technology Development and Transfer System in Mauritania](#). Beirut.
- _____ (2023a). [Background note on SDG 9](#).
- _____ (2023b). [ESCWA Arab SDG Monitor](#).
- _____ (2023c). [Progress Towards the Sustainable Development Goals in the Arab Region](#). Beirut.
- _____ (2024). [Annual SDG Review 2024: Skills development, innovation and the private sector in the Arab region](#). Beirut.
- Economic and Social Commission for Western Asia (ESCWA) and University of St Andrews (2020). [Syria at War – Eight Years On](#).
- Egypt (2021). [Voluntary National Review 2021](#).
- Egypt Ministry of Trade and Industry (2015). [Industry and Trade Development Strategy 2016–2020](#).
- European Commission (2021). [Updates on the Association of Third Countries to Horizon Europe](#).
- _____ (2022). [EU-Mediterranean Cooperation in Research and Innovation](#). Publications Office of the European Union.
- _____ (2023). [Research and innovation – Mediterranean](#).
- European Union (2023). [MED MSMEs policies for inclusive growth – Algeria](#).
- Hussein, H. (2023). [UAE, Egypt, Jordan and Bahrain Sign \\$2bln of industrial agreements](#). Zawya, 27 February.
- The Institute of Engineering and Technology (2022). [Engineering and technology skills in the United Arab Emirates](#).
- _____ (2023). [Engineering and technology skills in the Sultanate of Oman](#).
- International Telecommunication Union (ITU) (2020). [Assessing Investment Needs of Connecting Humanity to the Internet by 2030](#).
- Invest Qatar (2023). [Sectors and opportunities: education](#).
- Islamic Development Bank (2022). [Annual reports](#).
- Kleiner-Schaefer, T., & Schaefer, K. (2022). [Barriers to university–industry collaboration in an emerging market: Firm-level evidence from Turkey](#). *The Journal of Technology Transfer*, 47, 872–905.
- Mantlana, K. B., and M. A. Maela (2019). [Mapping the Interlinkages between sustainable development goal 9 and other sustainable development goals: a preliminary exploration](#). Business Strategy and Development, 13 December.
- Al Maskry, F. (2016). [Riyada, Bank Muscat join hands to support women entrepreneurs initiatives](#). Oman Daily Observer.
- Middle East business intelligence (MEED) (2023a). [Egypt 2024 country profile and databank](#).
- _____ (2023b). [Morocco 2024 country profile and databank](#).
- Morocco (2020). [Voluntary National Review 2020](#).
- Morocco Ministry of Industry and Trade (2023). [Key figures](#).
- The National Fund for Small and Medium Enterprise Development (2023). [Main website](#).
- Noumba Um, P. (2020). [Building forward better in MENA: How infrastructure investments can create jobs](#). World Bank Blogs.
- Oman Development Bank (2021). [Annual Report 2021](#).
- Organisation for Economic Co-operation and Development (OECD) (2017). [How Arab countries and institutions finance development](#).
- _____ (2021). [Middle East and North Africa Investment Policy Perspectives](#). Paris.
- Palestine Ministry of Telecoms and IT (2019). [Policy Agenda to Support Palestine ICT Startup Ecosystem](#).
- The Peninsula (2022). [“Karwa” to operate massive bus fleet to serve World Cup fans](#).
- PwC (2022). [The Hopes and fears of employees across the Kingdom of Saudi Arabia](#).
- Qatar Development Bank (n.d.). [Role of QDB in supporting entrepreneurship and SMEs in Qatar](#).
- Qatar Ministry of Commerce and Industry (2018). [Qatar National Manufacturing Strategy 2018–2022](#).
- Saudi Authority for Industrial Cities and Technology Zones – Modon (2021). [Annual Report 2021](#).
- Saudi Industrial Development Fund (2021). [Annual Report 2021](#).



- El-Sayed, K., and M. Ghoneima (2022). Science, Technology, Innovation and Digitalization. In M. Mohieldin, ed., *Financing Sustainable Development In Egypt Report*. Cairo: League of Arab States.
- Sharakah (2023). Ruwad Sharakah.
- Sohar (2023). Sohar One Stop Shop.
- Tamkeen (2023). Tamkeen Annual Plan 2023.
- Tanchum, M. (2022). Morocco's new challenges as a gatekeeper of the world's food supply: the geopolitics, economics, and sustainability of OCP's global fertilizer exports. Middle East Institute.
- Tunisia Ministry of Industry, Energy and Mines (2022). Tunisia Industrial and Innovation Strategy 2035.
- United Nations (2023a). Financing for Sustainable Development Report 2023: Financing Sustainable Transformations. New York: Inter-agency Task Force on Financing for Development.
- United Nations (2023b). Technology Bank for the Least Developed Countries.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (2021). UNESCO Science Report: the race against time for smarter development. Paris.
- _____ (2022). UNESCO Institute for Statistics Database. Accessed on 1 July 2023.
- United Nations Industrial Development Organization (UNIDO) (2021a). Industrial Development Report 2022. The Future of Industrialization in a Post-Pandemic World. Vienna.
- _____ (2021b). Statistical Indicators of Inclusive and Sustainable Industrialization – Biennial Progress Report 2021.
- _____ (2023). An overview of the industrial deep decarbonisation initiative.
- _____ (2024). Independent Terminal Evaluation – Job Creation for Youth and Women through Improvement of Business Environment and SMEs Competitiveness.
- United Nations Technology Bank for the Least Developed Countries (2022). The State of Science, Technology and Innovation in the Least Developed Countries.
- World Bank (2018). Tech Startup Ecosystem in West Bank and Gaza.
- _____ (2020a). Updated dynamic needs assessment for Yemen.
- _____ (2020b). Morocco Infrastructure Review.
- World Intellectual Property Organization (WIPO) (2022). Global Innovation Index 2022: What Is the Future of Innovation-Driven Growth? Geneva.
- Yalçıntaş, M., Çiflikli Kaya, C., & Kaya, B. (2015). University-Industry Cooperation interfaces in Turkey from academicians' perspective. *Procedia – Social and Behavioral Sciences*, 195, 62–71.
- Zawya (2020). 100% foreign ownership now possible in most Omani businesses.
- _____ (2021). Morocco becomes Africa's new automotive manufacturing hub.
- _____ (2023). Saudi megaprojects: value of construction deals reaches \$250bln.