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Structural transformation through domestic value addition in commodity-producing developing countries

Note by the UNCTAD secretariat

Summary

The benefits of value addition along value chains are explored in this note, with an examination of country experiences involving different commodity groups and an outline of lessons learned. Domestic value addition is pivotal in building resilient and diversified economies and can help commodity-producing developing countries optimize benefits from their resources and enhance international competitiveness. By ascending the value chain and producing higher value added products, countries can reduce dependence on raw commodity exports, mitigating the impacts of price volatility and external market fluctuations. Value addition can help increase revenue, job creation and technological advancement. In the present context, the green and digital transitions offer opportunities in commodity value chains for products that support decarbonization and digitalization. Insights from country cases highlight the importance for domestic value addition of policy coherence, human capital development, investment incentives, infrastructure, market access facilitation, finance and technologies.



Introduction

1. The Accra Accord, in paragraph 208, gave a mandate to the Trade and Development Board of UNCTAD to establish a multi-year expert meeting on commodities. The mandate was reaffirmed in paragraph 17 of the Doha Mandate, which extended it to 2016, and in paragraph 100 (s) of the Nairobi Maafikiano, which extended it to 2020. The mandate has been further extended in line with paragraphs 123 and 127 (l) and (m) of the Bridgetown Covenant, which states that UNCTAD should “pay special attention to the challenges of the commodity-dependent developing countries” and “continue to address commodity dependency, including by strengthening the capacity of commodity-dependent developing countries to mitigate negative effects of commodity price volatility” and that “there is a need to analyse and study the policy options available to Governments in order to diversify and transform the structure of their economies”.

2. The benefits of value addition along value chains are explored in this note, with examples from commodity-producing developing countries, identifying enabling factors and potential barriers. This note was prepared with contributions from UNCTAD member States, United Nations entities and other stakeholders.¹

I. Value addition

A. Characterizing value addition

3. Supply chains involve the processes of producing and distributing goods or services, from the sourcing of raw materials to final delivery to end consumers. They encompass all activities, actors and resources from a product’s origin to its consumption. Supply chains comprise upstream activities, which involve raw material extraction, and downstream activities, which involve the manufacture, distribution and consumption of a finished product.

4. Closely related to supply chains, value chains involve activities focused on creating and delivering value with regard to produced goods. Value addition is critical in diversification and enhancing resilience. It involves enhancing the value of a product as it progresses along the supply chain from upstream to downstream activities. There are several stages in the value chain of raw materials, including beneficiation, processing, manufacturing, research and development, design and sales and marketing. These stages may vary across commodity groups, yet the primary objective of each is to transform raw commodities into products with greater economic value.

5. In the mining industry, metallurgy is a significant component of value addition in the processing of minerals. Mineral beneficiation, the initial step after mineral extraction, enhances the economic value of an ore or mineral through the elimination of impurities or the improvement of properties in preparation for further downstream processing. This is related to mineral processing, which involves comminution² and separating concentrates from ore by eliminating gangue minerals³ and impurities. For instance, bauxite beneficiation and processing result in the extraction of high-aluminium and low-aluminium minerals. Further processing and refining through smelting, melting and chemical reactions are required to transform the commodity into refined goods such as metals, alloys and intermediate materials for manufacturing.

¹ Contributions from the Governments of Cambodia, Canada, China, Ecuador, Iraq, Japan, Morocco, North Macedonia, the Russian Federation, Sri Lanka, Thailand, Togo, the African Development Bank and the Economic Commission for Europe are gratefully acknowledged.

² The reduction of solid material particle size by fracture through grinding, milling or similar processes.

³ The commercially worthless material that surrounds the wanted mineral in an ore deposit.

6. In agriculture, value addition often involves agroprocessing activities such as sorting, cleaning, drying, preserving and packaging, to increase market value. For instance, cocoa beans are fermented, roasted and ground to create cocoa products; coffee beans are roasted, ground and packaged, to produce consumer-ready products;⁴ and raw cotton fibres are processed into textiles through spinning, weaving and dyeing.

7. The petrochemical industry plays a role in adding value to energy commodities by transforming petroleum and natural gas into various products, including fuels, plastics, chemicals and synthetic materials. Similar to metallurgy and agroprocessing, petrochemical processing converts raw materials into higher value products through chemical and physical processes.

8. Value addition gains a novel dimension with the twin transition of environmental sustainability and digitalization. In the mining industry, increased demand for renewable energy technologies, in particular, has increased international investment in the value chains of critical minerals such as aluminium, cobalt, copper, lithium and nickel.⁵ This trend continues, despite lower levels of investment in the digital economy and infrastructure sector for these minerals.⁶ In the fuel industry, the urgency of transitioning towards renewable energy sources and curbing carbon emissions means that value addition opportunities are concentrated in lower-carbon energy sources and the circular economy. In agriculture, there is a growing emphasis on sustainable practices and product differentiation, to meet consumer demand for ethically and sustainably sourced products, and value addition in this sector can involve adopting technologies for precision farming, enhancing supply chain transparency and leveraging increased consumer consciousness, by innovating food processing techniques, such as for organic, fair trade or specialty foods. There is also potential for raw agricultural commodities to substitute for less sustainable or higher carbon content materials. For instance, bamboo can be used to substitute for some conventional construction materials and hemp fibres can serve as alternatives to synthetic fibres and plastics used in packaging.⁷

B. Benefits of value addition

9. Enhancing domestic value addition can help commodity-producing developing countries optimize resource use, increasing the unit value of processed products derived from a commodity and boosting international competitiveness. Ascending the value chain and producing higher value added products reduces dependence on raw commodity exports, mitigating price volatility and the impact of external market fluctuations. Value addition enables the capture of greater value from natural resources, increasing revenue, job creation and technological advancement, and contributing to more resilient and productive economies. In addition, the twin transition presents opportunities to leverage commodity value chains with products that align with decarbonization and digitalization efforts.

10. The greater unit value of processed products compared with that of raw materials may be seen across different commodity groups (figures 1–3). For instance, among the leading three exporting countries, Côte d'Ivoire, Ghana and Ecuador, the unit value for cocoa beans ranges between \$2.47/kg and \$2.58/kg; the unit value for processed cocoa products, such as cocoa butter, is higher, and ranges between \$4.41/kg and \$4.74/kg. Filled and unfilled chocolate bars have higher unit values, reaching \$5.54/kg and \$7.20/kg, respectively. There is greater unit value variability for these products compared with that of cocoa beans, reflecting potential differences in processing methods, product attributes, quality standards and market demand. Despite the variability among exporting countries,

⁴ UNCTAD, 2018, *Commodities at a Glance. Special Issue on Coffee in East Africa* (United Nations publication, Geneva).

⁵ UNCTAD, 2024a, *World Investment Report 2024: Investment Facilitation and Digital Government* (United Nations publication, sales No. E.24.II.D.11, Geneva).

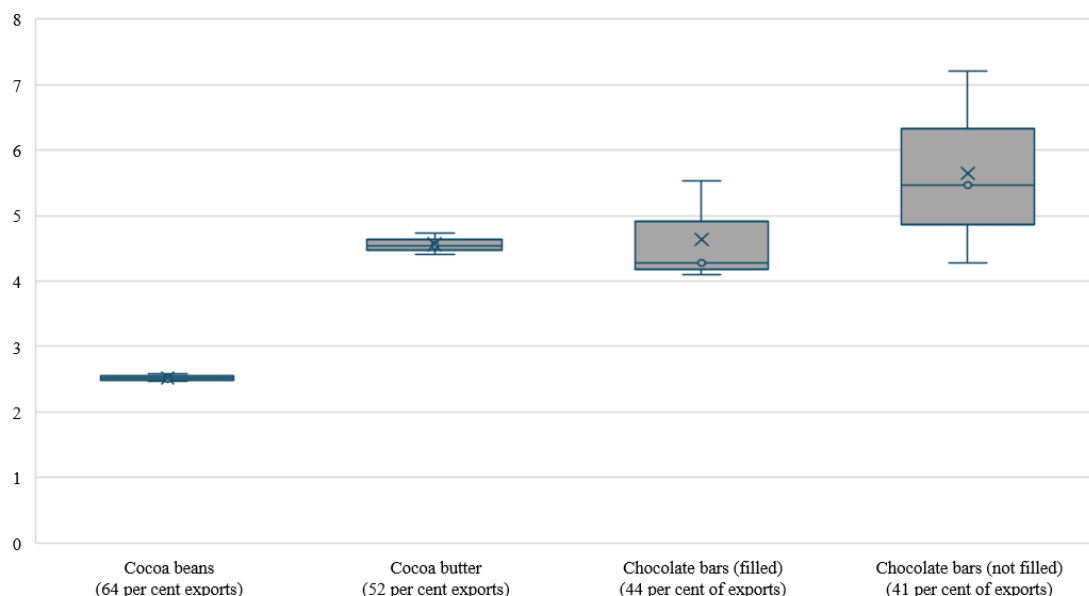
⁶ Ibid.

⁷ UNCTAD, 2022a, *Commodities at a Glance: Special Issue on Bamboo* (United Nations publication, Geneva); UNCTAD, 2022b, *Commodities at a Glance: Special Issue on Industrial Hemp* (United Nations publication, Geneva).

higher unit values are consistently observed for more processed cocoa products. Similar trends are seen with regard to bauxite ore compared with processed aluminium. Among the leading three exporting countries, Guinea, Australia and Indonesia, the unit value for bauxite ore ranges between \$0.04/kg and \$0.06/kg; the unit value for processed aluminium oxide is higher, at around \$0.43/kg and further processing into unwrought aluminium (both alloyed and not alloyed) raises the unit value to \$3.28/kg. The highest unit values are for tubes and pipes made from aluminium alloys, ranging between \$5.8/kg and \$9.2/kg. Similar to cocoa, there is greater variability in average unit values for more processed products, reflecting greater product differentiation at these levels. The same upward trend is observed when comparing natural gas with fertilizers; the unit value of liquefied natural gas is on average \$0.92/kg, compared with \$1.3/kg for ammonium nitrate and \$1.5/kg for urea (figure 3).

Figure 1
Cocoa beans and cocoa-based products: Top three exporting countries, unit value, 2022

(United States dollars per kilogram)

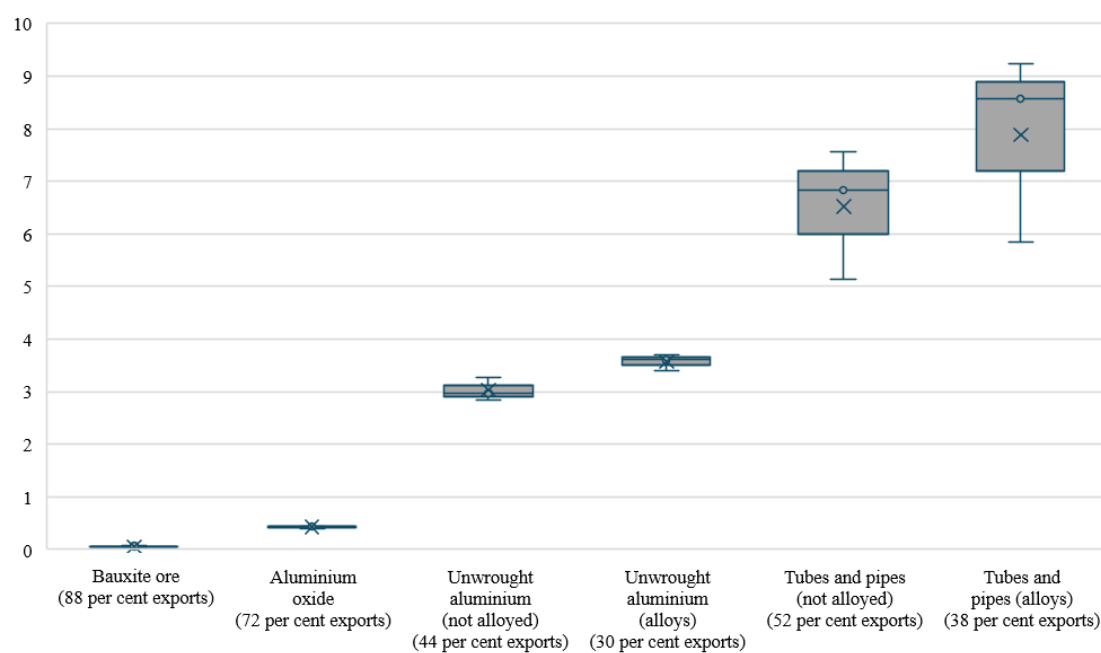


Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Notes: The top three exporting countries are as follows: cocoa beans, Côte d’Ivoire, Ghana and Ecuador; cocoa butter, Kingdom of the Netherlands, Indonesia and Malaysia; filled chocolate bars, Germany, Kingdom of the Netherlands and Poland; and unfilled chocolate bars, Germany, Switzerland and Poland. Unit values calculated by dividing trade value by net weight, using the following Harmonized System codes: 180100, cocoa beans, whole or broken, raw or roasted; 180400, cocoa, butter fat and oil; 180631, chocolate and other food preparations containing cocoa, in blocks, slabs or bars, filled, weighing 2 kg or less; and 180632, chocolate and other food preparations containing cocoa, in blocks, slabs or bars, (not filled), weighing 2 kg or less.

Figure 2
Aluminium ore and selected aluminium products: Top three exporting countries, unit value, 2022

(United States dollars per kilogram)

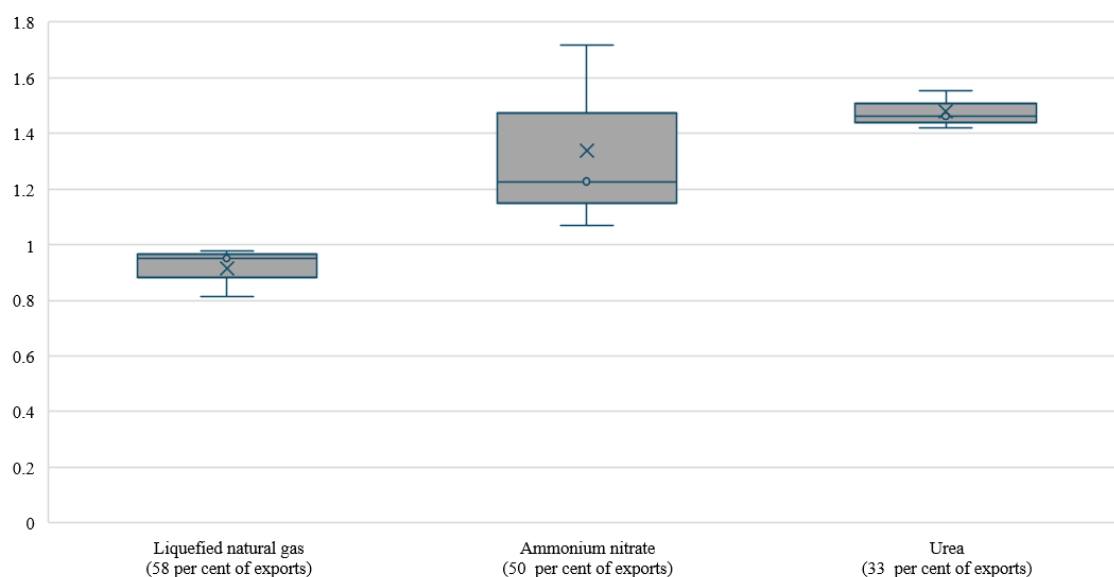


Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Notes: The top three exporting countries are as follows: bauxite ore, Guinea, Australia and Indonesia; aluminium oxide, Australia, Brazil and Indonesia; unwrought unalloyed aluminium, India, Russian Federation and Canada; unwrought alloyed aluminium, United Arab Emirates, Norway and Canada; unalloyed tubes and pipes, China, United States of America and United Arab Emirates; and alloyed tubes and pipes, China, United States and Germany. Unit values calculated by dividing trade value by net weight, using the following Harmonized System codes: 260600, bauxite ore; 281820, aluminium oxide; 760110, unwrought aluminium (not alloyed); 760120, unwrought aluminium (in alloys); 760810, tubes and pipes (not alloyed); and 760820, tubes and pipes (in alloys).

Figure 3
Liquefied natural gas and selected fertilizers: Top three exporting countries, unit value, 2022

(United States dollars per kilogram)



Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Notes: The top three exporting countries are as follows: liquefied natural gas, United States, Australia and Qatar; ammonium nitrate, Russian Federation, Georgia and Bulgaria; and urea, Oman, Russian Federation and Qatar. Unit values calculated by dividing trade value by net weight, using the following Harmonized System codes: 271111, liquefied natural gas; 310230, ammonium nitrate, whether or not in aqueous solution; and 310210, fertilizers, mineral or chemical, nitrogenous, urea, whether or not in aqueous solution.

11. Price volatility in raw commodities poses significant challenges to economic development. The cyclical pattern of commodity prices, for instance, due to weather patterns or business cycles, is relatively well understood, yet unexpected or excessive volatility can disrupt terms of trade, exchange rates, capital flows and public revenues, leading to budgetary constraints for Governments, investor uncertainty and economic instability, particularly among commodity-dependent developing countries.⁸ However, diversification through value addition can help mitigate such volatility and foster economic resilience. Value addition contributes to a greater variety of goods produced in a country and can act as a buffer against price volatility. Processed products tend to exhibit less price volatility than raw commodities due to their broader demand base across industries and trading partners. This diversified demand can help dampen demand-side shocks, particularly with regard to commodities with a high concentration of exporters and few importing countries, including minerals such as cobalt, lithium and nickel.⁹

12. The contrast between the price volatility of raw commodities and that of processed counterparts may be seen with regard to lithium carbonate and lithium-ion batteries and crude oil and polymers (figures 4 and 5). For lithium carbonate, the coefficient of variation of monthly prices (the standard deviation divided by the mean of the distribution of prices) is higher, at 0.96, than that of lithium-ion batteries, a product derived from lithium carbonate, at 0.29. Similarly, crude oil exhibits a coefficient of variation of prices, at 0.32, that is higher than that of polymers such as ethylene, propylene and styrene, which have coefficients between 0.19 and 0.21. With regard to lithium, there may be greater price fluctuations for lithium carbonate due to changes in expected demand from the largest importer, China, and the price for lithium-ion batteries may remain more stable due to their widespread use and a relatively larger number of trading partners in consumer electronics

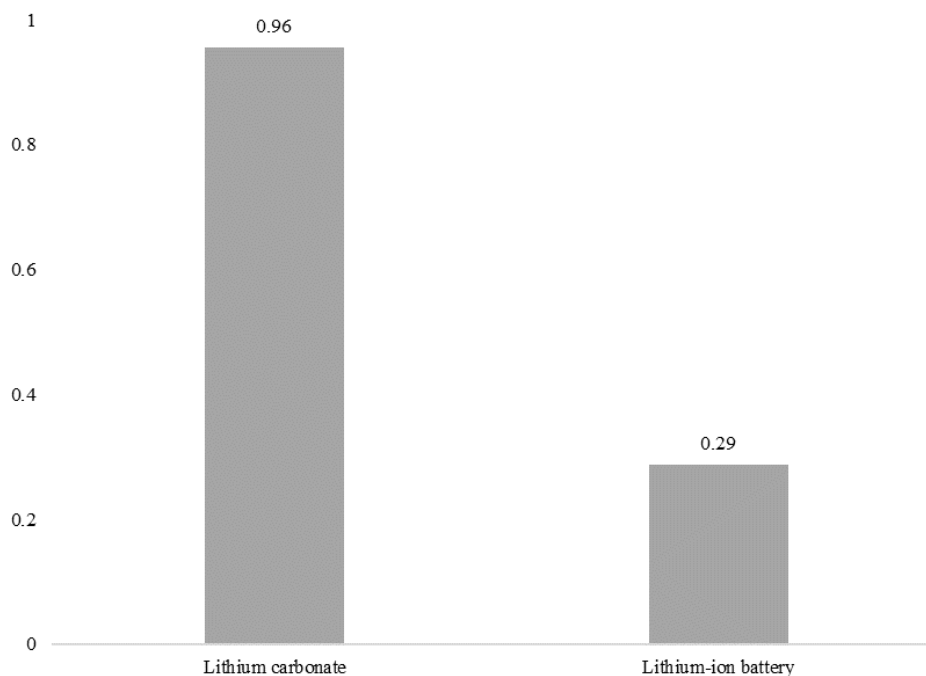
⁸ TD/B/C.I/MEM.2/57. Commodity-dependent developing countries are those with an export value consisting of at least 60 per cent in commodities.

⁹ TD/B/C.I/57 and TD/B/C.I/57/Corr.1.

and renewable energy storage systems. Similarly, the demand for refined petroleum-based polymers such as polyethylene and polypropylene may remain relatively stable due to a more diverse import base and use across industries.

Figure 4

Lithium carbonate and lithium-ion batteries: Price volatility, 2019–2022

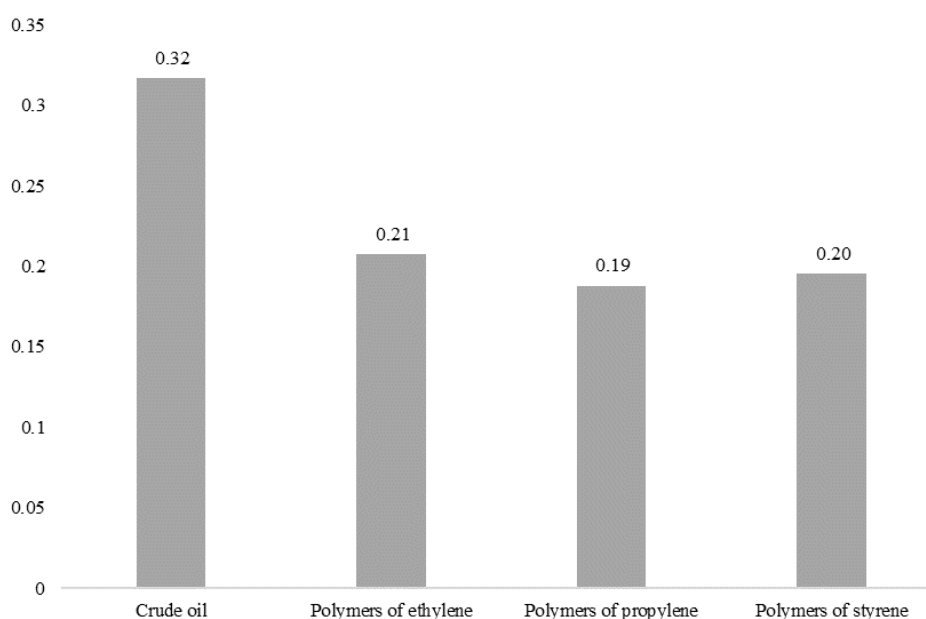


Source: UNCTAD secretariat calculations, based on monthly data from the Comtrade database.

Note: Calculated using the following Harmonized System codes: 283691, lithium carbonate; and 850760, lithium-ion batteries.

Figure 5

Crude oil and different polymers: Price volatility, 2019–2022

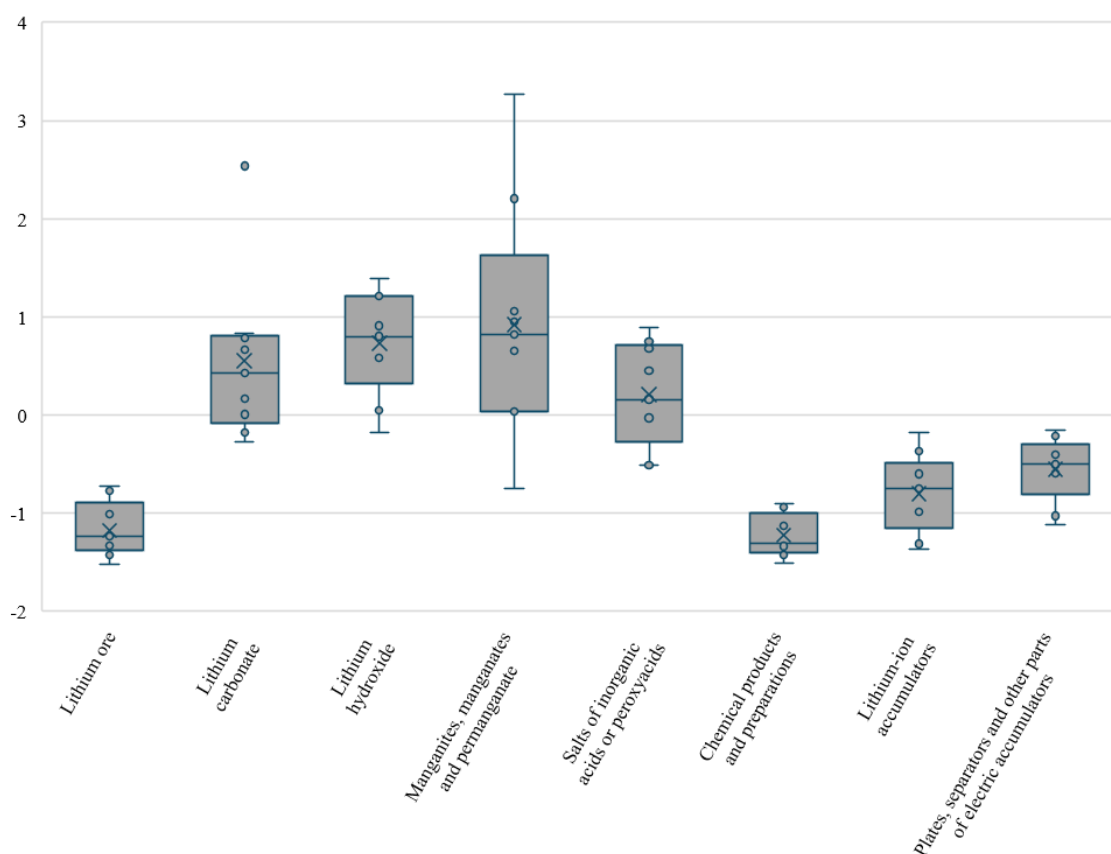


Source: UNCTAD secretariat calculations, based on monthly data from the Comtrade database.

Note: Calculated using the following Harmonized System codes: 2709, crude oil; 3901, polymers of ethylene; 3902, polymers of propylene; and 3903, polymers of styrene.

13. An additional benefit of value addition is the greater economic complexity associated with downstream products. Economic complexity enhances productive capacity in a country and the ability to produce diverse goods and services. It fosters technological innovation associated with the technological sophistication of a product and helps promote competitiveness in the global marketplace. For instance, there is greater product complexity associated with more processed lithium-related products (figure 6). Lithium ore exhibits less economic complexity than beneficiated and more processed products, such as hydroxide, lithium carbonate, lithium-ion accumulators and manganites. This difference serves to show the greater technological sophistication and value added activities involved in producing more downstream lithium products. There is a leap in the product complexity index between lithium ore and lithium carbonate, highlighting the benefits of initial beneficiation in expanding productive capacity in a country, which can positively spill over to related sectors. In this instance, the beneficiation process involves chemical and metallurgical operations requiring more specialized machinery and expertise compared with exporting the raw mineral. The variability in product complexity values in each product category corresponds to differences in country price ranges, which can be due to different processing methods and product attributes across exported products. Despite this variability, the trend remains consistent, namely, most lithium-based products exhibit greater product complexity than the ore.

Figure 6
Lithium ore and lithium-based products: Product complexity, 2022

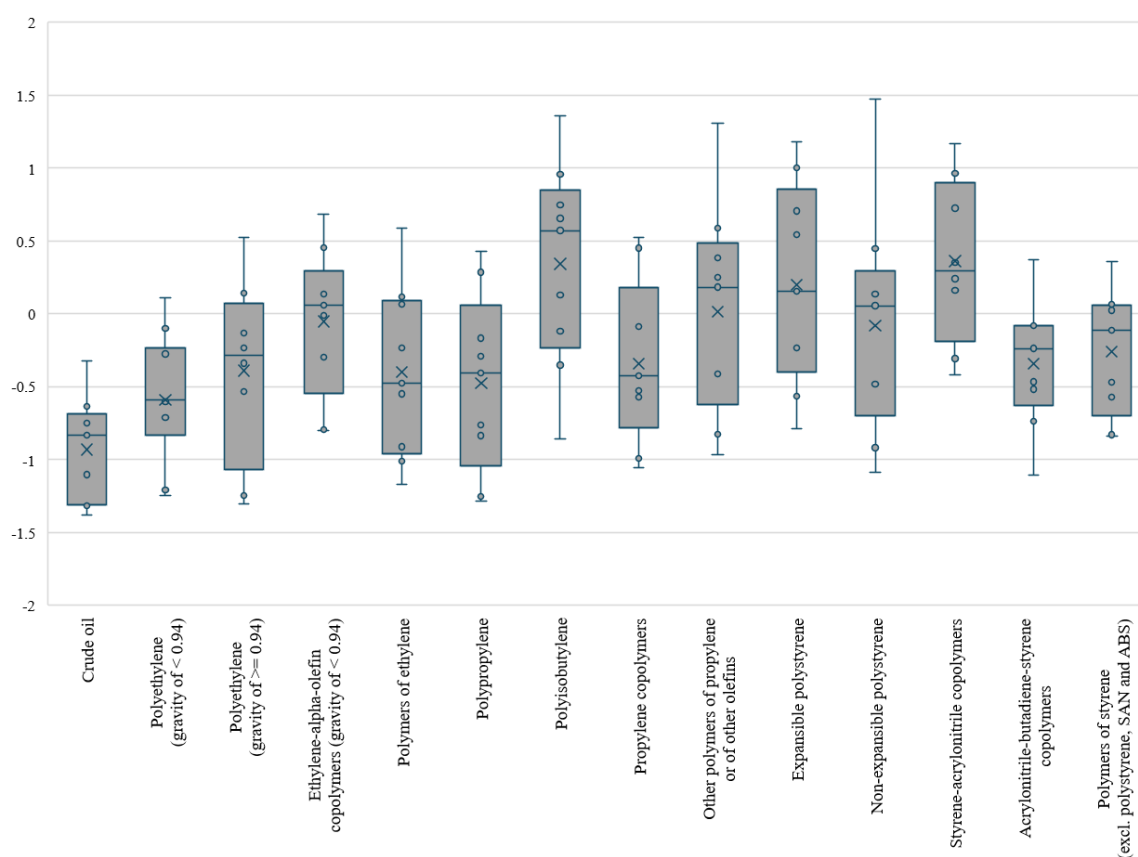


Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: A product complexity value of 0 indicates the average product complexity globally and a value of 1 indicates the standard deviation; calculated using the following Harmonized System codes: 253090, lithium ore; 283691, lithium carbonate; 282520, lithium hydroxide; 284169, manganites, manganates and permanganate; 284290, salts of inorganic acids or peroxyacids; 382499, chemical products and preparations; 850760, lithium-ion accumulators; and 850790, plates, separators and other parts of electronic accumulators.

14. Other commodity groups exhibit similar trends, such as refined petroleum-based polymers (figure 7). The transformation from crude oil to products such as polyethylene, polypropylene and styrene, involving refining and polymerization, underpinned by chemical engineering and petrochemical technologies, translates to higher complexity values. The difference in product complexity between the raw material and refined products is less defined compared with lithium, however, there is still a distinction, emphasizing the importance of the technology and human capital requirements driving such processes.

Figure 7
Crude oil and polymers: Product complexity, 2022



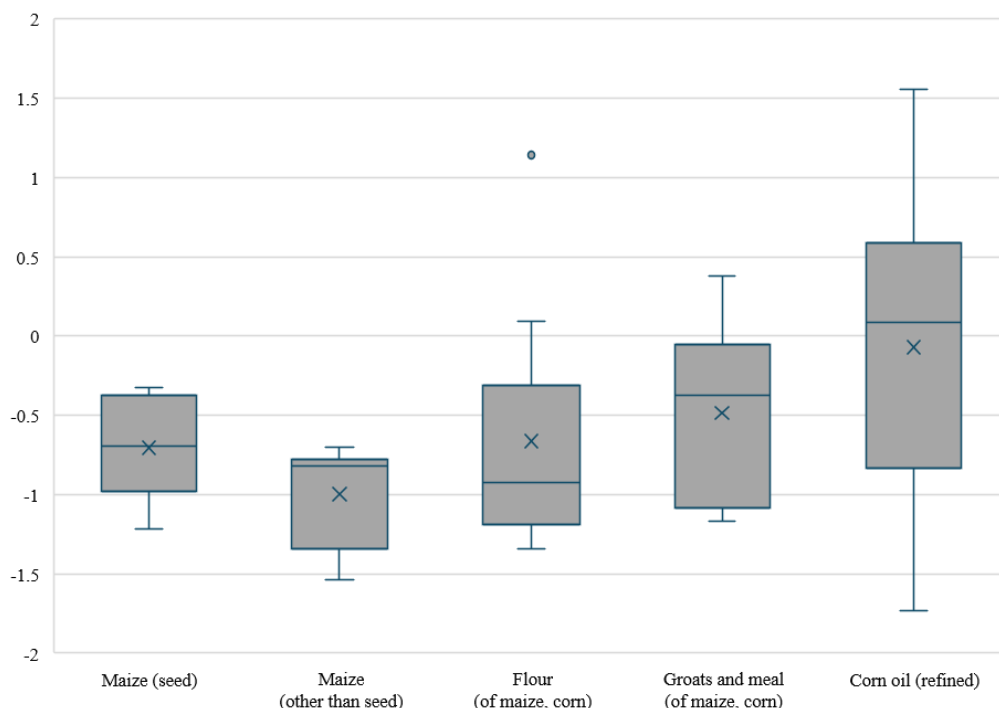
Abbreviations: SAN, styrene-acrylonitrile resin; ABS, acrylonitrile-butadiene-styrene.

Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: A product complexity value of 0 indicates the average product complexity globally and a value of 1 indicates the standard deviation; calculated using the following Harmonized System codes: 270900, crude oil; 390110, polyethylene with a gravity of <0.94 in primary forms; 390120, polyethylene with a gravity of ≥ 0.94 in primary forms; 390140, ethylene-alpha-olefin copolymers with a gravity of <0.94 in primary forms; 390190, ethylene polymers; 390210, polypropylene; 390220, polyisobutylene; 390230, propylene copolymers; 390290, propylene, other olefin polymers; 390311, expandable polystyrene; 390319, non-expandable polystyrene; 390320, SAN copolymers; 390330, ABS copolymers; and 390390, styrene polymers, in primary forms (excluding ABS, polystyrene and SAN).

15. With regard to maize, a marginal increase in product complexity may be observed when comparing corn flour and corn meal with raw maize, and an even greater difference compared with corn oil (figure 8). The latter product requires greater industrial processing, such as extraction and refining methods, which require specialized machinery beyond that necessary to produce raw maize. Greater product complexity indicates greater productive and technological capacities needed for diversification. Generating more sophisticated products helps promote the development of a robust industrial base and positions countries in more competitive and innovative markets.

Figure 8
Maize and maize-based products: Product complexity, 2022



Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: A product complexity value of 0 indicates the average product complexity globally and a value of 1 indicates the standard deviation; calculated using the following Harmonized System codes: 100510, maize (in seed); 100590, maize (other than seed); 110220, cereal flour, of maize (corn); 110313, cereal groats and meal, of maize (corn); and 151529, corn oil (refined).

II. Experiences of in-country value addition in commodity-dependent developing countries

16. In-country value addition experiences among commodity-dependent developing countries involving different commodity groups are detailed in this chapter, including lessons learned, by commodity group, namely, agricultural commodities, minerals and energy-related commodities. The case studies show the potential of targeted policies, institutional support and commodity associations in transforming raw commodity exports into higher value products. Different policy instruments used for this purpose are highlighted in each example.

A. Country examples

1. Colombia: Coffee value addition

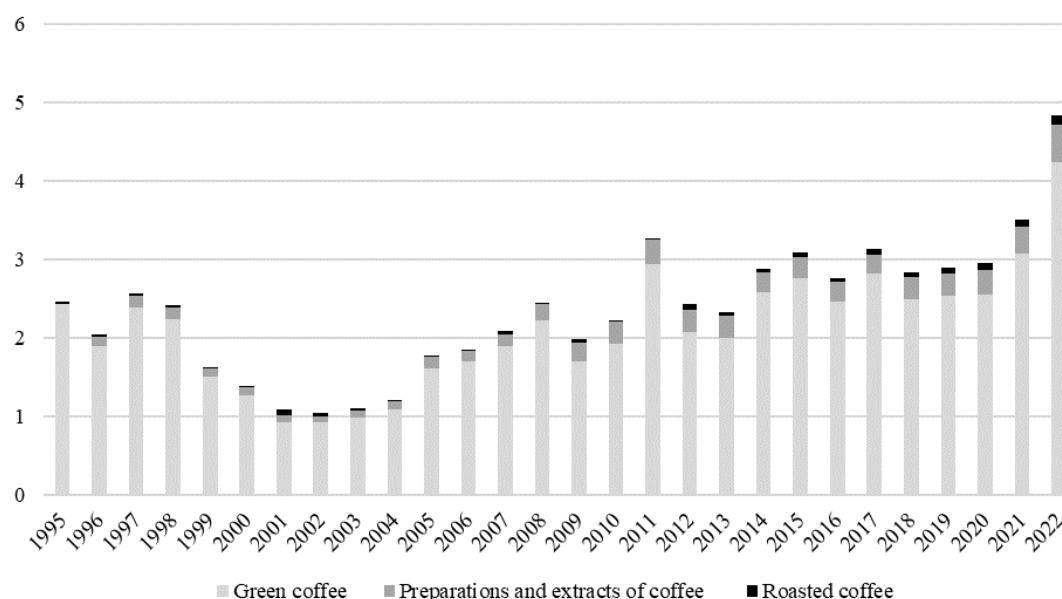
17. Colombia is a leading coffee producer and exporter, with a share of 11.3 per cent of the world's production of arabica coffee, second to the 44.5 per cent share of Brazil.¹⁰ In 2022, 87.4 per cent of the value of coffee exports from Colombia, amounting to \$4.2 billion, was attributed to green coffee, that is, coffee in the naked bean form after removal of the silver skin but before roasting.¹¹ In addition to green coffee, Colombia exports processed coffee, including soluble coffee and coffee roasted in origin; the latter two categories reached export values of \$478 million and \$130 million in 2022, respectively (figure 9).

¹⁰ Based on data from the International Coffee Organization corresponding to the 2022/23 coffee year.

¹¹ See <https://www.ico.org/glossary.asp>.

Figure 9
Colombia coffee exports, by product category, 1995–2022

(Billions of United States dollars)



Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: Calculated using the following Harmonized System codes: 090111 and 090112, green coffee; 210111 and 210112, extracts and preparations of coffee; and 090121 and 090122, roasted coffee.

18. Colombia has boosted the value of coffee exports by promoting and expanding higher value added roasted-in-origin coffee under the Juan Valdez brand through a network of third-party salespoints, branded shops and electronic commerce platforms in coffee-importing countries. The National Federation of Coffee Growers of Colombia, founded in 1927, supports coffee growers by offering various services to its 360,000 affiliated members, including guaranteed purchases, technical assistance, educational opportunities, loans and certification initiatives, to improve coffee quality.¹² The National Federation oversees other supporting bodies, including the National Coffee Research Centre and the National Coffee Fund, established in 1940, which finances public goods and services offered to coffee growers through the National Federation. Funds are collected through a fee paid by exporting members for each pound of exported coffee.¹³ In 1959, the National Federation created the Juan Valdez character, to differentiate Colombian-origin coffee from other coffee blends and, in 2002, the National Federation established a private firm to add further value to coffee produced by members, by expanding international sales points and establishing Juan Valdez-branded stores, first in Colombia and later globally through a franchise system; in 2022, the firm reported an income of \$130.3 million, of which \$73 million was through store channels, and the international market accounted for \$24.3 million, the equivalent of 19 per cent of firm sales.¹⁴ As at 2024, Juan Valdez products are available at 13,475 sales points and 551 dedicated stores and electronic commerce platforms across 40 countries and expansion has increased global demand for Colombian coffee products and allowed producers to capture more value downstream by participating in the benefits generated by retail sales; about 18,000 coffee producers are shareholders in the private firm, receiving benefits from the appreciation of shares.¹⁵

¹² See <https://federaciondecafeteros.org/wp/federacion/estructura/>.

¹³ See <https://federaciondecafeteros.org/wp/conceptos-generales-fonc/>.

¹⁴ See <https://www.juanvaldezcafe.cl/quien-es-juan-valdez-la-historia-detras-del-personaje/>, <https://juanvaldez.com/franquiados-2/> and <https://federaciondecafeteros.org/app/uploads/2023/08/2022-FNC-Mgmt.-Report.pdf>.

¹⁵ See <https://juanvaldez.com/franquiados-y-distribuidores/#>.

19. The unique institutional framework of coffee growing and commercialization in Colombia, led by the National Federation, has facilitated mechanisms to drive value addition. In addition, the Government has made interventions through broader rural development policies or to provide support to coffee growers, for instance through Agro Ingreso Seguro 2006–2008 and the Apoyo al Ingreso del Caficultor programme, which offered subsidies for coffee shipments.¹⁶ In 2022, the Ministry of Agriculture and Rural Development introduced a credit line system, targeted to small and medium-sized coffee producers, providing an average of 300 credits per day in 2024 alone.¹⁷

2. Uganda: Cotton by-products industry

20. Cotton is a traditional cash crop in Uganda, providing direct and indirect income for an estimated 2.5 million people; in 1994, following the liberalization of the textile and apparel sector, the industry experienced operational constraints that hindered ability to compete internationally.¹⁸ In 1995–2000, nearly all cotton in Uganda was exported as unprocessed lint, representing an average of 84 per cent of cotton exports during the period (based on data from the Comtrade database).

21. The Government of Uganda has implemented policy measures since the 2000s to attract investment in the value added processing of cotton, including fiscal incentives such as tax breaks and duty exemptions for capital inputs, including equipment and fertilizers, as well as an electricity subsidy introduced in 2015, to make processing more economically viable.¹⁹ A number of these measures have been financed through the national budget and, since local processors face challenges in securing a steady supply despite the availability of raw materials, given that local ginners often prefer to sign long-term contracts to export lint in dollars, the Government established a revolving lint buffer stock fund, to ensure the procurement of lint for local processors.²⁰ As a result of these policies, two spinning mills have operated in Uganda for over a decade, processing roughly 5 per cent of national lint production into higher value products such as cotton thread, yarn and woven fabrics (based on 2012–2021 data from the Comtrade database). The Government has provided technical assistance and training in production technologies, crop establishment, pest control and soil management, among others, under the guidance of the Cotton Development Organization.²¹

22. Exports of carded and combed cotton have increased, as well as exports of intermediate goods derived from raw cotton, from \$7.6 million in 2000 to \$49 million in 2019 (figure 10). Challenges remain, yet the efforts of the Government underline the importance of interventions in overcoming obstacles to domestic value addition. A key aspect of such a strategy is to retain sufficient cotton domestically to support the local industry, with spinning mills forming the foundation for the textile and clothing industry in Uganda. The Government aims to capture market opportunities such as in supplying public sector uniforms, domestically and through intra-African trade under the African Continental Free Trade Area.²²

¹⁶ See <https://www.ilo.org/publications/user-guide-complete-case-study-colombia> and Lora E, Melendez M, Tommasi M, 2013, Las instituciones cafeteras, in Echavarría JJ, Esguerra P, McAllister D and Robayo CF, *Informe de la Misión de Estudios Para la Competitividad de la Caficultura en Colombia*, available at <https://imgcdn.larepublica.co/cms/2014/10/20234641/2014-10-01%20INFORME%20FINAL%20%281%29%20ALTA%20COMISION%20Echavarría.pdf>.

¹⁷ See <https://www.minagricultura.gov.co/noticias/Paginas/En-2024-se-han-tramitado-300-cr%C3%A9ditos-cada-d%C3%ADa,-en-promedio,-para-caficultores.aspx>.

¹⁸ UNCTAD, 2017, Cotton and its by-products in Uganda, available at <https://unctad.org/project/promoting-cotton-products-eastern-and-southern-africa>.

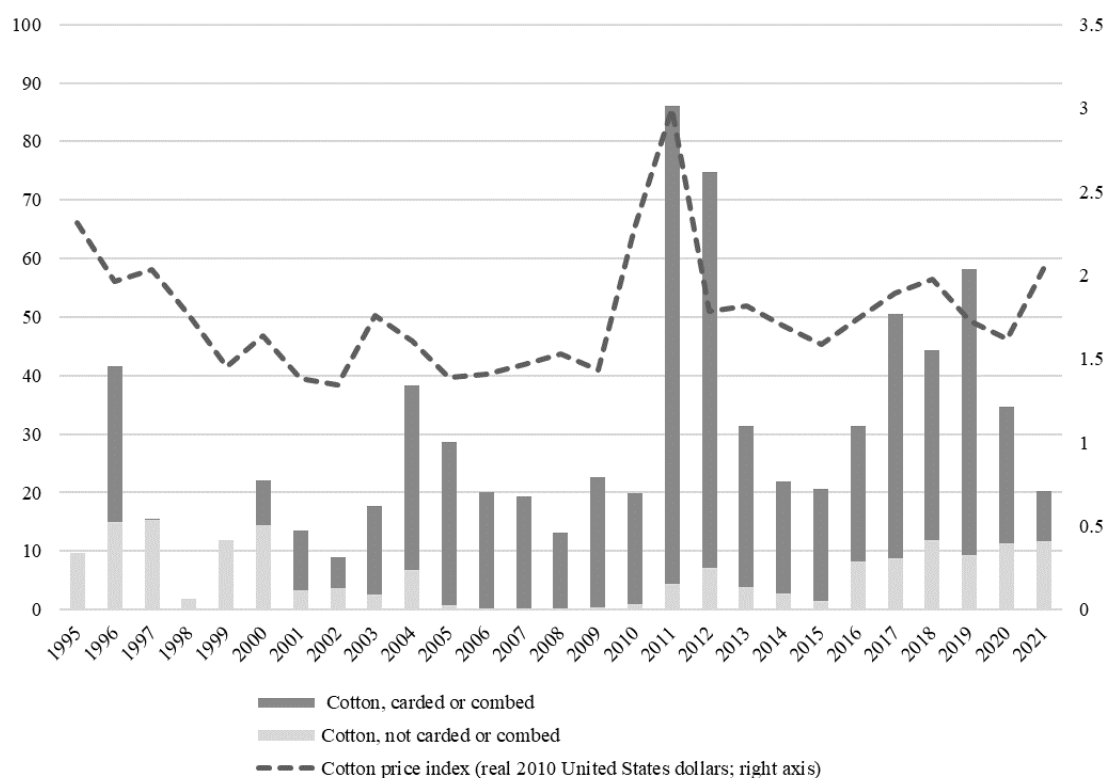
¹⁹ Ibid. See <https://worldbusinessjournal.com/cdo-leads-way/> and <https://www.ugandainvest.go.ug/wp-content/uploads/2024/01/Tax-Incentive-Guide-2.pdf>.

²⁰ See <https://budget.finance.go.ug/sites/default/files/Sector%20Spending%20Agency%20Budgets%20and%20Performance/Cotton%20Development%20Organization.pdf>.

²¹ Ibid.

²² See Fundira T, 2022, Promoting the textiles and clothing value chain: Role of the African Continental Free Trade Area. Trade Law Centre Trade Report No. 2.

Figure 10
Uganda cotton exports, by product category, 1995–2022
 (Millions of United States dollars)



Source: UNCTAD secretariat calculations, based on data from the Comtrade database and data from the World Bank pink sheet on cotton prices.

Note: Calculated using the following Harmonized System codes: 5201, cotton, not carded or combed; and 5203, cotton, carded or combed.

3. Indonesia: Nickel downstream policy

23. Indonesia is a significant producer of nickel, accounting for 48 per cent of mine production in 2022.²³ The national mining policy, particularly for nickel ore, aims to increase downstream manufacturing and domestic value addition. In January 2020, Indonesia reinstated an export ban on unprocessed nickel ore and required foreign buyers to invest in domestic smelters and local processing. This trade measure was one element of a broader set of policies for supporting value addition, including fiscal incentives, investment promotion measures and the streamlining of administrative procedures. Foreign direct investment has significantly increased, amounting to \$22 billion by 2022, part of which was used to install five new smelters and resulted in an increase in processed nickel exports.²⁴ A substantial portion of this investment was made by China, which accelerated the adoption of high-pressure acid-leaching technology, to process low-grade nickel ore.²⁵ Investments facilitated the transfer of technologies necessary to leverage low-grade nickel from limonite and higher-grade saprolite ore, making nickel from Indonesia highly competitive.²⁶

²³ See <https://www.usgs.gov/publications/mineral-commodity-summaries-2023>.

²⁴ International Monetary Fund, 2023, Indonesia, available at <https://www.imf.org/en/Publications/CR/Issues/2023/06/22/Indonesia-2023-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-535060>. Based on data from the Comtrade database; calculated for processed nickel exports under the following Harmonized System codes: 282540, 750110, 750120 and 750210.

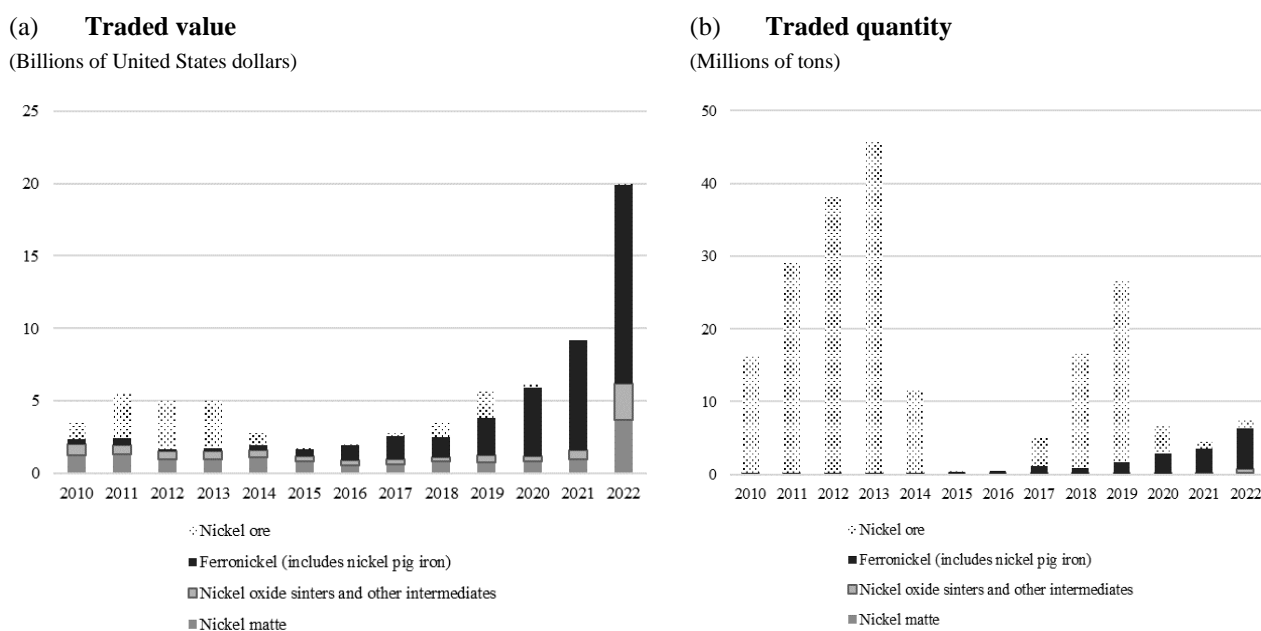
²⁵ International Monetary Fund, 2023. See <https://www.csis.org/analysis/indonesias-nickel-industrial-strategy>.

²⁶ See <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/indonesias-nickel-processing-boom-raises-questions-over-tailings-disposal-75180844>.

Following the introduction of the export ban and other value addition supporting measures, which prompted on-site processing and smelting, value addition in the minerals sector increased from \$1.1 billion to \$20.8 billion in 2021 alone.²⁷ These measures contributed to greater tax revenue from nickel downstream activity, increasing from \$266 million in 2019 to \$1.3 billion in 2022.²⁸

24. The evolution of nickel product exports in Indonesia serves to highlight the shift from exporting large quantities of nickel ore to exporting a higher value of semi-processed products (figure 11). The traded value and traded quantity serve to show that nickel-based processed products, such as ferronickel, nickel oxide and mattes, have a significantly higher traded value and economic benefit compared with nickel ore, despite having been exported in smaller quantities since 2020.

Figure 11
Indonesia nickel product exports, by traded value and quantity, 2010–2022



Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: Calculated using the following Harmonized System codes: 260400, nickel ores and concentrates; 720260, ferronickel (including nickel pig iron); 750120, nickel, oxide sinters and other intermediate products; and 750110, nickel mattes.

25. Indonesia implemented targeted investment promotion measures, increased cooperation with China, the largest investor in the mineral sector since 2013, and established Morowali Industrial Park.²⁹ Given the location of mines, quality investments have extended beyond Java, the most populous island and the location of the capital, contributing to accelerated economic growth in other developing regions, as demonstrated in Morowali and Central Halmahera, which experienced significant increases in gross regional domestic product in 2019–2022, as follows: Morowali, \$9.6 billion to \$19.9 billion; and Central Halmahera, \$428 million to \$2.9 billion.³⁰ New tertiary education institutions and university programmes related to the downstream mining industry have

²⁷ See <https://asiatimes.com/2023/07/indonesias-mineral-export-bans-face-hot-global-fire/>.

²⁸ Seto SH, 2024, Critical minerals value added policies: Indonesia’s story, presented at the fourteenth session of the Trade and Development Commission, 22–26 April, available at <https://unctad.org/meeting/trade-and-development-commission-fourteenth-session>

²⁹ See <https://carnegieendowment.org/research/2023/04/how-indonesia-used-chinese-industrial-investments-to-turn-nickel-into-the-new-gold?lang=en>.

³⁰ UNCTAD secretariat calculations (2023 United States dollars), based on Indonesia, Statistics, 2024, Gross regional domestic product of regencies/municipalities in Indonesia 2019–2023, available at <https://www.bps.go.id/en/publication/2024/06/07/f90b4d2293193647cf2faee1/gross-regional-domestic-product-of-regencies-municipalities-in-indonesia-2019-2023.html>.

been introduced, to support human capital development. These initiatives aim to ensure greater local worker participation, contributing to sustained economic development. Indonesia is considering similar measures for other raw materials, comprising broad sets of policy measures, including trade restrictions to promote value addition, such as, in 2023, an export ban on bauxite and a plan to increase export duties on various unprocessed metals.³¹

4. Brazil: Ethanol national programme

26. In Brazil, the national ethanol fuel programme was launched in 1975 amid global oil crises, to reduce dependence on imported oil by promoting ethanol production from sugarcane.³² The programme aimed to enhance energy security, reduce foreign currency expenditure, stimulate the domestic growth of capital goods and foster employment and economic growth.³³ It also promoted technological innovation and added value to the sugarcane and biofuels industry.

27. The Government implemented several measures to promote ethanol production, including a commitment from a State-owned company to purchase a guaranteed amount of ethanol, providing stability and lower risks for producers.³⁴ Additional incentives, such as low-interest loans, were offered to agribusinesses, to reduce costs and enhance competitiveness; ethanol prices were also fixed, “taking into account sugar prices and setting the ethanol price so that producers would be indifferent to manufacturing sugar or ethanol from the same raw material, sugarcane”.³⁵ These initiatives were financed by high taxes on gasoline, complemented by a loan from the World Bank.³⁶ The initiatives incentivized sugarcane cultivation and the construction of distilleries to convert the crop into ethanol, leading to an increase in ethanol production, from 147 million gallons in 1975 to 894 million gallons in 1979.³⁷

28. The Government mandated a minimum blend of 20 per cent ethanol in gasoline, reinforcing incentives for ethanol production and innovation for vehicle manufacturers and fuel producers. This mandate has changed over time; the latest mandate, from 2015, requires a blend of 27 per cent.³⁸ These policies have fostered technological advancements beyond sugarcane processing, including the development in 2003 of flexible fuel technology, which allows engines to run on any mix of gasoline and ethanol.³⁹ The introduction of this technology contributed to economic diversification and generated employment in the vehicle manufacturing sector. About 80 per cent of the fleet in Brazil comprises flexible fuel vehicles, with an estimated market value of \$19.8 billion in 2024.⁴⁰ Brazil is the second largest ethanol producer after the United States, which uses corn for biofuel; in 2022, ethanol exports reached \$1.9 billion (figures 12 and 13).

³¹ See <https://www.globaltradealert.org/state-act/63654/indonesia-government-announced-an-export-ban-on-bauxite> and <https://www.globaltradealert.org/state-act/76553/indonesia-government-changed-export-duties-on-several-minerals>. The increased export duties involve the following unprocessed mineral ores: copper, iron, lead and zinc.

³² Goldemberg J, 2008, The Brazilian biofuels industry, *Biotechnology for Biofuels*, (1):6.

³³ Stolf R and Rodrigues de Oliveira AP, 2020, The success of the Brazilian alcohol programme: A decade-by-decade brief history of ethanol in Brazil, *Engenharia Agrícola*, 40:243–248.

³⁴ Goldemberg, 2008.

³⁵ See <https://www.gov.uk/research-for-development-outputs/ella-policy-brief-government-intervention-to-strengthen-the-ethanol-sector-lessons-from-brazil>.

³⁶ Ibid; see World Bank, 1981, Report and Recommendation of the President of the International Bank for Reconstruction and Development to the Executive Directors on a proposed loan to the Federative Republic of Brazil for an alcohol and biomass energy development project.

³⁷ Ibid. See Brown LR, 2011, *World on the Edge: How to Prevent Environmental and Economic Collapse* (Earth Policy Institute, Rutgers University, United States).

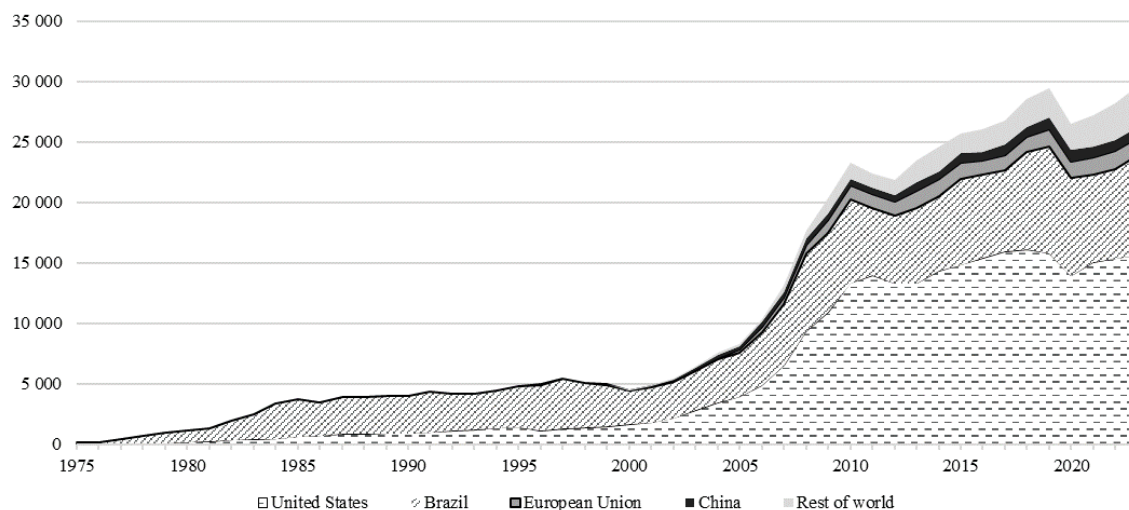
³⁸ See <https://www.iea.org/policies/2021-ethanol-blending-mandate>.

³⁹ See <https://oxfambelgique.be/publications/belgian-consumption-sugarcane-ethanol-brazil-and-peru>.

⁴⁰ See <https://www.coherentmarketinsights.com/industry-reports/brazil-flexfuel-market>.

Figure 12
Global ethanol production by country or region, 1975–2023

(Millions of gallons)



Source: UNCTAD secretariat calculations, based on data from the Renewable Fuels Association and United States Department of Energy for 2007–2023 and Brown, 2011, for 1975–2006.

Figure 13
Brazil ethanol exports, aggregated traded value and quantity, 1990–2022



Source: UNCTAD secretariat calculations, based on data from the Comtrade database.

Note: There is currently no dedicated customs classification for bioethanol for biofuel production; this product is traded under Harmonized System code 2207, which covers denatured and undenatured alcohol, both of which can be used for biofuel production.

B. Lessons learned and other examples

29. Colombia capitalized on the large domestic market by initially focusing on local consumption of Juan Valdez coffee, building a strong domestic market foundation for later international expansion. This strategy highlights the importance of recognizing and harnessing the potential of specialty goods and niche markets for product differentiation and added value. Establishing retail outlets and coffee shops created an ecosystem based on Colombian coffee, extending from the cultivation and processing of coffee beans to services, which supported economic growth and employment across sectors.

30. The experience of Indonesia highlights the importance of investment promotion measures and policy coherence. A comprehensive national plan was central to attracting foreign direct investment, which involved identifying major players, investors and innovators in the mining sector. This targeted approach contributed to technological transfers that enhanced the competitiveness of nickel ore from Indonesia by enabling the extraction of both low-grade and high-grade ore. Understanding the potential of a country for comparative advantages along a value chain is important for assessing the feasibility and profitability of value added initiatives. The introduction of the ban on nickel exports in Indonesia incentivized investments for those seeking to maintain access to the raw mineral. The ban was not an isolated measure but part of a broader policy package implemented in order to foster a conducive investment environment and develop the necessary physical and human capital. Skill development initiatives to support downstream industries were important to enable the domestic workforce to capitalize on foreign investment opportunities. However, the use of trade-restrictive policy instruments needs to be carefully considered with regard to rules under the World Trade Organization. There is a need to avoid trade-disrupting measures, yet further progress is needed to balance the developmental goals of developing countries with limited fiscal space. Trade restrictions can lead to international concerns, for instance, in 2019, the concerns raised at the World Trade Organization by the European Union with regard to the ban on nickel exports and the impact on the steel industry in the European Union. Indonesia has notified of the decision to appeal, but this has not yet been scheduled given the current non-operational situation of the appellate body.⁴¹ The success of such policy instruments is contingent upon various factors, including the substitutability and availability of a mineral elsewhere. This perspective is highlighted by UNCTAD in a discussion of lessons learned from the ban on nickel exports in 2014–2017, the success of which, with regard to the promotion of value addition, was attributed in part to the non-substitutability of Indonesian laterite nickel ore in the nickel pig iron process.⁴² In contrast, a parallel ban on bauxite ore exports was less successful due to readily available substitutes in the market; aluminium refiners shifted to sourcing bauxite from neighbouring countries, which emerged as the net beneficiaries of the export ban.⁴³

31. In Uganda, the interventions made to add value to cotton products emphasize the importance of buffering systems in order to ensure a steady supply of raw materials for local processors, providing stability. Policy interventions should be tailored to addressing industry-specific challenges wherever possible, considering factors such as infrastructure deficiencies and market dynamics. Leveraging trade agreements and locating opportunities along regional value chains is also important in better policy planning and targeting.

32. Special economic zones are another tool for attracting investments and adding value locally through customs, fiscal and regulatory incentives, as well as infrastructure support.⁴⁴ Such zones, often located near major transportation hubs, facilitate access to markets and inputs and can foster innovation and improved supply chain integration through clusters in which related industries are near one another.⁴⁵ Countries have successfully used such

⁴¹ See https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds592_e.htm.

⁴² See https://unctad.org/system/files/non-official-document/suc2017d8_en.pdf.

⁴³ Ibid.

⁴⁴ UNCTAD, 2019a, *World Investment Report 2019: Special Economic Zones* (United Nations publication, Sales No. E.19.II.D.12, Geneva).

⁴⁵ Ibid; World Bank, 2010, *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Washington, D.C.).

zones to promote investments. For instance, in Mauritius, special economic zones, supported by regulatory frameworks and incentives, were part of efforts to diversify the economy, promote export-oriented development and reduce dependence on traditional industries such as sugar.⁴⁶ In Togo, an integrated industrial platform was created in 2020, to host factories, primarily for processing local raw materials.⁴⁷

33. Trade and investment promotion agencies can help attract investments by targeting investors seeking market opportunities, pursuing greater efficiencies in order to lower costs and seeking resources and/or strategic assets.⁴⁸ Such agencies can help facilitate market access for local producers. For instance, in Sri Lanka, the Export Development Board facilitates market access for value added agricultural products through trade fairs, buyer and seller meetings and promotional campaigns in domestic and international markets.

34. With regard to the role of financial incentives for domestic producers, in Brazil, this included low-interest loans and price-setting mechanisms that reduced the opportunity cost of producing ethanol compared with sugar. In addition, guaranteed purchases provided stability and reduced risks for producers. An important element was policy direction and synergy across sectors. Collaboration among government agencies, industries and research institutions created a comprehensive support system for ethanol production.⁴⁹ This cross-sectoral approach promoted technological advancements, such as flexible fuel technology.

35. With regard to policy coherence, in Malaysia, in the 1980s, the multisectoral national industrial policy and industrial master plan targeted resource-based industries for value addition and diversification, supported by fiscal incentives, trade promotion, industrial clusters and research and development support.⁵⁰

36. Capacity-building efforts vary across the case studies, highlighting different approaches to human capital development. In Colombia, the National Federation of Coffee Growers focused on grassroots-level capacity-building, offering technical assistance and training to coffee farmers, including guidance on increasing productivity tailored to individual cultivation characteristics and support for small-scale coffee exports. Initiatives in Indonesia primarily targeted tertiary-level education and collaborations with research institutions and universities, to prevent skill mismatches and ensure alignment with industry needs. In Uganda, training in cotton production and farming practices is offered to farmers in collaboration with the Cotton Development Organization.

37. Capacity-building initiatives should target particular groups, to ensure inclusion and a gender balance. In Ecuador, the Mujer Agro Innovadora capacity-building programme targets women in the agricultural sector, and other initiatives, such as Escuela de Emprendimiento Joven Rural, focus on rural youth, offering training in business administration, entrepreneurship, financial education and applied technologies in agriculture.⁵¹

38. Value added initiatives should consider environmental and social implications, particularly since, in the context of commodity-dependent developing countries, such implications are closely linked to natural resource management. Doing so is critical in order to avoid exacerbating the triple planetary crisis of climate change, pollution and biodiversity loss. In agriculture and biofuels, sustainable land use practices are important in order to prevent deforestation. In mining, attention should be given to rehabilitating mined

⁴⁶ Dube C, Matsika W and Chiwunze G, 2020, Special economic zones in southern Africa: Is success influenced by design attributes? United Nations University World Institute for Development Economics Research Working Paper Series No. 61.

⁴⁷ Contribution from the Government of Togo.

⁴⁸ UNCTAD, 2019b, *Promoting Investment in the Sustainable Development Goals* (United Nations publication, Geneva).

⁴⁹ See <https://www.gov.uk/research-for-development-outputs/ella-policy-brief-government-intervention-to-strengthen-the-ethanol-sector-lessons-from-brazil>.

⁵⁰ Lebdioui, 2022, The political economy of moving up in global value chains: How Malaysia added value to its natural resources through industrial policy, *Review of International Political Economy*, 29(3):870–903; UNCTAD, 2023a, *Commodities and Development Report 2023: Inclusive Diversification and Energy Transition* (United Nations publication, sales No. E.23.II.D.9, Geneva).

⁵¹ Contribution from the Government of Ecuador.

areas, proper extraction techniques and effective waste management systems. Robust governance and policy frameworks are essential in order to uphold environmental and social standards. Attention should also be directed towards indigenous and local communities, to prevent land grabbing and displacement, ensuring that value added initiatives align with sustainable development goals. In addition, addressing these factors is important in order to attract and retain investors, given the increasing emphasis on environmental, social and governance-related reporting and due diligence.

III. Policy considerations

A. Domestic policy considerations

39. To advance local value addition and ascend into higher value added segments of commodity value chains, Governments in commodity-dependent developing countries are encouraged to consider the following policy options:

(a) Develop regulatory frameworks aligned with national development plans, to promote value addition and diversification.⁵² Strategic plans should leverage country-specific characteristics; in the case of large domestic markets, initiatives can focus on national markets before expanding internationally;

(b) Foster human capital and a skilled workforce capable of participating in higher value added manufacturing.⁵³ This can be achieved through curriculum updates, partnerships with universities and industries, vocational training, certifications and upskilling for existing workers in related sectors. Capacity-building initiatives should be tailored to industry needs and promote gender inclusion;

(c) Improve infrastructure, including with regard to transportation, energy and telecommunications, as a prerequisite for supporting value addition activities and facilitating market access. Infrastructure upgrades are particularly important in landlocked countries that rely on the infrastructure of neighbouring countries. Industry-specific infrastructure, such as processing units, is also needed in order to increase value addition;⁵⁴

(d) Establish industrial parks and special economic zones with shared facilities, to help reduce business costs, attract foreign direct investment and stimulate exports through additional fiscal incentives. This approach can be particularly beneficial in countries with weaker governance and where implementing reforms nationwide may be difficult, as it provides a targeted and effective initial step;⁵⁵

(e) Promote public–private partnerships in regions with a significant potential for industrial growth, to leverage private sector expertise and funding;

(f) Design tailored incentive packages for attracting investments and driving innovation, including streamlining and digitalizing administrative procedures, offering tax incentives and providing grants for research and development.⁵⁶ Trade and investment promotion agencies should facilitate connections between local and foreign businesses and assist with regulatory compliance.⁵⁷ Special attention should be given to supporting small and medium-sized enterprises by customizing performance indicators; promoting backward linkages between domestic firms and multinational firms, for knowledge and skill transfers;

⁵² UNCTAD, 2023a.

⁵³ Ibid.

⁵⁴ UNCTAD, 2024a.

⁵⁵ UNCTAD, 2019a.

⁵⁶ UNCTAD, 2023b, *Economic Development in Africa Report 2023: The Potential of Africa to Capture Technology-Intensive Global Supply Chains* (United Nations publication, Sales No. E.23.II.D.22, Geneva.; UNCTAD, 2022c, *World Investment Report 2022: International Tax Reforms and Sustainable Investment* (United Nations publication, Sales No. E.22.II.D.20, Geneva.)

⁵⁷ UNCTAD, 2023c, *Investment promotion in the least developed countries: A needs assessment*, available at <https://unctad.org/publication/investment-promotion-lDCs-needs-assessment-ipa-observer-13>.

and investment promotion agencies focused on reducing information asymmetries and facilitating market access;⁵⁸

(g) Develop financial instruments that provide affordable credit and investment capital to businesses engaged in value addition. Doing so can include public–private partnerships and the use of commodity revenues for infrastructure, capacity-building and research and development or other national objectives. Transparency is needed to ensure an adequate allocation of funds and the effective resource and financial management of commodity rents;⁵⁹

(h) Strengthen links to regional value chains and enhance regional cooperation, to help amplify the impact of domestic value addition initiatives.⁶⁰ Doing so allows for cost-sharing, as well as addressing financial constraints otherwise borne by a single country, fostering technology transfer, improving market access and gaining greater bargaining power in international markets;

(i) Implement robust environmental and social safeguards. Doing so involves enforcing regulations, to prevent environmental degradation and safeguard communities impacted by industrial activities. Such measures are not only important in effective environmental, social and governance-related reporting but also in attracting and retaining investments.⁶¹ Social safeguards should protect the rights of local communities and indigenous groups, ensuring that they benefit from industrial activities without facing displacement.

B. International policy considerations

40. At the international level, the following key policy considerations are proposed, to support value addition and diversification in commodity-dependent developing countries, focused on regional cooperation, technology transfer and infrastructure development:

(a) Promote regional trade agreements such as the African Continental Free Trade Area Agreement, which can boost intraregional trade and economic integration by lowering trade barriers and simplifying customs procedures. Openness to including provisions supporting value addition initiatives, such as rules of origin and local content criteria, in order to foster development and economic diversification in commodity-dependent developing countries is encouraged. Such provisions can help advance developmental goals in these developing countries;

(b) Develop a technology transfer framework and knowledge-sharing initiatives between developed and developing countries. Doing so can facilitate the exchange of expertise, best practices and innovative technologies. Such initiatives can promote value addition and economic diversification in commodity-dependent developing countries and encourage the adoption of advanced, less carbon-intensive technologies, aligning with global climate goals;

(c) Foster regional cooperation in human capital development by establishing capacity-building centres focused on industries for value addition. Initiatives such as the Africa Higher Education Centres of Excellence and the Copperbelt University Africa Centre of Excellence in Sustainable Mining can serve as regional hubs for training, research and knowledge dissemination. Multi-stakeholder engagement at the regional level, including among academia, research institutions and industry, can help enhance the effectiveness and impact of such centres;

⁵⁸ UNCTAD, 2001, *World Investment Report 2001: Promoting Linkages* (United Nations publication, sales No. E.01.II.D.12, New York and Geneva); UNCTAD, 2024b, *Promoting International Investment by Small and Medium-sized Enterprises* (United Nations publication, Sales No.: E.23.II.D.39, Geneva).

⁵⁹ UNCTAD, 2023a.

⁶⁰ TD/B/C.I/MEM.2/58.

⁶¹ UNCTAD, 2023d, Tackling the sustainability reporting challenge: A policy guide, available at <https://unctad.org/publication/tackling-sustainability-reporting-challenge-policy-guide>.

(d) Encourage international investment in infrastructure, which can help enhance transportation networks, improve connectivity and reduce logistics costs, thereby facilitating the movement of goods and services and creating opportunities for local value addition along supply chains;

(e) Adopt international standards, such as those under the Global Reporting Initiative and the International Sustainability Standards Board, and certifications for sustainable production practices, which can help minimize environmental impacts and ensure social responsibility in value addition initiatives. Standardized international guidelines can help reduce information asymmetries, facilitating market access and participation by developing countries.⁶²

⁶² UNCTAD, 2023e, *World Investment Report 2023: Investing in Sustainable Energy for All* (United Nations publication, Sales no. E.23.II.D.17, Geneva).