

The Potential of Africa to Capture Technology-Intensive Global Supply Chains

OVERVIEW

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Global supply chains: Turning disruption into opportunity

The Economic Development in Africa Report 2023: The Potential of Africa to Capture Technology-intensive Global Supply Chains provides a unique insight into the potential for increased integration into the supply chains in Africa by bringing together knowledge on how Africa can strengthen supply chain diversification in high-knowledge- and technology-intensive sectors.

In recent years, global supply chains have come under immense pressure as a result of unprecedented trade turbulence, economic uncertainty, geopolitical events and natural disasters. Consequently, these supply chains were severely disrupted. This has led key players, such as the series of manufacturers, distributors, consigners and so on involved in producing goods of a particular kind and bringing them to market, to re-examine ways to strengthen supply chain resilience. Although the integration of African economies into supply chains is relatively low compared with other regions, disruptions to supply chain operations have a more than proportionate adverse impact on their economies.

Key players and stakeholders are looking to strengthen the resilience of existing supply chains by diversifying their sources. This may create an opportunity for African economies to heighten their involvement in global supply chains. For instance, the semiconductor supply chain, which involves hundreds of suppliers and an intricate process of manufacturing microchips and other critical components in the electronics and automotive industries, was negatively affected during the 2008–2009 global financial and economic crisis, as well as the recent coronavirus disease (COVID-19) pandemic. Other industries that came under supply chain pressure during previous global shocks and environmental disasters, with associated difficulties in trade and investment, will be the focus of this report. These include the automotive, electronics, renewable energy and pharmaceutical product and medical device industries, which are strategic, emerging industries that require the use of critical minerals and high-technology metals for manufacturing and services.

Africa, which boasts an abundant supply of raw materials with utility in the energy, automotive and electronics sectors, could provide an opportunity for the diversification and resilience of global supply chains by offering a new regional market for businesses and industries in their quest to further expand their supply chain relationships. The box below provides a definition of supply chain diversification and what it entails for African countries.

As multinational companies seek to extend their supply chains into diverse regions, African countries could become potential sources of high-technology mineral resources along shorter and simpler supply chains, with the added effect of contributing to the stable development of emerging industries on the continent. More equal investor–State agreements, or host government agreements, especially for the critical minerals and metals that are used in high-technology products and supply chains, will be necessary to develop domestic industries successfully and improve the capability of local firms to design, procure or manufacture necessary parts and components in high-technology-intensive supply chains.

The unequal terms of mining contracts and exploration licences has led many Governments in Africa to review their mining laws and regulations to harness business opportunities for domestic enterprises and better reap the benefits of capital-intensive large-scale mining for inclusive and sustained development in their countries. To date, 17 African countries have local content regulations in place, namely Angola, Botswana, Burkina Faso, Cameroon, Côte d'Ivoire, the Democratic Republic of the Congo, Ghana, Guinea, Mali, Mozambique, Namibia, the Niger, Sierra Leone, South Africa, the United Republic of Tanzania, Zambia and Zimbabwe. In Zambia, for example, foreign suppliers account for about 96 per cent of goods and services supplied to mines, whereas domestic suppliers contribute about 4 per cent, mainly in services (catering, security and office maintenance). This is a case that illustrates the importance of sound local content policies in developing local supply chains and facilitating the creation of backward linkages in the mining sector, for example, generating value addition in domestic supply sectors, creating local employment opportunities or transferring technology.

Under such a scenario, the potential upgrading of industrialization, combined with the rapid wealth creation of the rising middle class in Africa, will start to offer opportunities to develop local supplier bases, broaden local production and increase the African workforce and consumer market. As the interest of potential investors and global suppliers to deepen their footprint across the African continent is carved out, incentives to invest in and build partnership with local suppliers and customers will be key.

Nonetheless, venturing into Africa as a supply chain destination will require enormous investment in adequate infrastructure, as well as the availability of human capital and technology. In many African countries, the state of infrastructure development – transport, warehouse and other facilities – which is not yet at a standard and quality comparable to other developing and emerging countries, is one of the main barriers to logistics and supply chains on the continent. However, national and regional initiatives to scale up financing for infrastructure development and improve logistics performance in Africa, such as the African Union Programme for Infrastructure Development in Africa, are promising and can strategically enhance the integration of African economies into regional and global supply chains.

In spite of the current low levels of technology and human capital in many parts of Africa, which can be a hindrance when gains in productivity and value added are considered decisive in furthering supply chains across the continent, opportunities are emerging that can overcome these lingering risk factors. The young and growing population of Africa, projected to reach 2.5 billion by 2050 – a quarter of the world's population – is embracing technology and has many advantages that can entice firms seeking to expand their supplier and consumer relationships in Africa. The advancement of technology and innovation on the continent is being increasingly driven by young entrepreneurs. The Global System for Mobile Association reported 618 active technology hubs in Africa in 2019, compared with 442 such hubs between 2016 and 2018. This growing technology ecosystem will leverage the innovation and entrepreneurial mindset and skills that will eventually attract investors and technology-based supply chain participating companies. By relocating some of their supply chains to Africa or by entering into a partnership with local suppliers, these companies will then contribute to employment creation, especially in digital- and high-technology-intensive industries and, hence, to income growth. As technology-intensive industries tend to offer higher wages and can have a positive job-multiplier effect, the potential of generating more employment in those sectors will have undeniable benefits for the workforce and foster sustainable development in Africa. In the United States of America, for example, workers in high-technology industries earn on average 101.8 per cent more than workers in non-high-technology industries. Facilitating a conducive environment for firms in those industries to establish or build new supplier relationships in African countries can help raise wages in Africa, which are set at a minimum of \$220 per month, compared with an average of \$668 in the Americas.

Understanding supply chain diversification

In analysing supply chains and the potential for economies in Africa to integrate into supply chains, the report makes a clear distinction between supply chains and value chains. For the purpose of the report, the use of the term supply chains is defined as follows: the system and resources required to move a good or service from a supplier to a customer. In comparison, the value chain concept builds on this to consider the way value is added along the chain, both to the good or service and the actors involved. The report further outlines the following fundamental steps of a supply chain, which are product development, sourcing procurement, manufacturing, logistics, distribution and customer service.

Thus, supply chain diversification takes into account two principal factors, that is, diversification of the direct supplier base and diversification of the customer base. Supply chain diversification is imperative to reinforce supply chain resilience. There are, therefore, plentiful opportunities for Africa to benefit from supply chain diversification through integration into both the supplier and customer bases. The potential benefits of the African Continental Free Trade Area through increased trading facilitated by the removal of tariff and non-tariff barriers, is poised to offer an advantage for supply chain diversification in Africa.

Nonetheless, for African economies to benefit from supply chain diversification, it is important to manage existing supply chain vulnerabilities effectively. For instance, it would be urgent to implement policies to mitigate poor infrastructure (transport, warehouse and other facilities), informality, weak institutions and regulations, fragmented markets, limited sources of capital, low levels of technology and political risks.

Source: UNCTAD.

New opportunities for global supply chain diversity and sustainability: The comparative advantage of Africa

The recent crises have revealed that undiversified economies in Africa remain vulnerable. For instance, the lingering effects of the COVID-19 crisis, compounded by inflationary effects owing in part to the war in Ukraine, saw economic growth in Africa decline by 0.8 percentage points, from 4.5 per cent in 2021 to 3.7 per cent in 2022. Integration into supply chains, and hence the diversification of African economies, would create an economy with better resilience to shocks. The comparative advantage of Africa for integration into global supply chains could be analysed through factors inherent to the supply chain, that is, procurement, production and distribution, with the third factor including consumer demand.

Procurement

As the global economy adapts to climate change, dynamic production processes will require alternative inputs, and low-carbon technologies are expected to flourish. Consequently, there will be a rise in the demand for specific metals with utility in the low-carbon transition and green mobility, for instance, aluminium, cobalt, copper, lithium and manganese. Given the abundance of these minerals, in particular key metals required for the low-carbon transition, the continent can reposition itself as a supplier of raw materials for global supply chains. In fact, 48.1 per cent of global cobalt reserves and 47.6 per cent of global manganese reserves are located in Africa. Other metals and minerals that are important for the low-carbon transition are also produced in Africa: chromium, lithium, natural graphite, nickel, niobium, rare earth metals, silver, tellurium and titanium.

In addition, African countries need not only supply raw materials for the low-carbon transition. They can also strengthen value chains by ensuring that raw materials are converted into intermediate products within the continent. For instance, in 2022, the Democratic Republic of the Congo had the largest production of copper in Africa, 1.8 million tons. But beyond exploration and extraction, the country is a potential destination for refining metal products, which would lower the costs of transporting bulky, low-value initial extracts.

Production

The cost of production is an important factor in the discussion of the integration of Africa into supply chains, and of the possibility for firms to move entire production processes to the region. For example, since distance plays an important role in costs through transportation and other distribution infrastructure, the cost of production essentially must compensate for distance, and vice versa. Thus, a survey of current factor inputs into the production process provides a clear picture of where African countries stand, what gaps exist and what needs to be done to bridge those gaps.

The report analyses factors of production (capital, labour, human capital and total factor productivity) and finds that capital has been a key driver of output growth since 2003. Next comes labour, followed by human capital, whose contribution has remained largely unchanged. By contrast, the contribution of total factor productivity to output growth during that time has been dismal, and in some cases has declined, signalling a gap in productivity and use of technology. Consequently, while labour is abundant, African countries should implement policies that ensure increased skills and the ability to innovate and use technology in the production process, as well as in the overall supply chain system, which can also have a positive effect on wages and income. In addition, a productivity analysis carried out in the report shows that a reallocation of resources between and within sectors has not always been efficient for the African countries in the sample. Thus, policies that encourage efficient allocation of factor inputs should be implemented.

Distribution

Within the supply chain, distribution is perhaps the most prolific and, therefore, dynamic feature. The logistics aspect of distribution is also an important part of procurement and production. In 2018, for example, performance of African countries was considerably lower (2.46) than the global average (2.87), as measured by the World Bank logistics performance index on a scale of one to five, with one being the lowest, and five, the highest. Nonetheless, when compared with past performance, improvement has been marginal. In addition, the best performing categories were timeliness, and tracking and tracing, both an indication of increased investment in soft infrastructure, such as the Internet and mobile telephones. While it is important to invest in information and communications technology infrastructure, it is imperative that African countries maintain investments in hard infrastructure that reduce the cost of logistics in the supply chain.

Hard infrastructure, such as ports, roads and rail, have tended to lag behind. For instance, investment in African ports is often made on an as-needs-basis, which leads to operational inefficiency at the ports. There are less than 70 operational ports, many of which are poorly equipped and uneconomical, with delays two or three times above the global average. It is therefore advisable that African countries encourage investments in hard infrastructure, including from the private sector, to improve efficiency and capacity that would ensure that more value is gained by trading and participating in supply chains in Africa.

Trade policies and incentives

African countries are engaged in various trade agreements aimed at strengthening trade and enhancing productivity and diversification. The African Continental Free Trade Area has the potential to meet these goals and to foster continental and regional integration, stimulate intra-African trade and harmonize the heterogeneity of trade rules across regional economic communities and under regional trade agreements. In addition to the Agreement Establishing the African Continental Free Trade Area, African countries have joined preferential trade agreements with other regions or countries. The African Growth and Opportunity Act, established by the United States, is such an agreement, and it can generate a complex dynamic gain by facilitating opportunities for new factors of production, including capital. Other preferential schemes and economic cooperation partnerships in the context of South–South cooperation, which are contributing to the growth of local industry and improving intra-African trade, can also boost global supply chains. One such cooperation initiative is the Silk Road Economic Belt and 21st Century Maritime Silk Road, also known as the Belt and Road Initiative, which facilitates access to financing for public and regional infrastructure development projects in Africa and contributes to improving skills, innovation and technology through its various training and transfer of technology programmes.

Opportunities for greening supply chains

Within production and distribution processes, Africa offers several opportunities for greening supply chains and shrinking the carbon footprint of companies. For instance, the green hydrogen potential of Africa opens up opportunities for decarbonizing supply chains, which is becoming a requirement for companies to curb their greenhouse gas emissions. A company's emissions can be significantly improved by choosing suppliers

of lower-carbon materials or relocating its energy-intensive industries, such as steel and chemical industries, to low-cost countries for renewable and green hydrogen power. Other advantages of supply chain expansion into Africa include opportunities to tap into its renewable energy potential, which can lower production costs and lessen reliance on fuel-based energy. As one of the world's largest untapped sources of solar energy, Africa can, for example, lend advantages in the solar power supply chain, which can promote the development of renewable energy technologies on the continent and facilitate the integration of African economies into global supply chains.

High-technology-intensive supply chains and industries: Resetting African markets and businesses for mobility and scale

While supply chains have come under considerable strain owing to the aforementioned crises, some industries are more exposed to global shocks than others and are thus increasingly relevant for geographic diversification. This section focuses on the integration of Africa into medium- and high-technology-intensive supply chains by taking advantage of its natural endowments, with such global supply chain integration likely to pave way for the region's industrialization and sustainable development. Emphasis is placed on the automotive, electronics, renewable energy technology and medical device industries and supply chains, as these are sectors that can be vulnerable to global shocks (for example, the COVID-19 pandemic, trade disputes and geophysical events) and which require more diversified geographic footprints to ensure undisrupted access to suppliers and buyers. Africa can provide such alternative access to inputs and components for these technology-intensive supply chains.

Automotive Industry

The automotive industry is particularly vulnerable to supply chain disruptions, as witnessed during the COVID-19 crisis. While the registration of new vehicles remains low, with over 80 per cent of vehicle registrations pertaining to used vehicles, Africa has the potential to raise its vehicle demand nearly tenfold by 2030. Nonetheless, new vehicle production remains low, at about 1.2 per cent of the global total. Vehicle production is dominated by South Africa, Morocco, Algeria and Egypt in that order, while other African countries have relatively small assembly plants with minimal value addition

(Angola, Ethiopia, Ghana, Kenya, Lesotho, Mozambique and Namibia). In Morocco, increased vehicle production has been underpinned by investment in infrastructure, proximity to the European market and policies geared towards strengthening the vehicle manufacturing sector.

A supply chain mapping approach shows that while African countries remain largely dependent on the import of automotive parts and components from outside the continent, there is room for greater regional supply chain integration. In particular, the manufacture of non-specific parts and components (so-called tier 2) provides the most viable production options for most African countries. They are less technology and knowledge intensive than tier 1 suppliers (manufacture and supply modules and systems ready for vehicle assembly), and often represent the next processing stage that requires abundant metals as inputs demanded by a range of manufacturing sectors. Hence these are essential components for achieving supply chain diversification. The identification of feasible export diversification opportunities that could fill recent gaps in the regional supply chain suggests that countries with already existing capabilities can take on the production of larger, more complex automotive parts and components. In addition, clustered production in special economic zones could strengthen economies of scale and benefit from joint infrastructure and financing.

Mobile telephones

The electronics industry, especially the mobile telephone supply chain can catch the eye of many potential investors and companies that are pursuing the diversification of their supply chains and exploring Africa as a new or alternative destination. Most of the minerals and metals that go into the production of smartphones can be sourced within African countries. For instance, the continent has large reserves of cobalt, copper, graphite, lithium, manganese and nickel, which are used in the production of telephone batteries, circuit boards and other components. The abundance of these resources also provides vast opportunity for strengthening regional supply chains in mobile phone production from precursor production. The production of cathode precursors (nickel-manganese-cobalt oxides), a main ingredient in the manufacture of battery components, can contribute to higher value capture in the battery industry and integration into the electronics and mobile telephone supply chain. It is estimated that building a 10,000-ton precursor facility in the Democratic Republic of the Congo, for instance, could cost \$39 million, which is three times less than what it would cost for a similar plant in a country without the required natural resources or proximity to countries where those metals

can be sourced. In addition to its large reserves of cobalt, representing about 70 per cent of global supply, the Democratic Republic of the Congo could develop a precursor plant by procuring nickel from Madagascar and shipping it through Mozambique or the United Republic of Tanzania or procuring additional manganese from neighbouring country Gabon.

These regional procurement and production opportunities will be facilitated under the African Continental Free Trade Area and strengthened by increased infrastructure investment. Several African companies, such as the Mara Group in Rwanda, Onyx in South Africa and VMK in the Republic of the Congo, have emerged in the precursor development market, in addition to Transsion, the leading Chinese mobile manufacturer in Africa. Developing mobile telephone supply chain capacities in Africa can unlock further potential in the electronics supply chain and open up market opportunities towards the production of tablets, laptops and high-performance servers, and data storage solutions. These are key goods and services that are predicted to be in increasing demand by the growing consumer market in Africa, including electronic commerce and other technology-based services.

Solar panels

Solar panel module assembly is a lucrative area for investment, given the high growth of the renewable energy sector on the continent. Between 2000 and 2020, the level of renewables investment in Africa rose at an annual average rate of 96 per cent, owing to the region's vast solar energy potential. Yet, the continent continues to suffer from significant investment gaps, receiving about 2 per cent of global investments in renewable energy. The production of solar photovoltaic panels is limited, with some opportunities materializing in Egypt, Morocco and South Africa. Despite the rapid growth of solar home systems, systems in Africa are tiny compared with their counterparts in developed countries and require batteries and charge controllers to ensure stable output. Assembly of the solar field, which must be performed at the site, offers significant local manufacturing potential. As many component inputs, such as ball joints, bearings and cables, are used by other industries, these parts offer opportunities for already established companies to achieve lateral diversification of customers. Not all countries in Africa might be able to produce solar panels for their market but the additional employment generation through project development and advisory services, installation and repair services can be substantial and should attract greater attention throughout Africa. Local entrepreneurs are keenly aware of specific local needs, including language

and culture, that are essential for the implementation of large-scale investment projects in renewable energy.

Pharmaceutical products and medical devices

In Africa, the pharmaceutical industry is concentrated in generic medicines characterized by simple production processes, limited production of intermediates and active product ingredients, and scant upstream research and development. The trade deficit in pharmaceutical products increased from -\$2.3 billion in 2000 to -\$12.5 billion in 2020. In addition to limited local production and dependence on imports of medicine, poor access to diagnostic equipment in Africa, especially in rural areas, is also a main constraint to public health. Encouragingly, there have been strong advances in Africa in providing health care and diagnostics to people in rural areas through the implementation of technologies and innovative solutions. Nevertheless, despite some progress, African countries recorded a trade deficit of \$2.6 billion in the medical device sector between 2018 and 2020.

Apart from collaborating with multinationals to access knowledge and technology to make and supply medical products and devices, it would be important to enhance the local sourcing and manufacture of raw materials. For example, in Egypt, there are major local research initiatives under way to produce the most essential active pharmaceutical ingredients.

Localization of mining equipment and supplying industry inputs

Despite the vast mineral wealth in the region and significant foreign investment that the sector has attracted throughout the years, many resource-rich countries in Africa have not been able to translate their resource wealth into sustainable economic, social and environmental development. Supporting African suppliers to the mining industry has perhaps the most potential among all the benefits countries can derive from mining. This can range from products, such as pick-up trucks, tyres, drills, conveyor belts and specific replacement parts, to services, such as catering, surveying and human resource management. In Zambia, however, foreign suppliers dominate the local market for the supply of goods and services across mining sites, mainly because of various constraints, such as a lack of access to long-term capital, restricted access to production technologies, high costs of production inputs and a lack of full quality control

of production. Moreover, the absence of legislative provisions does not encourage domestic production and sourcing. It is important for the mineral-rich countries of Africa to put in place sound local procurement policies based on clear local sourcing and local ownership criteria. Further, to tackle structural transformation in resource-dependent countries and improve the social benefits of mining, there is a need for a new global governance architecture. An example is the sustainable development licence to operate, which is a holistic multilevel and multi-stakeholder governance framework aimed at enhancing the contribution of the mining sector to sustainable development.

Optimizing supply chain opportunities in Africa through enablers and incentives

The global economic crises have emphasized the need for the diversification of suppliers, goods and services to build resilience and better mitigate risks, such as input shortages and soaring product prices. Diversifying and making supply chains more resilient is also associated with digitalization and the adoption of digital technologies through the supply chain. In complex, high-value products and supply chains with shorter lead times, such as medical devices and electrical equipment, the use of digital technologies – advanced automation, machine learning, artificial intelligence and blockchain technologies, to name a few – are a necessity for production, distribution, logistics and procurement efficiency.

For instance, digital platforms and technology-enabled services allow better integration and smooth coordination between different sectors and processes and across distant markets, thus facilitating supply chain diversification. Other technology-enabled services that can enable supply chain resilience and sustainability include supply chain connectivity and logistics; supply chain digitalization; electronic data interchange, supply chain traceability software and smart services.

Supply chains are complex, spanning multiple interconnected countries. They serve numerous electronic commerce platforms and customers with high demand and involve broad ranges of relationships and collaborations. Such complexity can lead to a race to the bottom for many firms, especially small and medium-sized enterprises.

In Africa, many small and medium-sized enterprises operate outside the global supply chain network because of the limited use of digital technologies. Most local small and medium-sized enterprises rarely use technology due to a lack of skills, informality,

infrastructure issues and funding gaps. The main technology-enabled services are almost nonexistent in most African countries. The lack of investment in technology and the low level of human capital are major obstacles to exploiting these potentials.

However, African firms can play a more significant role in supply chain diversification by integrating vertically or horizontally into the supply chain. For instance, by engaging into a business-to-business or business-to-customer collaboration, large firms and small and medium-sized enterprises integrating through mergers and acquisitions can create complementary businesses and expand into upstream or downstream activities. This would enable the integrated companies to streamline their operations and supply chains by acquiring or establishing their own suppliers, manufacturers, distributors, or retail locations instead of outsourcing or importing inputs or other supply chain components. A global supplier can also integrate with an African firm to expand its operations in Africa at similar value or at the supply chain level and within the same industry, thus enabling the integrated companies to expand into new markets and diversify their product offerings. These two types of integration are better facilitated with the use of technology services at all stages, whether transactional or operational.

Countries in Africa should facilitate the adoption and use of these innovative digital technologies that can optimize supply chain practices. Some countries have already embarked on this path. This is the case of Kenya, for example, which has one of the highest adoption rates of digital skills in Africa. Some of the emerging technologies that are increasingly being deployed in that country and which can be leveraged to boost specific industries and supply chains (for example, innovation, product design, manufacturing, logistics and supply chain management) include artificial intelligence, the Internet of things and cloud-computing technologies such as blockchain. This growing technology-oriented ecosystem, also known as the Silicon Savannah, has benefited from sound policies, an enabling regulatory environment and other government-led programmes that favour the upgrading of skills and adoption of digital technology.

Advanced technologies also serve as valuable tools and platforms that can address the financing needs of firms in Africa and potential suppliers or service providers in supply chains. For instance, banks and other credit providers can also use blockchain to improve supply chain financing, as the technology will enable them to make better lending decisions in a fast and cost-efficient manner by having access to real-time and verifiable transactions between the supplier and buyer without having to conduct physical audits or pay for financial reviews. Facilitating supply chain-related investments and finance is particularly important to unleash the potential of small and medium-sized enterprises and their participation in technology-intensive supply chains. Financing

solutions, such as supply chain finance, could be opportunities for the integration of these enterprises into supply chains.

Supply chain finance focuses on facilitating access to working capital, bridging the payment time gap between buyers and sellers to efficiently manage cash needs stemming from daily operations and reduce stress to the balance sheet. There are no internationally agreed supply chain finance standards for the following areas: the part of financial supply chain management that is integrated into physical supply chain activities, financing instruments to manage working capital and liquidity in the supply chain and payables finance or reverse factoring.

In general, supply chain finance in Africa faces several barriers, such as know-your-customer or anti-money laundering regulations and buyer performance, which are related to supply chain finance default risk and profitability. In addition, firms in Africa must overcome barriers to conventional bank financing and capital. African countries are often confronted with a disproportionately higher risk perception by major global financial players, which hinders the expected and necessary financial flows into the continent and feeds into their currency risk. Some countries in Africa are constrained by low or nonexistent country risk ratings, weak banking systems, regulatory challenges and a lack of credit information.

Scaling innovative supply chain finance solutions could significantly improve the access of small and medium-sized enterprises to financing and competitiveness in a well-integrated supply chain that could further increase employment, income, quality of life and economic growth in Africa. However, the level of involvement in supply chain finance is low. In 2022, Africa contributed to only 1.9 per cent of global supply chain finance volume (\$2.2 trillion) and remains the most underdeveloped supply chain finance market across major regions. However, its growth is picking up speed, at about 40 per cent between 2021 and 2022. The availability of supply chain finance continues to be far less than what is demanded across the continent. African countries should ensure that small and medium-sized enterprises have access to supply chain finance by removing certain barriers. These include the lack of technological infrastructure and technology-enabled services; inadequate legal and regulatory frameworks; high risk perception by local firms, owing to insufficient knowledge and education; a fragmented market; and challenging sustainability criteria applied by banks and other lending institutions. Moreover, women entrepreneurs in Africa face additional hurdles to accessing timely finance, compared with their male counterparts.

Policy options for strengthening global supply chain diversification

The risks of concentrating manufacturing and supply chains in a few markets or sourcing and supplying sector-specific intermediate goods from a few locations can increase exposure to shocks and disruptions in production networks and supply chains. By diversifying or relocating to Africa, supply chain participating companies can source some of the inputs (raw materials and intermediate goods) from the continent, while reducing the costs of transportation and logistics and minimizing risks of supplier delivery delays and other challenges.

African countries offer many advantages that can contribute to or drive the diversification of global supply chains for high-knowledge- and technology-intensive industries. Nonetheless, to attract supply chains, African countries will need to adopt certain policies that strengthen and ensure an attractive environment for businesses to relocate to.

The report provides a list of comprehensive policy options that, if implemented, could provide incentives for supply chains to relocate to African countries. Below is a selection of some of the policy options from the report.

Automotive industry

There is a need for a more coordinated automotive strategy and regional automotive development plan to avoid the duplication of efforts. To facilitate continental vehicle sales and promote the domestic supply of parts and components and aftersales goods and services, harmonized and transparent standards are necessary. The African Continental Free Trade Area can provide a platform to create linkages between automakers (for example, original equipment manufacturers), auto suppliers and local suppliers to access the necessary knowledge and technology to meet car-specific requirements.

Electronics: Mobile telephone supply chain

The enforcement of decent labour laws is paramount in an assembly industry that employs more women than men – women are often more vulnerable to exploitation and health risks. It is necessary to invest in skills development and technical training to create a skilled workforce for the mobile telephone industry. Countries that already have

some mobile telephone assembly should develop research facilities to invest in next-generation battery technology.

Renewable energy technology: Solar panel supply chain

There is a need for intensified collaboration to enhance knowledge and technology transfer. This could take the form of mentoring programmes, in which successful, more established companies can exchange information and experience. Moreover, formal and informal intra-industry exchanges are essential to continuous learning.

Health-care industry: Pharmaceutical product and medical device supply chain

To broaden demand and access to medicine, pooled procurement and financing should be further promoted. This can be achieved, for example, by platforms, such as the Africa Medical Supplies Platform, an online portal that enables the delivery of medical supplies to the Governments of Africa. Another important example can be found in a project launched by the Economic Commission for Africa, the African Continental Free Trade Area-based Pharmaceutical Initiative, which contains a centralized pooled procurement mechanism.

Mining industry

Local content requirements or supplier programmes will not sufficiently promote domestic firms if the initial challenges of these firms – lack of electricity and finance – are not tackled at the same time. Supply chain finance and targeted support to these companies can be negotiated ex ante with mining companies before licences are granted.

Localization of supply chains

The future of supply chain transformation in Africa, especially in technology-intensive industries in the automotive, electronics, renewable energy and pharmaceutical sectors, will require viable options for creating domestic supply chains that are reliant and

resilient. This can be achieved through localized supply chains, supplier development programmes and the establishment of local procurement requirements.

Regional market opportunities under the African Continental Free Trade Area

The implementation of the African Continental Free Trade Area provides momentum to attract greater attention towards more high-technology sectors that generate local value addition and employment opportunities. As the African Continental Free Trade Area also aims to strengthen national and regional competitiveness by facilitating regional economic performance and industrial innovation, it will help enhance regional supply chain capabilities and contribute to the efforts of supply chain hubs to foster economic development in Africa.

A push for technology and innovation in supply chain transformation

The use of new technologies and digital solutions can provide comprehensive supply chain visibility and transparency and facilitate the ability of supply chain participating companies to respond more effectively to shifting global market dynamics. Identifying the potential of individual countries in high-technology supply chains; assessing the technology and digital readiness of African firms; facilitating technology transfer, reverse engineering and domestic innovation; and developing and increasing the utilization of digitalization and technology in supply chain processes and interactions will be vital for the transformation of supply chains in Africa.

Technology-enabled service providers and supply chain financing for small and medium-sized enterprises

Small and medium-sized enterprises can be strategic sources and key drivers of global supply chain diversification and supply chain transformation in Africa. Adopting digital solutions and models to their business performance, operating in a conducive technology-based supply chain environment or tapping into novel financial tools to increase the participation of these enterprises in supply chains will be necessary for

those seeking to expand their markets and integrate into global supply chains. These enterprises could also reinforce their collaboration with larger firms or supply chain participating companies by establishing complementary businesses (vertical integration) or similar businesses in other localities (horizontal integration). Large companies should seek to vertically or horizontally integrate start-ups and small and medium-sized enterprises to diversify and regionalize their supply chain. This is particularly important if regional integration through the African Continental Free Trade Area is to be enhanced.

To benefit from supply chain opportunities arising from global disruptions and emerging challenges, the Governments of African countries can count on the research and policy analysis, technical cooperation and consensus-building support of UNCTAD. Leveraging its expertise and experience in providing on-the-ground technical assistance and innovative capacity-building tools, UNCTAD, in cooperation with the Governments of Africa and other relevant stakeholders, could develop bespoke training programmes and tools that can assist African industry leaders and small and medium-sized enterprises to understand the opportunities to integrate global supply chains through increased access to new technologies, financing solutions and re-skilling programmes. By providing a forum for open and constructive dialogue for policymakers, financiers and development partners, UNCTAD could work with the Governments of Africa, domestic and global industry leaders, and domestic and foreign investors to facilitate, streamline and heighten visibility, transparency and impact in overall supply chain processes. Such collaboration could lead to the adoption of policies and standards that would encourage more local content requirements, as well as to the strengthening of local capabilities that are essential to innovation and the production and delivery of goods and services across regional and global supply chains.

