REGIONAL VALUE CHAINS AND ECONOMIC INTEGRATION IN AFRICA IN THE CONTEXT OF THE AFCFTA: THE CASE OF PHOSPHATE AND DERIVATIVES

CHAINES DE VALEUR REGIONALES ET INTEGRATION ECONOMIQUE EN AFRIQUE DANS LE CONTEXTE DE LA ZLECAF : LE CAS DU PHOSPHATE ET DE SES DERIVES

Islam JAAFARI
Docteur
Université Mohammed Premier Oujda
Email : islam.jaafari@ump.ac.ma

Mohammed SADIK
Doctorant
Université Sidi Mohammed Ben Abdellah Fès
Email : mohammed.sadik@usmba.ac.ma
Abstract

Despite its strong demographic and natural potential, Africa still occupies a marginal place in the mapping of the global economy. This low ranking is explained by the low level of diversification of production in most African countries and the lack of integration of African economic communities compared to other sub-regions of the world. Against this contrasting background, the official entry into force of the African Continental Free Trade Area (AfCFTA) could represent an opportunity for the continent given its prospects for strengthening the integration of African countries, and the potential contribution of its mechanisms to achieving sustainable industrialization in Africa. The creation of regional value chains (RVCs) is one of AfCFTA’s priorities because of their ability to boost inclusive and sustainable development. This study has shown that the creation of RVCs for phosphates and phosphate derivatives has the potential to stimulate the integration of African economies and contribute to the continent’s food security, provided that trade barriers are removed within the AfCFTA framework.

Keywords: Regional value chains; Economic integration; AfCFTA; Phosphate and derivatives.

Résumé

Malgré son fort potentiel démographique et naturel, l'Afrique occupe encore une place marginale dans la cartographie de l'économie mondiale. Ce classement s'explique par le faible niveau de diversification de la production dans la plupart des pays africains et le manque d'intégration des communautés économiques africaines par rapport à d'autres sous-régions du monde. Dans ce contexte contrasté, l'entrée en vigueur officielle de la Zone de libre-échange continentale africaine (ZLECAf) pourrait représenter une opportunité pour le continent compte tenu de ses perspectives de renforcement de l'intégration des pays africains, et de la contribution potentielle de ses mécanismes à la réalisation d'une industrialisation durable en Afrique. La création des chaînes de valeur régionales (CVR) est l'une des priorités de la ZLECAf en raison de leur capacité à stimuler un développement inclusif et durable. Cette étude a montré que la création de CVR pour les phosphates et les dérivés de phosphate a le potentiel de stimuler l'intégration des économies africaines et de contribuer à la sécurité alimentaire du continent, à condition que les barrières commerciales soient supprimées dans le cadre de la ZLECA.

Mots-clés : Chaînes de valeur régionales ; Intégration économique ; ZLECAf ; Phosphate et dérivés.
Introduction

The issue of the integration of African countries into regional value chains (RVCs) has been revived in recent years, particularly in a context marked by the willingness of African states to initiate a process of industrialization of the African continent, a guarantee of sustainable and inclusive development.

This question has also been revived following the gradual opening up of Africa to the world economy and the diversification of its trading partners (the United States, China, the European Union, Turkey, etc.), and the official entry into force of the African Continental Free Trade Area (AfCFTA). The integration of African countries into RVCs could be an alternative for African economies which are often in an unfavorable situation due to the low export diversification of most African countries and the existence of various obstacles that penalize intra-African integration in several regional economic communities (RECs). Integration into RVCs is one of the main objectives of the creation of the AfCFTA, which also aims at developing African brands integrated into competitive and strong RVCs.

From this perspective, the objective of this study is to find out how AfCFTA could promote regional value chains? To answer our research question, we will first look at the contributions of this agreement to the promotion of RVCs and its role in anchoring and developing activities that can strengthen continental economic integration and promote intra-African trade. Our attention will also be focused in a second phase on the design of a mapping of the regional value chain of phosphate and derivatives in Africa. Our results show that Morocco is well positioned in all segments of the chain. Other players such as Egypt, Algeria, and South Africa are partners rather than competitors in the fertilizer segment. Our results also show that trade is with the rest of the world rather than with African countries and that the potential for developing a RVC for phosphate and derivatives can be exploited with the removal of tariff and non-tariff barriers to contribute to the continent's food security.

I. THE CHALLENGES OF AFRICAN TRADE: LACK OF DIVERSIFICATION AND WEAK REGIONAL INTEGRATION

According to the UNCTAD report (2019), there are many obstacles to the development of intra-African trade, including the lack of productive capacity and the low diversification of the exportable offer of most African countries, but also the existence of trade costs (tariff and non-tariff) that penalize the competitiveness of African companies and hinder African regional integration.
I.1. Lack of productive capacity and low diversification of exportable supply

Production in Africa is still hampered by structural constraints and a lack of competitiveness at higher levels of value chains compared to other sub-regions of the world (Hallward-Driemeier & Nayyar, 2018). The primary specialization of most African countries is illustrated by the predominance of commodities in exports. Most developing countries, including many African countries, tend to concentrate in low-value segments, exporting mainly low-processed primary products (Figure 1). Similarly, the manufacturing activities of many African countries are concentrated on segments where they provide assembly activities with few links to other processes (Bamber et al., 2014).

Figure 1
Structure of Africa's external trade, 2016

An examination of the structure of intra-African trade shows that the continental market remains limited in size. However, intra-African exports remain more diversified and less dependent on primary products than Africa's exports to the rest of the world. Mineral products (oil, minerals, etc.) account for the lion's share (33%) of intra-African exports and constitute half of Africa's total exports to the rest of the world. This concentration of exports to the rest of the world around mineral products is also present at the level of the regional economic communities. More globally, in 2015-2017, manufactured exports accounted for 45% of intra-African exports, but only 20% of Africa's exports to the rest of the world (UNCTAD, 2019). Moreover, intra-industry trade is even lower compared to other regions. This is likely to penalize the insertion of African countries in regional value chains. In Africa, the low processing capacity in the vast majority of countries and the concentration of exportable supply in a small range of primary products makes the African continent vulnerable to the vagaries of the prices of these products and highly dependent on unilateral preferences on the main international markets (UNCTAD, 2019). This concentration around a narrow range of low-value commodities also affects outcomes in terms of inequality and job quality. Indeed,
many studies have shown that there are negative correlations between export complexity and vulnerable employment shares. For example, the concentration of exports around a few products can lead to geographical inequalities, especially when export industries are clustered in the same location (e.g. mining) (AUC/OECD, 2018). Africa’s underperformance is not limited to trade flows but is also reflected in its low share of foreign direct investment flows (Figure 2). Indeed, FDI outflows from Africa in 2019 fell by 35% to $5.3 billion (UNCTAD, 2019). A significant share of FDI outflows from African countries correspond to intra-continental flows, in particular, investments made by South African and Moroccan multinationals on the continent, as well as some notable projects from TOGO in the West African region (UNCTAD, 2019). By 2019, FDI flows to Africa had already declined by 10 percent to $45 billion as the negative effects of tepid global and regional GDP growth and declining commodity demand inhibited flows to countries in the region (UNCTAD, 2019).

**Figure 2**

*FDI flows in billions of dollars in 2019*

![Graph showing FDI flows in billions of dollars in 2019](image)

**Source:** Authors’ conception with reference to UNCTAD calculations (2019)

In addition to this weak diversification of exports, other factors penalize the integration of African economies and their competitiveness. These include deficits in infrastructure and services, the lack of a stable macroeconomic environment, difficult access to finance, lack of professional skills, and inconsistent national and regional policies.

**I.2. Weak regional integration**

Although intra-African trade has been growing at about 15.2% of total African exports during 2015-2017 (AUC/OECD, 2018). Africa remains the region with the lowest proportion of intra-regional exports, excluding Oceania (UNCTAD, 2019) (Figure 3). However, it should be
noted that since 2008 only the African and Asian regions continue to show positive growth rates in foreign trade (UNCTAD, 2019).

**Figure 3**

*Intra-regional trade in the world*

![Intra-regional trade in the world](image)

**Source:** Authors' compilation based on UNCTAD calculations (2019)

The development of intra-regional trade faces numerous obstacles related to insufficient infrastructure, high export and import costs, and the complexity and multiplicity of non-tariff barriers (Ministère de l’Économie et de l’Innovation du Québec, 2019). This prevents African countries from taking advantage of their proximity to markets. For example, sub-Saharan Africa is the region with the highest export and import costs compared to other regions of the world, except Latin America and the Caribbean (UNCTAD, 2019). Compared to other more developed economies, customs clearance costs are the equivalent of three times higher for members of the West African Monetary Union (WAEMU), where trade costs are the lowest among African regional economic communities (Ministère de l’Économie et de l’Innovation du Québec, 2019).

### II. REGIONAL VALUE CHAINS AS AN ALTERNATIVE FOR AFRICAN COUNTRIES TO INITIATE REGIONAL INTEGRATION

One of the most important changes over the past two decades has been the growing importance of global value chains (GVCs) and regional value chains (RVCs) in managing and coordinating production and trade linkages between countries (African Union Commission/OECD, 2018). The global economy today tends to be structured around Value Chains in which intermediate goods and services are traded through fragmented production processes across multiple countries or regions. The development of value chains has been facilitated by improved transport, the ICT revolution, and widespread trade and investment liberalization (Bamber et al., 2014). The rise of VCs is not only due to their positive
correlation with the growth rate of GDP per capita, but also due to their ability to bring about a sustained industrialization process. The fragmentation of production on an international or regional scale has gone hand in hand with an intense process of diversification of production (Hoekman & Shepherd, 2017). The growth of GVCs has been one of the main drivers of the changing relationship between developing and developed countries (De Backer et al., 2018).

The problem for African countries is not their level of integration into world trade, given that foreign trade in goods and services accounted for almost half of Africa's GDP in 2015-16, a level identical to that of Asia and higher than that of LAC (44%) (AUC/OECD, 2018). The challenge lies rather in the quality of this integration. In this perspective, the development and promotion of RVCs is likely to enable African countries to overcome the lack of diversification and the weakness of intra-African trade from which Africa suffers. Indeed, the African continent still has a significant deficit in intra-regional trade in intermediate products compared to other regions of the world (Figure 4).

Figure 4.

Trade in intermediate goods in % of GDP

![Graph showing trade in intermediate goods in % of GDP.](chart.png)

Source: AUC/OECD (2018)

Upgrading existing products, broadening the exportable offer, and improving access to capital goods and factors of production are above all paths to sustainable growth that could strengthen the capacities of African countries to position themselves in other more sophisticated export baskets. RVCs are real tools for promoting intra-African trade in a context of developmental regionalism (UNCTAD, 2013) by enabling the countries that integrate them to appropriate modern technologies and to move upmarket. RVCs offer new opportunities for the industrial transformation of commodities, which represents a promising alternative for African countries that are often at a disadvantage in competing with or overcoming GVCs. RVCs and emerging markets represent important opportunities for small exporters and a springboard for integrating GVCs as standards at the RVC level are less
stringent. Because of the knock-on effects, RVCs offer emerging economies the opportunity to add more value to their local industries, create jobs and increase their incomes. Structuring around RVCs is likely to promote access to intermediate products in regional markets, which could boost a country's export competitiveness (Kowalski et al., 2015). However, successful regional integration around RVCs requires trade facilitation measures, harmonization of external policies, and strengthening of intellectual protection measures.

III. THE AFCFTA, A SPRINGBOARD FOR AFRICAN REGIONAL INTEGRATION

On 21 March 2018, 44 African states signed in Kigali the agreement creating the AfCFTA, one of the world's largest free trade areas with a potential consumer base of more than 1.3 billion people and an annual output of 2,220 billion dollars (AUC/OECD, 2018; UNCTAD, 2019). The zone could generate 16.1 billion dollars in welfare gains and induce a 33% increase in intra-African trade (UNCTAD, 2019).

The AfCFTA agreement aims to stimulate African economies by harmonizing trade liberalization and facilitation among RECs. Indeed, the entry into force of the protocols foreseen by the agreement (Figure 5) could foster the economic diversification of African countries, accelerate the process of regional integration, and promote the emergence of a manufacturing sector through diversification and the development of regional value chains by strengthening the competitiveness of African firms through the optimal exploitation of economies of scale.

Figure 5

The different protocols of the AfCFTA

Source: Authors' elaboration on the basis of the AfCFTA agreement

Article 2 of the Trade in Goods Protocol aims at stimulating intra-African trade in goods through the development and promotion of value chains at regional and continental levels, the progressive elimination of tariffs and non-tariff barriers, the improvement of the efficiency of customs procedures, the facilitation of trade and transit and the strengthening of cooperation in the field of technical barriers to trade and sanitary and phytosanitary measures.

The creation of the AfCFTA has the potential to stimulate the structural transformation of African economies by promoting a more equitable distribution of the benefits of trade in
African countries (Valensisi & Karingi, 2017). It is a means of deepening the continent's integration into the global economy by accelerating the development of the productive capacity and competitiveness of African firms. The elimination of customs duties combined with trade facilitation measures is likely to increase flows between members of the zone, which guarantees better exploitation of comparative advantages. Accelerating the process of industrialization in Africa is also a major objective of the AfCFTA. The creation of a single market for goods and services on the African continent is expected to reduce the costs of intra-regional trade, which would encourage the creation of regional value chains and the diversification of export products (Ministère de l’Économie et de l’Innovation du Québec, 2019). Indeed, this agreement can play a catalytic role in the creation of RVCs in the manufacturing and agribusiness sectors (UNCTAD, 2019). It is an opportunity to address the disconnects between the continent's different communities.

Trade integration has led to spectacular success stories in other continents and has been instrumental in getting development off the ground. It is a source of positive structural transformation by ensuring the diffusion of knowledge and technology and facilitating the development of new products.

The entry into force of the AfCFTA will amplify the region's potential for economic transformation and could significantly boost intra-regional trade in Africa, provided that both tariff and non-tariff levers are used. An overall reduction in tariffs is likely to have a significant impact on trade flows in the region. This is evidenced, for example, by the development of intra-regional trade, which has grown significantly in parallel. Indeed, the experience of the African RECs sheds light on the factors that can influence intra-regional trade on the continent. The development of regional trade flows in Africa over the past few decades has been a corollary of the creation and expansion of several RECs, some of which apply almost zero preferential tariffs to trade between their member countries (Banque Centrale des Etats de l’Afrique de l’Ouest, 2020).

Scenario studies for African countries have shown that lower tariffs could have positive effects on intra-regional trade, particularly in mineral products, manufactured goods, and agriculture-related sectors (Table 1).
Table 1

Results of AfCFTA impact studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Scenarios</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mevel and Karingi (2012)</td>
<td>Full tariff liberalization (100%) + 50% of the costs of trade liberalization</td>
<td>Tariff reduction only: 0.2% positive effect on welfare and 50% on intra-African trade. Including the reduction in the cost of trade, a 1% increase in welfare and a doubling of intra-African trade; a welfare gain is observed in all modeled countries.</td>
</tr>
<tr>
<td>Depetris Chauvin Ramos and Porto (2016)</td>
<td>Full liberalization of customs duties (100%), reduction of 50% of NTBs, 30% reduction in transaction costs</td>
<td>In 2030, +1% GDP (tariffs only); +6% GDP (tariffs + NTB + transaction costs). Almost all countries have a positive or zero effect on their GDP in all scenarios. Welfare gains are positive for all if, and only if, NTBs are reduced, up to 2.66% more welfare in 2027 in the maximalist scenario. The micro-simulation shows pro-poor welfare effects.</td>
</tr>
<tr>
<td>ILO and UNCTAD (2013)</td>
<td>AfpCFTA of goods</td>
<td>50% increase in intra-African trade</td>
</tr>
<tr>
<td>Everwi (2016)</td>
<td></td>
<td>Substantial increase in welfare in 15 of 17 African countries or regions; significant loss for one country (Zimbabwe)</td>
</tr>
</tbody>
</table>

Source: Commission économique pour l’Afrique (2017)

However, the reduction of trade tariffs within the African RECs has not had an equal impact on trade flows in the sub-regions concerned. In particular, the persistence of other non-tariff barriers still prevents true African integration. For example, in SADC trade flows peaked after the reduction of tariffs, and the share of intra-Community trade has increased significantly. However, in other RECs, the reduction in tariffs has not translated into a significant increase in sub-regional trade flows (e.g. in the Economic and Monetary Community of Central Africa, CEMAC). The removal of tariff and non-tariff barriers, as well as structuring around RVCs, is likely to strengthen intra-regional integration in Africa.

To show the potential for deepening African integration, we have opted for a case study of the phosphate and derivatives RVC, a chain that is likely to play a key role in meeting the challenges of the continent's food security and economic development.

IV. REGIONAL VALUE CHAIN FOR PHOSPHATE AND DERIVATIVES

The Phosphate Value Chain is based on the exploitation of phosphorus (P) contained in rock phosphate. Together with nitrogen (N) and potassium (K), phosphorus is considered a fundamental macronutrient for plant and animal life. It is mainly used in the production of fertilizers: this accounts for about 86% of the global demand for phosphate products (FAO, 2019). Fertilizers are used to increase soil fertility by providing nutrients and improving the yield of agricultural crop production. Phosphorus is also used in the manufacture of food preservatives and cosmetics, water treatment, and metallurgy.
We first carry out a diagnosis of the African market for phosphate and derivatives, to then map the RVC of these products in Africa and then focus on Morocco's positioning in this chain.

IV.1. Diagnosis of the African phosphate and derivatives market

Phosphate rock extraction depends on phosphate reserves and extraction capacities. Africa has the largest phosphate reserves in the world with a share of 78.3% (USGS, 2021). As for extraction capacities, they amount to 59.2 million tons (Mt) in 2019, i.e. the second largest capacity after East Asia. The IFA (International Fertilizer Association, 2020) forecasts an increase in this capacity to 75.2 Mt in 2024.

In Africa, processed phosphate rock increased from 12763.2 thousand tons (Kt) P2O5 (phosphorus pentoxide content) in 2008 to 15589 Kt P2O5 in 2019, with an average annual growth rate of 1.7% (Figure 6). Africa accounts for an average of 24% of world phosphate rock production. This share remains below the region's potential, which is mainly due to two factors. The first is the under-exploitation of reserves in certain countries such as Algeria and Togo. The second is the social tensions in the phosphate regions of Tunisia, which in some cases lead to a halt in production.

Africa is a net exporter of rock. Indeed, 36.8% of production on average is exported to other regions, which use it mainly to produce phosphoric acid and subsequently phosphate fertilizers. The export of this rock in its raw state results in a loss of added value for the continent. This is the result of the mismatch between extraction and processing capacities.

While the production of phosphate rock amounts to 15589 Kt P2O5, the transformation capacity into phosphoric acid amounts to 11158 Kt P2O5 in 2019 (IFASTAT, 2021).

The rest of the rock's production is consumed by the continent to produce phosphoric acid. The amount produced rose from 5295.2 Kt P2O5 in 2008 to 8381.5 Kt P2O5 in 2019, representing an average annual growth of 3.9% (Figure 7). In this segment, Africa accounts for an average of 15.4% of world production, with sustained growth from 2015, rising from 13% to 18% in 2019. This growth is due to investments made by OCP to expand its production capacity to reach 7200 Kt P2O5 in 2019 against 6700 Kt P2O5 in 2017 (Africa Fertilizer Map, 2021).

On average, 43.7% of phosphoric acid production is exported outside the continent (mainly to India and Pakistan), with a drop to 36.8% during the period 2016-2019 following the increase in fertilizer processing capacities. The remainder is processed into phosphate fertilizers (DAP: Di Ammonium Phosphate; MAP: Mono Ammonium Phosphate; TSP: Triple...
Superphosphate), whose production reached 4727.1 Kt P2O5 in 2019 compared to 2124.1 Kt P2O5 in 2008, i.e. an average annual growth rate of 6.9% (Figure 7). Africa was able to improve its share of global production from 9% to 14% during the period 2008-2019. The bulk of production is exported (87.2% on average). Similarly, the continent imports an average of 60.8% of the phosphate fertilizers consumed, despite the fact that African production far exceeds consumption, which attests to the inadequacy of intra-regional trade. Indeed, several African countries obtain most of their supplies from countries outside the continent, such as Saudi Arabia, China, and Russia (ITC, 2021).

Overall, trade-in phosphate and derivatives between African countries remains fairly low compared to trade with the rest of the world.

**Figure 6**

*Phosphate and derivatives data in Africa 2008-2019 (in thousands of tons P2O5)*

![Graphs showing phosphate rock, phosphoric acid, and phosphate fertilizers production, export, import, consumption, and share of world production over the years 2008 to 2019.](image)

**Source:** Authors' calculations based on IFASTAT

The average African consumption of phosphate fertilizers amounts to 1028 Kt P2O5, which represents 3.4% of the world consumption during the period studied, a low consumption compared to the continent's potential. Indeed, fertilizer consumption depends mainly on
human and animal food demands, which in turn depend on population growth and cultivated land area (OCP, 2018).

Africa's total population is estimated at 1.3 billion in 2019, or 17% of the world's population, with a high population growth of 32.4% between 2008 and 2019 (FAOSTAT, 2021). However, the prevalence of undernourishment in Africa was 19.1% of the population in 2019, or more than 250 million undernourished people, compared to 17.6% in 2014. This prevalence is more than twice the global average (8.9%) and is the highest of all regions (FAO et al., 2020). Furthermore, agricultural land in Africa represents 37.5% of the total land area in 2018 but only 28.9% of agricultural land is under cultivation (279 million ha) compared to 32.6% globally (FAOSTAT, 2021). This represents huge challenges for the continent to ensure its food security.

However, phosphate fertilizer consumption in Africa has been growing at an average annual rate higher than the world average (3.5% against 2.9%). This annual growth rate is expected to fall to 2.9% until 2022 according to FAO forecasts (FAOSTAT, 2021) against a world rate of 1.6% (IFASTAT, 2021).

For the year 2020, and despite the second wave of COVID-19 and the reintroduction of stricter measures, most African countries have not experienced any fertilizer shortages. Shipments are coming in from different sources. In southern Africa, where rains are abundant and farmers are planting, suppliers are busy importing to meet the current high demand. In the East African region, fertilizer products have also started to arrive. In West Africa, fertilizers are available and accessible as the agricultural season is over in most countries. Several factors contribute to the increase in fertilizer demand in 2020, including government measures, resilient crop prices, a more attractive relationship between crop and fertilizer prices, weakening national currencies in major agricultural exporting countries and favorable weather conditions in major consuming countries (IFASTAT, 2021).

IV.2. Structure of the regional value chain for phosphate and derivatives in Africa

The value chain for phosphate and derivatives is quite complex. It is divided between the mining sector and the chemical industry sector. To map this chain, we must first distinguish between activities related to the production process and support activities.

The production process of phosphate and derivatives involves the extraction, and enrichment of phosphate, transport to processing sites and the production of phosphoric acid and subsequently phosphate fertilizers.
Phosphoric acid is mainly obtained by reacting ground mined phosphate with sulphuric acid (wet process), resulting in superphosphate, single (SSP), or triple (TSP), which is used directly as fertilizer. Phosphoric acid can also be combined with ammonia (source of nitrogen) to produce compound fertilizers (DAP, MAP) (Figure 7).

**Figure 7**

*Production process of the main phosphate products*

![Diagram of phosphate production process]

Support activities are intangible but highly value-adding activities. They include research and development, design, logistics, marketing and distribution, support services for farmers (soil mapping, training in the optimal use of fertilizers, assistance with financing, etc.), and the recycling of wastewater and waste. The difficulty is that these activities are non-tradable and therefore difficult to measure. The added value created by these activities is incorporated into the selling price of the finished product (phosphate rock, phosphoric acid, and fertilizer).

Although databases exist to measure the value-added of the various activities (Eora, TiVA, etc.), they remain general and not sufficiently detailed to be used in the context of such a specific value chain.

Based on various sources, our work has resulted in a mapping of the regional phosphate value chain and derivatives in Africa presented in Figure 8 below:

**Figure 8**

*Mapping of the African regional value chain for phosphate and derivatives*
In terms of phosphate reserves, Africa has approximately 55.6 billion tons (Bt), i.e. 78.3% of the world's reserves, including 50 Bt in Morocco, the world's leading country in terms of phosphate reserves. Apart from Morocco, the other reserves are in Egypt (2.8 Bt), Algeria (2.2 Bt), South Africa (1.4 Bt), Tunisia (0.1 Bt), Senegal (0.05 Bt), and Togo (0.03 Bt) (U.S. Geological Survey, 2021).
Phosphate extraction in Africa is carried out by public or multinational companies, given the heavy investments required for this operation. The volume of rock extracted in Africa amounts to 52230 Kt, i.e. 23% of world production, distributed between Morocco (35500 Kt), Egypt (5000 Kt), Tunisia (41110 Kt), Senegal (3420 Kt), South Africa (21000 Kt), Algeria (1300 Kt) and Togo (800 Kt). Increases in production capacity are planned for Africa where major expansion projects are underway in Algeria, Egypt, Guinea-Bissau, Morocco, Senegal, and Togo (U.S. Geological Survey, 2021).

The mined phosphate then goes through the beneficiation stage, which is a set of processes designed to improve the quality of the product, i.e. to move the product from a lower to a higher grade. Different beneficiation processes can be used, namely washing treatment, calcination treatment, and electrostatic separation treatment (CEA, 2018). The enriched phosphate undergoes a drying operation, which reduces its moisture content to allow transport by train. For transport by pipeline (mineral pipeline), which is only available in Morocco (between Khouribga and Jorf Lasfar), the phosphate undergoes a specific preparation in preparation lines located in the washing plants. This wet process facilitates transport and reduces costs and water consumption (OCP, 2018). Africa manages to enrich 15589 Kt P2O5. The majority is consumed by Africa to produce phosphoric acid (68%), the rest is exported to the rest of the world (IFASTAT, 2021).

The production of phosphoric acid is based on the attack of phosphate by sulfuric acid. The latter are either purchased by the state or produced from sulfur, a by-product of oil and natural gas desulphurization. Africa imports most of its consumption from other regions: 9290 Kt of sulfur and 1595 Kt of sulfuric acid (Africa Fertilizer Map, 2021; ITC, 2021). Phosphoric acid production in Africa amounts to 8382 Kt P2O5 (IFASTAT, 2021). Phosphoric acid is mainly used to produce phosphate fertilizers (DAP, MAP, TSP). Africa consumes 5419 Kt P2O5, of which 31 Kt P2O5 is imported, to produce 4727 Kt P2O5 of phosphate fertilizers, i.e. 14% of world production in 2019. The production also requires the use of 7869 Kt of ammonia, 80% of which is supplied by the local market (IFASTAT, 2021).

It must be noted that 88.5% of phosphate fertilizer production is destined for export. This situation is explained by two factors. The first factor is the weakness of African consumption of fertilizers in general and phosphate fertilizers in particular. Indeed, phosphate fertilizer consumption in Africa will amount to 5.3 kg/ha in 2019, whereas the world average is 25.9 kg/ha (FAOSTAT, 2021). The second factor is that some countries prefer to source outside Africa (e.g. South Africa) or supply foreign markets (e.g. Morocco and Tunisia) instead of the African market, which leads to weak intra-regional trade. Indeed, only 36% of African
consumption is met by African producers, compared to 64% for imports. The entry into force of the AfCFTA is an opportunity to intensify intra-regional trade and, beyond that, to promote the RVC for phosphate and derivatives by removing tariff and non-tariff barriers, which could make the African product more competitive with non-African products in terms of cost and more flexible customs and administrative procedures.

IV.3. Positioning of Morocco in the phosphate and derivatives regional value chain

Morocco is the world's leading country in terms of phosphate reserves, with a share of 70.4% or 50 billion tons. A reserve that can ensure several centuries of production (OCP, 2018). It is ranked as the second-largest producer behind China, the world's largest exporter of phosphoric acid, and the second-largest exporter of phosphate fertilizers (Table 2).

Table 2

Profile of Morocco (2020)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Rank</th>
<th>Value/Quantity</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphate reserves</td>
<td>1</td>
<td>50 billion tons</td>
<td>70,4%</td>
</tr>
<tr>
<td>Phosphate production</td>
<td>2</td>
<td>37 million tons</td>
<td>16,6%</td>
</tr>
<tr>
<td>Export of phosphoric acid</td>
<td>1</td>
<td>1.2 million USD (1,931 million tons)</td>
<td>31,2%</td>
</tr>
<tr>
<td>Export of phosphate fertilizers</td>
<td>2</td>
<td>278 million USD (1,177 million tons)</td>
<td>22,7%</td>
</tr>
<tr>
<td>Export of fertilizers</td>
<td>5</td>
<td>3,385 million USD (11,534 million tons)</td>
<td>6,1%</td>
</tr>
<tr>
<td>Trade balance: Fertilizers</td>
<td>3</td>
<td>3,122 million USD</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Compiled by the authors, based on USGS, 2021 and ICT (Accessed 19/02/2021)

On the African market, Morocco is the fourth-largest supplier of phosphoric acid behind China, Jordan, and South Africa with a share of 7.5% (Table 3). Its exports represent only 0.3% of the total exports of this product. This low share is due on the one hand to the weakness of outlets in Africa (only 70.7 Kt of imports), which has the low production capacity and therefore relies on fertilizer imports as a finished product. On the other hand, Morocco's exports to Africa are concentrated on a single country, Algeria (Table 4).

For fertilizers, Morocco is the leading supplier to the African market with a share of 59.5% for phosphate fertilizers and 28.4% for mixed fertilizers. Its exports to Africa account for about one-fifth of total fertilizer exports (Table 3).
Table 3

*Morocco's phosphate and derivatives exports to Africa (2019)*

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Rank</th>
<th>Value/ Quantity</th>
<th>Share of Morocco's exports</th>
<th>Share in African imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export of phosphoric acid</td>
<td>4</td>
<td>4.3 million USD (6 Kt)</td>
<td>0.3%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Export of phosphate fertilizers</td>
<td>1</td>
<td>45 million USD (163 Kt)</td>
<td>12.5%</td>
<td>59.5%</td>
</tr>
<tr>
<td>Export of mineral or chemical fertilizers containing two or three of the fertilizing elements: nitrogen, phosphorus and potassium</td>
<td>1</td>
<td>514 million USD (1.55 Mt)</td>
<td>20.2%</td>
<td>28.4%</td>
</tr>
<tr>
<td>Export of fertilizers</td>
<td>1</td>
<td>USD 562 million (1.72 Mt)</td>
<td>19.3%</td>
<td>13.5%</td>
</tr>
</tbody>
</table>

**Source:** Compiled by the authors, based on ICT (Accessed 19/02/2021)

However, these positive results are only evident down the value chain. The African countries appear as customers of Morocco rather than suppliers. Since the production of phosphoric acid and fertilizers requires the use of other intermediate products (Sulphur (S) and ammonia (NH₃)) (Figure 9), Morocco imports them essentially from non-African countries. OCP Group sources sulfur from many major suppliers, mainly from the United Arab Emirates (43.7%), Russia (15.9%), Saudi Arabia (12.2%), and Kazakhstan (11.6%) (ITC, 2021). Ammonia is used to produce MAP, DAP and NPK, as well as specialty fertilizers such as Sulphur-enriched, and micro-nutrient-enriched fertilizers (OCP, 2018). The Group purchases ammonia from a number of major suppliers such as Russia (60.9%) and Trinidad and Tobago (36.4%) (ITC, 2021). However, African countries also produce and export Sulphur (South Africa, Zambia) and ammonia (Algeria, Egypt, Nigeria, etc.), which proves that there is still potential for regional integration.

To clarify this potential, a more detailed analysis of cross-trade between Morocco and the rest of Africa was carried out. This analysis consists of examining the 4-digit Harmonized System (HS) trade in raw materials, intermediate products, and finished products in the phosphate and derivatives value chain (Table 4).
Table 4

Trade in phosphate and derivatives between Morocco and Africa in 2019 (Exports)

<table>
<thead>
<tr>
<th>Nature of the products</th>
<th>Title of the products</th>
<th>Main exports (HS4)</th>
<th>To Africa</th>
<th>Main African customers</th>
<th>Potential clients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>To the world</td>
<td>In thousands USD</td>
<td>As a % of</td>
<td>Country (Rank)</td>
</tr>
<tr>
<td>Raw materials</td>
<td>2510. Calcium phosphates (…), natural</td>
<td>760462</td>
<td>530</td>
<td>0.1</td>
<td>Ivory Coast (33)</td>
</tr>
<tr>
<td>Intermediate products</td>
<td>2809. Phosphoric acid</td>
<td>1413013</td>
<td>4309</td>
<td>0.3</td>
<td>Algeria (15)</td>
</tr>
<tr>
<td></td>
<td>2835. Phosphinate (…)</td>
<td>2757</td>
<td>1854</td>
<td>67.2</td>
<td>Egypt (1)</td>
</tr>
<tr>
<td>Finished products</td>
<td>3105. Mineral or chemical fertilizers containing 2 or 3 of the fertilizing elements</td>
<td>2546847</td>
<td>513774</td>
<td>20.2</td>
<td>Djibouti (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Benin (8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ethiopia (13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ivory Coast (14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nigeria (17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Senegal (18)</td>
</tr>
<tr>
<td></td>
<td>3103. Phosphate fertilizers</td>
<td>361810</td>
<td>45262</td>
<td>12.5</td>
<td>Djibouti (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ivory Coast (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ghana (8)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5084889</td>
<td>565729</td>
<td>11.1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Compiled by the authors from the ITC database (Accessed on 25/02/2021)

The data presented in Table 4 show that exports of MPs and FPs are concentrated on West Africa, with which Morocco has strong economic and historical relations, and East Africa, following the new orientations of Morocco's economic diplomacy and trade policy to diversify its African partners. However, the other regions present an additional potential to accentuate this diversification and reinforce the country's presence on the continent. For IP exports, they are concentrated on Egypt and Algeria, two North African countries, while Morocco can still diversify its clients by targeting eight African countries as a priority. Among these countries, Morocco (via the OCP group) has concluded agreements for the construction of three fertilizer production plants with Ethiopia, Nigeria, and Ghana scheduled for 2022, 2023, and 2024 respectively. These projects aim at co-development of the stakeholders by exploiting the available resources, namely Morocco's phosphoric acid and the natural gas (necessary for the production of ammonia) of its partners.

Concerning Morocco's imports, the data in Table 5 show that only 1.8% come from Africa, mainly from North African countries. However, other African countries can also position themselves as suppliers to Morocco. For example, South Africa and Zambia, which have
capacities in sulfur and sulfuric acid, can provide part of Morocco's needs. Similarly, Nigeria, Egypt, and Libya are potential suppliers of ammonia to the Moroccan market. In return, it would be interesting for Morocco to replace part of its imports of nitrogenous fertilizers from Russia with imports from Algeria, Nigeria, or South Africa, and of potassium fertilizers from Canada and Belarus with imports from South Africa or Mali.

These findings confirm the existence of a fairly high potential for the development of phosphate and phosphate derivatives RVC among African countries, which remains an urgent need following the disruption of international production activities caused by the covid-19 pandemic. According to UNCTAD (2020), the pandemic will lead to reconfigurations of GVCs in the extractive and chemical industries over the period 2020-2030. Of the four relevant trajectories (Relocation, Diversification, Regionalization, and Replication), both industries will be marked by increased regionalization, reducing the physical length and stimulating regional transformation. Regional economic cooperation, industrial policy, and investment promotion become essential to take advantage of emerging regional value chains (UNCTAD, 2018). In addition, the deepening of regional integration with the implementation of the AfCFTA Agreement and the expected conclusion of its investment protocol could have a positive effect.

Table 5

Trade in phosphate and derivatives between Morocco and Africa in 2019 (Imports)

<table>
<thead>
<tr>
<th>Nature of the products</th>
<th>Title of the products</th>
<th>From the world</th>
<th>From Africa</th>
<th>In tonnes USD</th>
<th>As a % of</th>
<th>Country (Rank)</th>
<th>In tonnes USD</th>
<th>As % of Morocco's imports</th>
<th>Potential suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw materials</td>
<td>2503. Sulphur</td>
<td>719684</td>
<td>0</td>
<td>0</td>
<td>//</td>
<td>//</td>
<td>//</td>
<td>//</td>
<td>South Africa, Zambia</td>
</tr>
<tr>
<td>Intermediate products</td>
<td>2814. Ammonia (...</td>
<td>391433</td>
<td>3765</td>
<td>1</td>
<td>Algeria (4)</td>
<td>3765</td>
<td>1</td>
<td>Nigeria, Egypt, Libya</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2807. Sulfuric acid</td>
<td>111805</td>
<td>0</td>
<td>0</td>
<td>//</td>
<td>//</td>
<td>//</td>
<td>South Africa, Libya</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2835. phosphinates (...)</td>
<td>16246</td>
<td>4126</td>
<td>25.4</td>
<td>Tunisia (2)</td>
<td>4126</td>
<td>25.4</td>
<td>South Africa, Senegal</td>
<td></td>
</tr>
<tr>
<td>Finished products</td>
<td>3102. Mineral or chemical nitrogen fertilizers</td>
<td>129721</td>
<td>7768</td>
<td>6</td>
<td>Egypt (5)</td>
<td>7768</td>
<td>6</td>
<td>Algeria, Nigeria, South Africa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3104. Mineral or chemical potash fertilizers</td>
<td>113417</td>
<td>10941</td>
<td>9.6</td>
<td>Egypt (3)</td>
<td>10941</td>
<td>9.6</td>
<td>South Africa, Mali</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3105. Mineral or chemical fertilizers containing 2 or 3 of the fertilizing elements</td>
<td>21662</td>
<td>157</td>
<td>0.7</td>
<td>Tunisia (14)</td>
<td>118</td>
<td>0.5</td>
<td>//</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Egypt (19)</td>
<td>39</td>
<td>0.2</td>
<td>//</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1503968</td>
<td>26757</td>
<td>1.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Compiled by the authors from the ITC database (Accessed on 25/02/2021)
Conclusion
The place of the African continent in the international economic arena is still fragile and suffers from many structural deficits. Africa's share of international trade remains marginal compared to other regions of the world, despite the demographic and natural potential of the continent. Indeed, the low diversification of exports and the lack of complexity of the production of African countries weaken its active participation in GVCs. In this context, the creation of the African Continental Free Trade Area aims to accelerate the integration of regional economic communities through the gradual reduction of tariff and non-tariff barriers, which should ultimately benefit intra-African trade by boosting competitiveness of African enterprises. The short-term increase in intra-African trade can stimulate intra-African investment in various sectors, from infrastructure to services to technology, which can facilitate the integration of African economies into value chains that can stimulate local entrepreneurship and lay the foundations for sustainable and inclusive development.

In this context, the phosphate and derivatives industry are a promising sector for Africa. Indeed, Africa is the second-largest producer of phosphate rock, phosphoric acid, and phosphate fertilizers after East Asia. However, African consumption of fertilizers remains rather low compared to the world average.

The analysis of the regional value chain for phosphate and derivatives reveals several results. Firstly, the value chain is marked by a low regional dispersion and remains concentrated in the countries that possess phosphate reserves. This finding is considered normal in the mining sector. However, segmentation possibilities remain unexploited in the chemical sector. African countries can strengthen their integration by following the OCP model, which consists of investing in countries that do not produce phosphate but are rich in natural gas. This model can enable these countries to participate in the phosphate and derivatives RVC by capturing one or more links in the chain. Secondly, intra-regional trade in relation to this chain remains insufficient and is outweighed by extra-regional trade. African countries trade mostly with countries outside the continent. Strengthening regional integration must, first of all, involve directing these countries' trade towards the African market, which should be encouraged by the implementation of the AfCFTA.
References


**Data Base:**


