A report presented as part of data collection for diagnostic component of national logistics master plan

Situational Analysis Report

PART III: Comprhensive Report on data collection for diagnostics component of national logisitics master plan

To: DT Global

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1. SITUATION ANALYSIS OF CROPS AND MINERALS IN ETHIOPIA

This report examines the state of selected crops and minerals in Ethiopia to understand the current potential, actual production, import and export situation and the key challenges facing the two sectors (Agricultural produces and minerals). The document is organized into two sub-sections. The first sub-section addresses the overview of the selected crops in Ethiopia whereas the second sub-section examines the overall condition of the selected minerals (mining sector) in the country.

1.1.OVERVIEW OF SELECTED CROPS IN ETHIOPIA

1.1.1. Wheat

Wheat, one of the most important food security crops in Ethiopia, is cultivated on a total area of 2.1 million (1.7 million ha rain-fed and 0.4 million ha irrigated) hectares annually with a total production of 5.52 million metric tons and 7.5 million metric tons in the production year of 2021/22 and 21/2022, respectively . The Rain-fed wheat production is dominantly carried out during the main rainy season in Ethiopia (June to October) in the highlands of the country while irrigated wheat production is carried out from November to April in the lowlands of Ethiopia along the Awash, Wabe Shebele, and Omo river basins .

Wheat is one of the major cereal crops in Ethiopia in terms of the area of land allocated, the volume produced, and the number of farmers engaged in its production . It accounts for about 17% of total the country's grain production which makes it the third most important cereal crop after teff and maize .

Ethiopia is the second largest wheat-producing country in Africa next to South Africa and is the primary wheat producer in Sub-Saharan Africa (SSA) owing to the suitable agroecological conditions. In Ethiopia wheat is predominantly produced by smallholders with average landholdings of less than one hectare. A relatively large percentage of wheat (5-10%) is produced on large-scale farms in the Arsi-Bale wheat belt. Wheat is mainly grown in the highlands of Ethiopia, and the two main wheat-producing regions (Oromia and Amhara) account for about 85 percent of the national wheat production. The central and southeastern highlands of the whereby Arsi, Bale, and parts of Shoa are considered to be the major wheat-producing regions of Ethiopia and are also identified as the main wheat-growing belt of East Africa.

Wheat ranks fourth in the country in terms of the area coverage next to teff, maize, and sorghum, Out of the total grain crop area, 80.8% was under cereals and wheat took up 13.3% of the grain crop area. Moreover, about 4.7 million farmers produce 42.3 million tons of wheat across 1.6 million hectares of land with average productivity of 2.7 t/ha. Ethiopia's annual wheat production is about 5.8 million tons with mean productivity of 3 tons per hectare (tha−1).

Wheat is an important crop with a significant contribution to the development of the agriculture sector in general and to household income and food security. To achieve self-sufficiency and be a net exporter of wheat by 2025/26, the Government of Ethiopia developed the National Wheat Flagship Program (NWFP). The objective of the Program is to produce an additional 4.2 million tons of irrigated wheat at an average productivity of 4.2 tons/Ha. These objectives are supported by the Ethiopia Wheat Value Chain Development Project (EWVCDP) financed by the African Development Bank. The Project is under implementation in four regions of Ethiopia which are Amhara, Oromia, Somali, and Afar regions.

Ethiopia exported an average of $72k wheat within five years from 2018 to 2021. The country became the 99th largest world wheat exporter in 2021. The country exported $7.33k wheat to main destination countries (Norway and Angola). The export destination area of the country includes Nigeria, Nertherland, Canada and France.

In 2021, Ethiopia imported $927M in Wheat, becoming the 22nd largest importer of Wheat in the world. At the same year, Wheat was the 1st most imported product in Ethiopia. Ethiopia imports Wheat primarily from: Ukraine, United States, Russia, Romania, and Bulgaria. As of now, the Ethiopian government decided to stop importation buyoued by massive production boost.

Regarding the challenges with wheat productin, transportation infrastructure is the main challenge due to the limited rural road networks. The concentration of wheat production in country is in the Amhara and Oromia regions and it needs a strong distribution channels to transport wheat to deficit areas that may be hundreds of kilometers away from surplus production zones.

The government controls the supply chain in urban areas through the Ethiopian Grain Trading Enterprise (EGTE) distribution, but transportation in rural areas is decentralized. 60% of grain stocks are held by the Ethiopia Food Security Reserve Administration for use in emergencies; the rest is held by the EGTE, a few mills, and a small amount of private storage. The supply of

agricultural inputs such as seeds, fertilizer, and pesticides is another challenge in the production and distribution of wheat. In addition, the traditional farming system and the lack of knowledge, capacity, willingness, or reluctance on the side of the farmers to adopt technology-driven agriculture is also another key challenge.

1.1.2. Coffee

Ethiopia is Africa's largest coffee producer and the world's fifth largest exporter of Arabica coffee. Coffee is Ethiopia's number one source of export revenue generating about 30 to 35 percent of the country's total export earnings. All the coffee produced in Ethiopia is of the coffee arabica variety. The aggregate production forecast for 2022/23 (Oct-Sep) and 2023/24 are 8.27 million 60 kg bags and (496,200 MT) 8.35 million 60 kg bags (501,000 MT), respectively, according to Post Addis.

Ethiopia is endowed with an ideal production environment for growing coffee with a combination of appropriate altitude, temperature, rainfall, soil type, and PH value. Ethiopia, being the epicentre of the origin of Coffee Arabica, possesses a diverse genetic base. Ethiopia produces a range of distinctive Arabica coffees and has considerable potential to sell a large number of selections of specialty coffee.

According to the USDA Foreign Agricultural Service, more than 15 million smallholder farmers participate in coffee value chain and about 25% of the population is directly or indirectly depend on the coffee value chain, reflecting coffee industry's significance as economic, sociocultural, spiritual life of the people.

Ethiopian coffee produces hard-type coffee beans, with intense flavours and aromatics. Fruit flavours are common in all regions, though the specific fruit character varies from region to region. Berry aromatics are relatively common, as are citrus and chocolate. Ethiopian coffee is organically produced as low yielding highest cup quality.

Coffee is major contributor to GDP and foreign exchange. According to some estimates, coffee production is estimated at 8.27 million 60-kilogram bags (496,200 MT) for 2022/23 with a 0.2% increase from 2021/22. The United States Department of Agriculture reported that coffee output increased from 7,055 thousand 60-kg bags in 2017 to 7,620 thousand 60-kg bags in 2021.

According to the USDA Foreign Agricultural Service, Ethiopia, coffee was cultivated in around 540,000 hectares of the area during 2020–21. About 95% of the coffee is produced in the Ethiopian forest land and production is considered organic.

In 2021, Ethiopia imported $223k in Coffee, becoming the 177th largest importer of Coffee in the world. At the same year, Coffee was the 762nd most imported product in Ethiopia. Ethiopia imports Coffee primarily from: United Arab Emirates, South Africa, Italy, Brazil and Germany. The major export destinations for Ethiopian coffee export includes Saudi Arabia, Japan, Germany, China, Switzerland, France, Italy, South Korea.

Very low-quality control, the deficiency of a strong coffee seed supply system, inadequate consideration to the input credit provision for efficiency and quality enhancement, and lack of clear national direction are considered the major support related challenges. Limited use of enhanced technology, land degradation and population pressure, limited access to inputs such as fertilizer, seeds, credit and irrigation; and high costs of quality coffee production and processing are also among the challenges identified by the Ethiopian Ministry of Agriculture.

1.1.3. Sesame(seed)

Ethiopia's oilseed industry makes a major contribution to foreign exchange revenues. Ethiopia's three main oilseed crops (sesame, soybean, and Niger seed) account for about 20% of the country's total agricultural export profits, second only to coffee. Even though Ethiopia is one of the world's largest producers and exporters of sesame seeds, the country is facing increasing supply and demand restrictions.

Sesame is a versatile crop that grows both cultivated and wild in Ethiopia, with a wide range of cultivated sesame varieties. It is one of the most widely planted oilseed crops in the country, accounting for 30% of the total output. Ethiopia’s northern and northwestern areas, which border Sudan and Eritrea, produce most of the country’s sesame oil crops. Sesame, the white gold crop, is the world’s second most exported crop after coffee, accounting for 14% of total global exports. Ethiopia is one of the world’s top six sesame producers. It is a key crop in Amhara, Tigray, Oromia, Benishangul-Gumuz, and the Southern Nations, Nationalities, and People's Region (SNNPR).

The oilseed sector in Ethiopia is one of the fastest growing sectors in the country. It is the second largest source of foreign exchange earnings after coffee and sesame is the main oilseed

crop in terms of production value. Ethiopia is one of the sesame growing and exporter countries in Africa exporting huge produce to the world market and it is the major oil seed in terms of exports, accounting for over 90% of the values of oil seeds exports following coffee. These crops are primarily used as sources of oil for local consumption and also contribute to the national economy through import substitution by helping save scarce foreign currency spent for importing cooking oil.

Sesame yields are highly variable depending upon the growing environment, cultural practices and the type of cultivar. It is a low yielder and worldwide average yields are low. Despite of its nutritional and high value crop, the existing production system suffers from traditional farming practices, unimproved seed, lack of fertilizer use, etc. This situation has caused productivity of the crop per hectare to be far below the estimated FAO potential, which is about 16 quintals/ha.

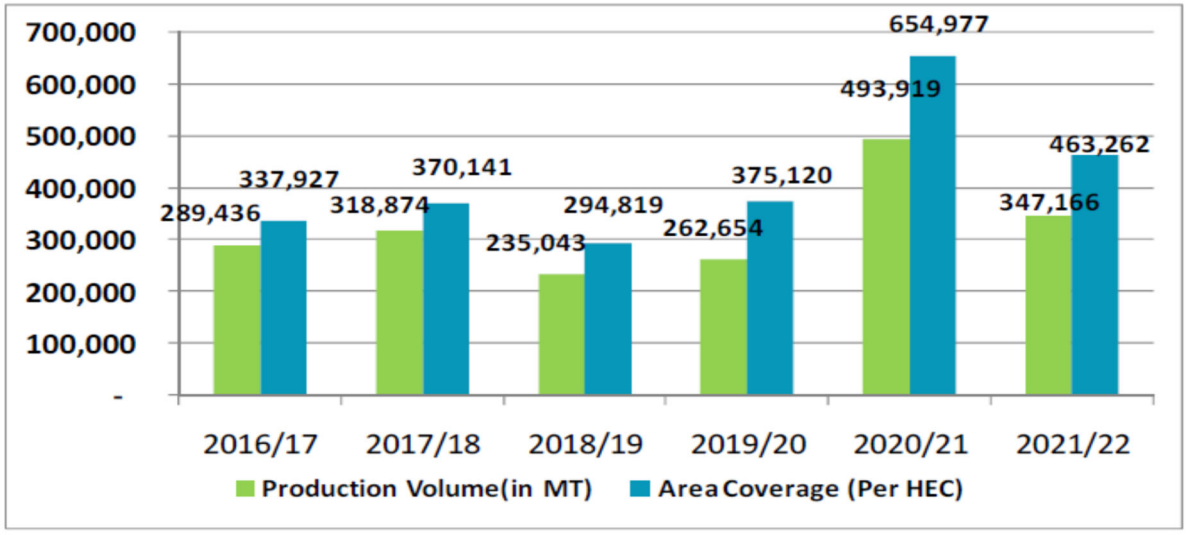

Figure 1: Ethiopian Sesame Seeds Production and Area Coverage (Source: CSA)

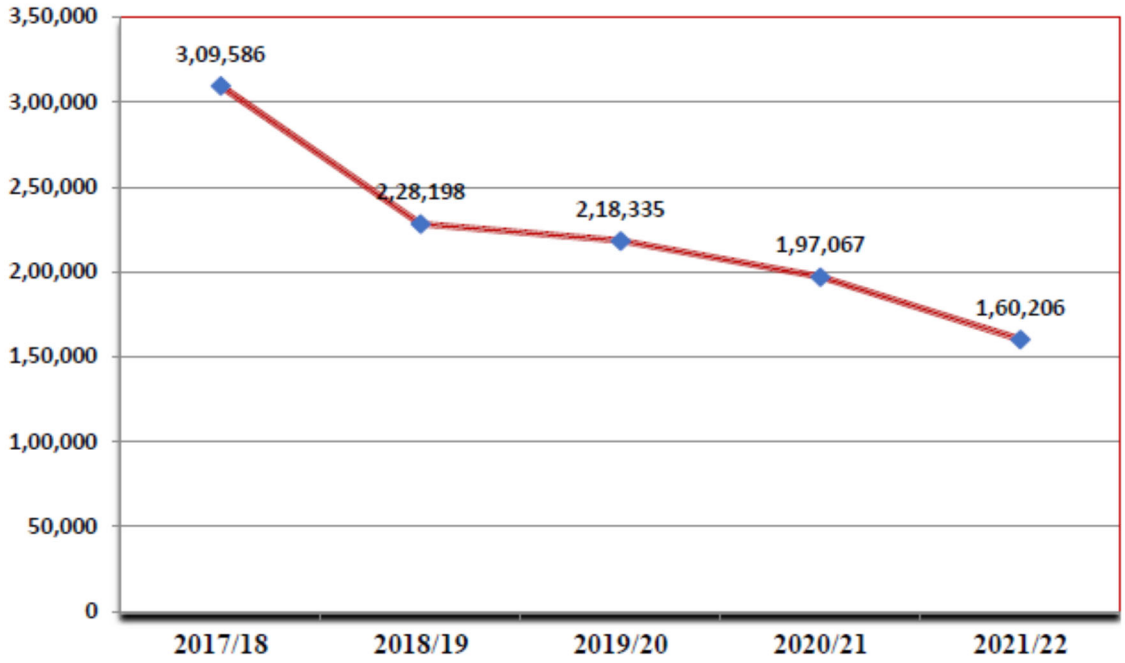

Figure 2: Sesame Export trend in Ethiopia from 2017/18 to 2021/2022 in Volume/MT (Source: Ministry of Trade and Regional Integration)

The major export destination countries for Ethiopia sesame export are Israel, United Arab Emirates, China, Singapore, Viet Nam, Japan, Turkey, Jordan, Saudi Arabia, Yemen

1.1.4. Live stocks

Ethiopia has the largest livestock population of any African Country. According to central statics agency (CSA, 2021) there are 70 million heads of cattle, 42.9 million sheep, 52 million goats,2.15 million horses,10.8 million donkeys,0.38 million mules, 8.1 million camels, 6.99 million hives, and about 57 million chickens.

Livestock is a major source of animal protein, power for crop cultivation, means of transportation, export commodities, manure for farmland and household energy, security in times of crop failure, and means of wealth accumulation. The sector contributed up to 40% of agricultural Gross Domestic Product (GDP), nearly 20% of total GDP, and 20% of national foreign exchange earnings in 2017 (World Bank, 2017). Among the Livestock export, live animal exports from Ethiopia play a significant role in the country's economy, contributing to foreign exchange earnings and providing employment opportunities. Ethiopia has been one of the largest exporters of live animals in Africa and potentially retain a competitive advantage in global export market due to the abandunce of livestock population **estimated to be around 60 million cattle, 30 million sheep, 30 million goats, and 1.2 million camels**.

Ethiopia exports a wide variety of live animals, including cattle, sheep, goats, camels, horses, poultry, and bees. Cattle are one of the most commonly exported animals, with breeds such as Boran, Arsi, and Horro being popular choices. Sheep and goats are also exported in large numbers, with breeds like Afar and Somali being favored for their adaptability to harsh environments. Ethiopia exports live animals to various countries around the world. The Middle East, particularly Saudi Arabia, Yemen, and the United Arab Emirates, is a major market for Ethiopian livestock. These countries have a high demand for meat and rely on imports to meet their domestic needs. Other destination markets for Ethiopian live animals include Qatar, Oman ,Vietnam, Hong Kong, Nigeria, and the neighbouring Sudan, Djibouti, Somalia, and Kenya. Here, massive smuggling has become unprecedented challenge.

Regarding meat production and export, the total volume of meat production in the country reached 1.9 million metric tons in 2019/2020, according to CSA data. Cattle are the primary source of meat production in Ethiopia; poultry meat production has seen substantial growth, with annual output of around 70 thousand metric tons.

The export income from meat products has shown positive growth over the years. According to data from the Ethiopian Meat and Dairy Industry Development Institute (EMDIDI), Ethiopia earned approximately $93 million from meat exports in the fiscal year 2019/2020. In 2018/2019 fiscal year, Ethiopia earned approximately $360 million USD from live animal exports. This represents a significant increase compared to previous years, highlighting the growing demand for Ethiopian meat in international markets. **As per FAO's data, though Ethiopia livestock exports fluctuated substantially in recent years, a long term trend forecast between 2001 and 2021 shows increasing trend towards 25,967,300 US$ export value in 2021.**

Major constraints in the sector include high cost of feed, land shortage of gazing and rearing land, poor quality feed, shortage of input supply, inadequate veterinary extension services, lack of refregrated containers, shortage of vehicles, crossborder smuugling, among others.

1.1.5. Fruits and Vegetables

Remarkably Ethiopia is rich in agro-biodiversity resulting from its natural features, cultural multiplicity, and solid food arts. The weather condition of Ethiopia has great variation due to the excessive difference in altitude ranging from sea level up to 4,500 m and also there is

plentiful potential for irrigation. This makes it possible for different crops to be grown in the country, including all types of fruit and vegetables. East Hararghe, East Shewa, West Shewa, Arsi, Gamo Goffa, Dire Dawa, Harari, Tigray, and Amhara regions are the major fruit and vegetable-producing areas in Ethiopia .

Ethiopia exports fresh fruits and vegetables to the international markets. The major markets for Ethiopian fresh fruits and vegetables are the European Union, the Arab countries and the regional markets. Ethiopia is very well known in some parts of Europe especially for her green beans, climbing beans, cut flowers, okra, melon and passion fruits.

The major fruit crops produced and exported from Ethiopia are bananas, mangos, avocados, citrus, pineapples, papayas, and strawberries. Fresh fruits' contribution to Ethiopia's export earnings is fairly small but it is growing quickly. As per the National Bank of Ethiopia data indicates, Ethiopia exported 191.18 million kg, 221.70 million kg, and 222.65 million kg of Fruits & Vegetables to different countries over the world in production years of 2019/20, 2020/21 and 2021/22, respectively. Although imports are growing faster than exports, Ethiopia is a net exporter of fresh fruits. Like other crops and vegetables, most of these fruits are grown by smallholder farmers. Meanwhile in recent years especially after the country opened its door for flower growers, some international companies have been engaged in production of fruits such as, strawberry targeting mainly export market.

Vegetables occupied around 1.62% of the total cropped area and their production makes up about 2.04% of all crop production in Ethiopia. The largest fresh products in Ethiopian export are vegetables, including tomatoes and onions, potatoes, Lettuce, green pepper, and red peppers.

Regarding the sector's challenge come to the fore poor quality infrastructure pertinent to electricity, irrigation, transport, and cold storage facilities. Transport cost to value of good is incredibly expensive, poor road conditions elongate transport time, and lack of cold chain picks risk of perishability on transport. Lack of access to seaport, railway, long distance to port, shortage of refrigerated containers come as export challenges via ocean. Thus, much of the light weight leafy vegetables and fruits are exported through the expensive air transport means, further undermining the international competitiveness of the sector. Here, the Ethiopian airlines often get congested resulting in transport delay, not to mention producers challenge associated to access to refrigerated vans and synchronization of supplier-buyer temperature control with Ethiopian Airlines Cargo storage system.

1.2.OVERVIEW OF THE SELECTED MINERALS IN ETHIOPIA

Mining is one of the key thematic areas in Ethiopia's homegrown economic reform programs. Due attention was given by the government to the mining sector. Although Ethiopia has a long history of mining practices, its commercial and large-scale mining involvement is at its infant stage. Mining in Ethiopia is currently predominantly controlled by low-skilled, small-scale miners utilizing low technological machinery and inputs. The sector's contribution to GDP is less than 1 percent with significant potential for the economy, contributed 14% to Export, 1% to Government revenue, and 54000 jobs to the economy.

Despite its current slight contribution, Ethiopia has huge untapped, diverse, and vast mineral resources offering huge potential opportunities for exploration and development. The country is rich with tantalum, potash, gemstones, gold, iron ore and various industrial, energy, and construction minerals, and many more. The recent improvement in the government policies and regulations vis-à-vis the sector makes Ethiopia one of the candidate countries for international mining investors and developers. According to research done by Swedish Geological AB, Ethiopia can be a major international supplier of minerals, specifically copper, gold, tantalum, potash, iron ore, and coal.

This analysis, therefore, has the objective of examining the potential, actual production, geographic distribution, export status, major destinations, challenges and opportunities, and logistics facilities and infrastructure available for the smooth mining business for selected minerals such as gold, tantalum, potash, Gemstone, Marble, Cement, Glass and Ceramics, Oil and Petroleum, Coal and Fertilizer.

1.2.1. Gold

The history of gold mining dates back to 6000 years in Ethiopia with the Assosa gold mine identified to be the oldest mine in the world. Gold Production in Ethiopia was reported at 3,480.000 kg in Dec 2021. This stayed constant from the previous figure of 3,480.000 kg for Dec 2020. Ethiopia's Gold Production data is updated yearly, averaging 3,766.000 kg from Dec 1990 to 2021, with 32 observations.The National Bank of Ethiopia (NBE) , however, has reported a decrease in the amount of gold it has received during the fiscal year. The bank received 2,684 kilograms of gold during the past nine months of the fiscal year out of the planned 10,000 kilograms of gold representing a 62.5 percent decrease compared to the same period last year. The data of the Ministry of Mines shows that the country has produced 2.68 tons of gold in the fiscal year. The bank indicated that the lack of proper delivery of gold produced by traditional gold producers and MIDROC Legedenbi mining company stating that smuggling was a challenge which was reiterated by the Minstry of Mines mentioning the existence of gap on the side of the regional states in licencising and regulating the gold produceres. The bank had the plan to increase prices by 35% with the objective to incentivise the legal business owners and to bring the smugglers in to the Bank's system.

Ethiopia earned USD 560 million from gold during the 2021/2022 fiscal year. Gambella, Benishangul Gumuz, Oromia, and South West Ethiopia are known for their gold resources. Gambella Regional State's Akbobo narrow greenstone sub-belt is labeled a high potential target for gold exploration by the Ministry of Mines. The major regional states which was rich in gold, Benishangul Gumuz, had already registered low income from gold during the first nine months of the 2022/2023 fiscal year when compared to the same period last year. In terms of export, there is a declining performance owing to the security situation in the country as it significantly impacted the gold mining faciltiies and logistics system and the delcing gold prices in the global market.

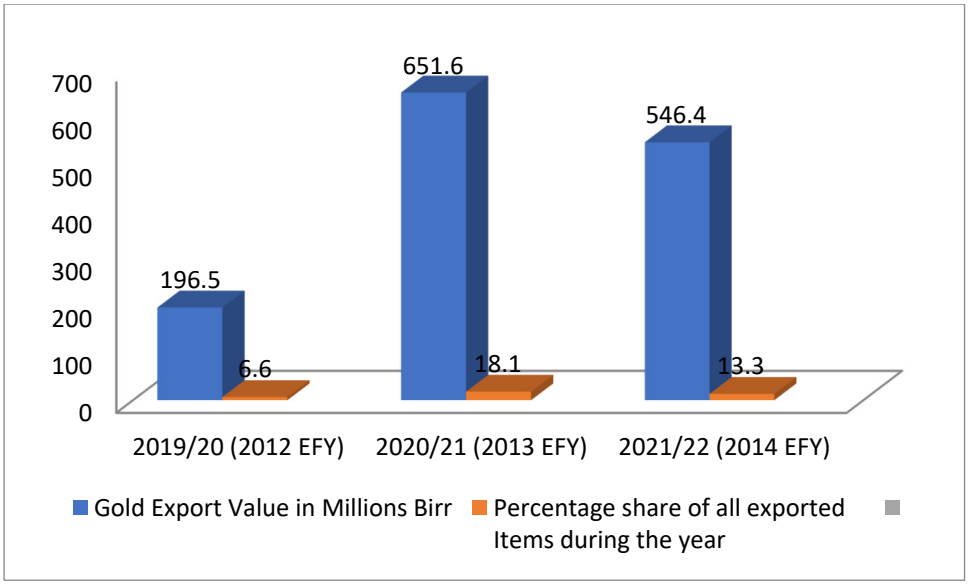

Figure 3: Gold Export Volume (in mn. of grams), Value (In Million Birr) and percentage share of all exported items during the fiscal year (Source: NBE, Ethiopian Custom Comission)

The figure above shows that the gold export value and volume compared to other itmes is the lowest. Yet, the main destination of Gold exports from Ethiopia is United Arab Emirates. . The fastest-growing export markets for Gold of Ethiopia between 2021 and 2022 were United Arab Emirates

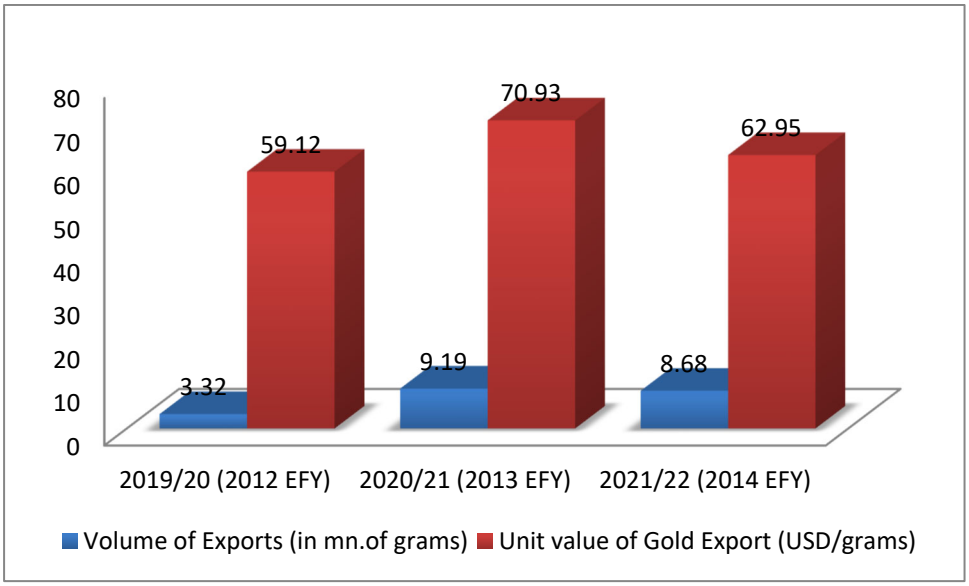

Figure 4: Volume and Value of Gold Export (Source: NBE and Ethiopian Custom Commission)

The figure above shows that the Ethiopian gold export has slightly increased during the 2013 EFY and declined during 2014 EFY. In the same manner, the price of gold has also changed in the same pattern. The price per gram was pick during 2013 EFY.

The most commonly endowed regions of gold reserves are mainly Tigray, Benishangul Gumz, Gamebella, Amhara, and Oromia. The majority of gold is being produced by tens of thousands of artisan miners who conduct mining in the traditional way which is the key challenge facing the sector. The informal sector dominates mining activities with a light regulatory framework. The current security situation in the country has also posed a challenge to effectively make use of the resources for national development.

1.2.2. Tantalum

Ethiopia is currently the world's sixth-largest producer of tantalum. In 2018, the country produced 70 metric tons of tantalum. Now, government reforms in the mining industry seek to increase the production of valuable minerals like tantalum. Mineral production only contributes about 1% of GDP for Ethiopia. The Kenticha mine is a tantalum and lithium mine located in the Oromia Region of Southern Ethiopia. It is one of the largest tantalum reserves in the country, having estimated reserves of 116 million tonnes of ore grading 0.02% tantalum.

In 2021, Ethiopia exported $1.13M in Tantalum, making it the 26th largest exporter of Tantalum in the world. At the same year, Tantalum was the 124th most exported product in Ethiopia. The main destination of Tantalum exports from Ethiopia are: United Arab Emirates ($603k), Singapore ($381k), Hong Kong ($61.6k), China ($43.3k), and India ($41.8k). The fastest growing export markets for Tantalum of Ethiopia between 2020 and 2021 were United Arab Emirates ($603k), Singapore ($381k), and China ($43.3k).In 2015, Ethiopia imported $55.5k in Tantalum, becoming the 0th largest importer of Tantalum in the world. At the same year, Tantalum was the 0^{th} most imported product in Ethiopia. Ethiopia imports Tantalum.

1.2.3. Potash

In 2021, Ethiopia imported $97.2k in Potassium hydroxide (caustic potash), becoming the 93rd largest importer of Potassium hydroxide (caustic potash) in the world. At the same year, Potassium hydroxide (caustic potash) was the 2418th most imported product in Ethiopia. Ethiopia imports Potassium hydroxide (caustic potash) primarily from: China ($92k), Germany ($2.54k), United States ($1.35k), Belgium ($481), and Turkey ($312). The fastest growing import markets in Potassium hydroxide (caustic potash) for Ethiopia between 2020 and 2021 were United States ($1.06k), Turkey ($179), and Belgium ($160).

1.2.4. Gemstones

Ethiopia's gemstone potential is exceptionally promising. Ethiopia has many varieties of high-quality gemstones, including opals, emeralds, sapphires, amazonite, amber, rubies, tourmaline, aquamarine, chrysoprase, periodt, and as well as various types of quartz, agate, jasper. New discoveries are also on the rise, including the especially exciting discovery of the color-change chrome grossular green garnet, as reported in the Journal of Gemology in 2018. These discoveries have brought Ethiopia's total reported gems up to over 40. Ethiopia has also become a significant producer of opal, sapphire, and emerald in recent years. The field is wide open for investors to bring these extraordinary gemstones to a global market. The following are some of the dominant gemstones in Ethiopia with significant potential.

1.2.4.1.Opal

Opal in Ethiopia was discovered in 1994 and has since grown to have an impact on the world market. Its rival Australian opal is seen to be more expensive, despite, Ethiopia's high quality. Precious, fire, and black opals are now being mined in Ethiopia, under the name "Welo/Wollo/Wello or Ethiopian Opals".

The best and most abundant opals are found in Ethiopia's Wollo region, in the north of the country, they have a wonderful variety of colors and body variety but opals have also been identified in the Shewa region, now known as "Mezezo or Shewa Opals".

Opals from Ethiopia vary widely but the most abundant are the stable and transparent ones that offer a beautiful play of colors within them.With no large mining companies or jewelry brands, opal production in Ethiopia is still in its infancy, but with more investment in this mineral, Ethiopia is sure to become a major player in the world opal market, offsetting Australia's hundred-year domination.

There are four types of opal in Ethiopia:

- **Showa and Mezezo opal**

Showa and Mezezo opals were discovered in the 1980s on the highland plateau located in the central Shewa province of Ethiopia, 2,500 to 3,299 meters above sea level and covering a large area of 100 to 200 square kilometers. This is a variable opal, including stones with chocolate, honey, and fire colors and qualities.

- **Wollo Opal**

As mentioned, the 2008 discovery of the Wollo opal took the gemstone world by storm. The play of colors in the Wollo gemstone often goes through the whole piece of the rough stone, producing a striking form with remarkable patterns. The opal mines extend from the Wollo and Gonder zones over 400 square kilometers in Amhara Regional State. This opal is mined 2,500 meters above sea level in this mountainous terrain.

- **Black Opal**

Ethiopia's most recently identified deposit, Black opal was discovered in 2013 at the Stayish mine just 100 kilometers from the famous and historic town of Lalibela in northern Ethiopia. This is where the stone derives its alternative name - Lalibela opal. Mined in a distinct opal-bearing layer in a mountainous area of around 3,000 meters in altitude, the general body tone of the rock is dark in color, hence the name 'black' opal. But the opal itself has a vivid play of color.

- **Afar opal**

The Afar opal is commonly fiery, with minor opalescence and a distinctive character. It was discovered as recently as 2010 in the Afar Regional State, in northern Ethiopia. Artisanal and small-scale mining of Afar opals currently takes place in Ethiopia, but large-scale mining has not yet been realized.

1.2.4.2.Emeralds

Emerald mining in Ethiopia is on the verge of growing but still needs more investment from both government and private entities. Generally found in an area close to the gold town of Shakiso in the southern part of Ethiopia, the beauty of the emeralds is exceptional. Mining conducted there is low tech and skills but shows promise as the quality of the emeralds is gaining in its reputation worldwide. Most of the mined emeralds are of the lighter green hue and found below 5 carats, but there are bright green 10-carat Ethiopians on the market. According to current standards, discovery, and production, it is highly unlikely that Ethiopian emeralds will ever de-throne Colombian dominance in the market, but low prices and high quality will ensure that it will be a stone to contend with. The emeralds are natural and do not require the addition of oil to improve its clarity, more prospecting and better technology could bring forth more discoveries around Ethiopia.

Until recently, emerald mining in Ethiopia has largely been carried out by artisanal miners who are organized into unions and cooperatives. As such, emerald mining is emerging as a major

sector, creating job opportunities for more than 30,000 Ethiopians. Most emeralds are then exported to Switzerland, Australia, and the United States. In 2017, Ethiopia exported 2,290kg of emeralds. Surpassing the export of opal and sapphire which are the current major gemstone types exported.

International gem forums were buzzing in 2017 with the news of the high quality and size of Ethiopia's very recently identified emerald deposits. Discovered in August of 2016 by artisanal miners looking for tantalum, these new finds are comparable to those mined in Colombia in terms of hue and quality. The emerald deposits are located in the Sebo Boru district in the beautiful coffee-producing Oromia Region in southern Ethiopia, where the rural villages of Kenticha and Dermi host, particularly high-quality deposits. Commercial emeralds are suddenly a real and urgent opportunity for investors – Ethiopia is calling. Ethiopia is currently exploring ways to establish a traceability and identification protocol for emeralds, to certify their origin and maximize their value.

- ☞ **Sapphires**

Ethiopians have been mining sapphires artisanally for many years in Tigray, the northernmost of the nine regions of Ethiopia, particularly around a local town called Chila. There are three well-known types of sapphire in Ethiopia. Blue Star sapphire and Fancy sapphire are common, but it is the 'color-changing' sapphire from the areas surrounding Chila which is of the highest quality and commercially sought. These color-changing gemstones feature a blue, star, and green series and can be classified as either 'High-Fe' sapphire or 'Low-Fe' sapphire, and are formed by magmatic and metamorphic processes. Ethiopia also produces the rare and coveted pink sapphires known as 'padparadscha' (from the Sinhalese word meaning aquatic lotus blossom), which has seen renewed interest since England's Princess Eugenie revealed her salmon padparadscha engagement ring in early 2018

The gemstone world was rocked in November 2016 with the news that high-quality deposits of new and unique sapphire had been found in Tigray. Early samples taken near the villages of Awaet, Adi-Shumbro, and Chila confirm the sapphires are of impressive quality, good size, and a wide variety – easily comparable to the sapphires of Madagascar. These deposits fall within the western greenstone belts that run from the northeast to the southwest of Tigray, which is primarily an agricultural and cattle farming region. These sapphires are dominated by a blue-yellow-green series but they also include exciting varieties such as red, purple, white,

orange, yellow, and even a deep pink. All indications are that Ethiopia's newly discovered deposits are ripe for commercial exploitation. Limited geological and geochemical work in the belt to define the mode of occurrence means that the field is wide open for investors to bring these extraordinary gemstones to a global market.

1.2.5. Dimension stone (marble and granite)

Ethiopia has untapped potential in marble production. It has been mined in many parts of Ethiopia since ancient times and the deposits are inexhaustible. The marble deposits are part of medium grade, meta sedimentary successions of the different Precambrian greenstone complexes. The marbles occur as strike parallel lenses (presumably reflecting fold patterns), intercalated with amphibolite, quartzite and schists. They are mostly located in the Northern and Western part of Ethiopia. Most marble deposits contain billions of tons of high-quality marble. The Ethiopian marbles vary within a large colour spectrum. Pure white marble is common together with grey, greenish, pink and sky blue varieties.

The deposit potential of building stones in Ethiopia have been explored by different organizatioins such as EIGS and other private companies and a number of building stone deposits throughout the country have been put into production. This is reflected by the extensive use of Ethiopian stone in new buildings in the capital and other cities.

In the exploitation of massive stone (dimensional stone), large, commercial blocks are extracted in the quarry and transported to a processing plant for final shaping and finishing to slabs and tiles. Those that are homogenous and attractive types of rocks are potentially exported to other countries as as rough blocks. In this regard, the major resource potential within investigated regions in Ethiopia lies in huge marble formations in the western part of the country. Furthermore, the most interesting deposits of marble are found in the western part of Wellega (Daleti) and Gojam (Mora, Bulen, Mankush and Baruda). The area is quite remote, and transport distances to Addis Ababa vary between 550 and 800 km, for the most part along non-paved roads. However, the cost of transporation and the security situation in the area are posing serious challenge for the production and smooth marketability of the product.

In terms of utililzation of the potiential for the production of dimension stone (marble), there are about 23 companies that located throuhtout the country. Of the 23 companies, 12 (52.17%), 4(17%) and 3(13%) of them are situated in Oromia, Amhara and Addis Ababa respectively. Although it is difficult to get the exhaustive performance data due to trade secret and the war in these potential mining areas, scant data obtained from the Minstry of Mines (MoM) shows

that there is a fluctuating performance for the Marble product whereas the granite production is relatively increasing (see figure below)

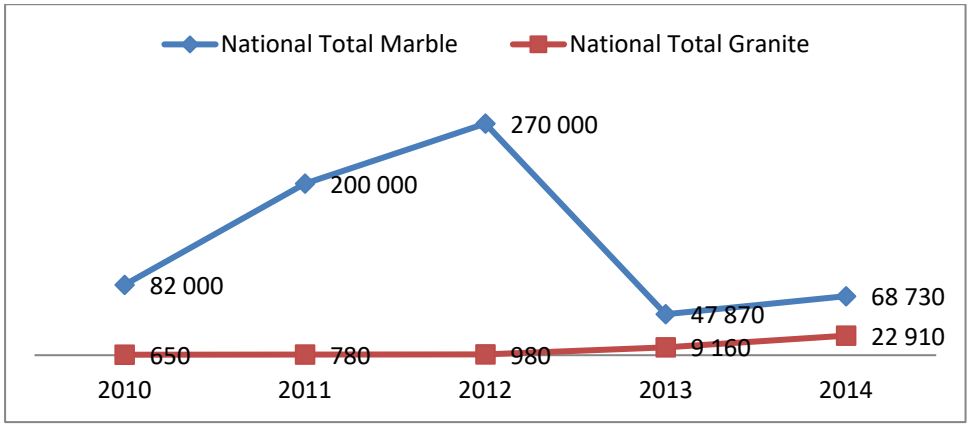

Figure 5: Dimension Strone Production (Marble and Granite) in tones in Ethiopia (Source: Minsitry of Mines)

The figure above indicates that the national dimension stone production in Ethiopia is 91,640 tones of which Marble is 68, 730 tons and Granite is 22,910 tons.. In 2021, Ethiopia exported $319k in Marble, Travertine and Alabaster, making it the 75th largest exporter of Marble, Travertine and Alabaster in the world. At the same year, Marble, Travertine and Alabaster was the 198th most exported product in Ethiopia. The main destination of Marble, Travertine and Alabaster exports from Ethiopia are: United Arab Emirates ($121k), China ($75.7k), Djibouti ($56.7k), Saudi Arabia ($49.2k), and Afghanistan ($9.2k).The fastest growing export markets for Marble, Travertine and Alabaster of Ethiopia between 2020 and 2021 were Saudi Arabia ($49.2k), United Arab Emirates ($31.9k), and Afghanistan ($9.2k).

In 2021, Ethiopia imported $250k in Marble, Travertine and Alabaster, becoming the 92nd largest importer of Marble, Travertine and Alabaster in the world. At the same year, Marble, Travertine and Alabaster was the 751st most imported product in Ethiopia. Ethiopia imports Marble, Travertine and Alabaster primarily from: China ($228k), Lebanon ($19.5k), United Arab Emirates ($3.37k), and Turkey ($15). The fastest growing import markets in Marble, Travertine and Alabaster for Ethiopia between 2020 and 2021 were China ($226k), United Arab Emirates ($3.37k), and Turkey ($15) (OEC, 2021).

1.2.6. Cement

The cement industry is one of the rapidly growing industries in Ethiopia. The average per capita cement consumption of the country is 62kg and this figure is far below the global average of

500kg. In recent years, the government of Ethiopia has been planning to upgrade the existing cement plants, and the opening of new ones to fill the widening demand-supply gap in the country. The government also lifted a ban on Foreign Direct Investment (FDI) in the local cement industry. However, cement producers in Ethiopia struggle to meet the significant gap between supply and demand; as of 2021, production was 5.5 million tonnes short of domestic demand.

The data obtained from the Ministry of Mines indicated that The factories all together have an annual production capacity of 10,690,422 tons with a weighted moving average 7,232,039.99 tons for three years (2012 EFY to 2014 EFY) . This figure is much higher compared to the data some decade ago. Despite, the current capacity utilization rate of the sector is found to be above average at 67.65% using the weighted moving average value. However, it is about 57% when the actual production is compared against the annual capacity (see figure below). This shows that the factories are operating under capacity. The shortage of supply is dire to the extent that it disturbs the cement market eco-system calling for government intervention to regulate the price of cement through measures such as setting fixed prices, limiting the volumes that individuals can buy, and asking producers to cut distributors out of the supply chain.

The cement industry is operating under persistent and continued challenges ranging from a shortage of skilled manpower, lack of foreign currency, erratic power supply and the acute shortage of inputs such as coal all continue to haunt domestic cement plants. There is a wide gap in terms of getting skilled man power in the local cement industry as most of the cement factories were operating by foreign experts which in turn escalates the cost of cement factories. There is a need to relate the industry with the universities so that they produce man power that best suits with the industry in the years to come.

The lack of foreign currency is another hurdle facing the industry. This significantly affects the imports of spare parts, which need to be ordered before the annual maintenance campaigns start. This demands closely working with the National Bank of Ethiopia to ensure that foreign currency is made available to the cement producers in the country.

Another reason why the factories were operating below their capacity is the frequent power interruptions which demands serious attention by the Ethiopian Electric Utility to alleviate the issue. In addition, the factories are operating under stressful condition because there was an acute shortage of inputs such as coal and various inputs.

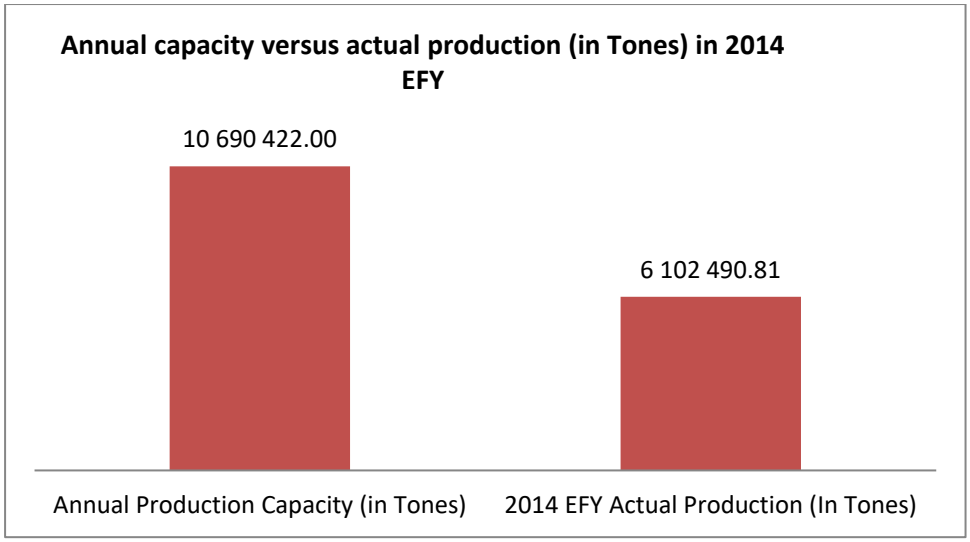

Figure 6: Ethiopia's Annual Capcity Utilization for 2014 EFY (Source: Minstiry of Mines)

By the year 2025, per capita cement consumption is expected to increase to 179kg. The cement industry in the country is highly dependent on the use of imported energy sources for its production contributing to high production costs which in turn is reflected in the price of the cement on the consumer side(Mulatu, Habte, and Aha, 2018). Being ranked as the 7th top producer of cement in Africa, Ethiopia has 13 companies operating 23 plants and the domestic market is led by a mix of both international and local players, of which Derba Midroc Cement, Dangote, Mugher Cement, Messebo Cement, Habesha Cement and National Cement (parent company East African Holding), are the largest. Production is concentrated in and around Addis Ababa, which is home to over 40% of plants, with the remainder spread among five of Ethiopia's 11 regions. The geographic distribution of cement plants in Ethiopia revealed that 10 are located in Addis Ababa, 7 are located in Oromia Regional state, 3 are located in Dire Dawa, 1 is located in Amhara regional state, 1 in Benshangul-Gumaz and the remaining in Tigray.

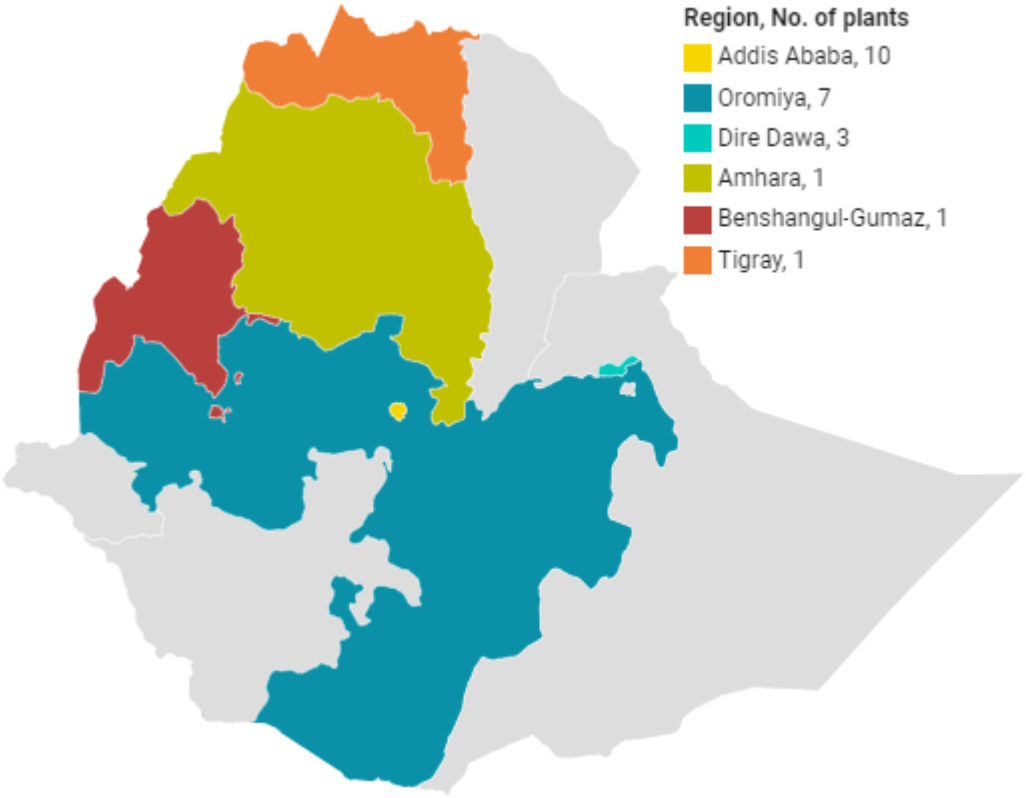

Figure 7: Geographic distribution of cement plants in Ethiopia (Source: Retrieved from https://www.asokoinsight.com/content/market-insights/ethiopia-cement-market on 14 August 2023)

In addition, the data obtained from OEC (2021) revealed that Ethiopia imported USD1.02M value in Cement, becoming the 191st largest importer of Cement in the world. In the same year, the source indicated that Cement was the 528th most imported product in Ethiopia. The international suppliers of cement to Ethiopia along with the value imported include Saudi Arabia (USD 435 thousand), United Arab Emirates (USD 381 thousand), India (USD 82.1 thousand), China (USD 52 thousand), and Jordan (USD 29.7 thousand). The fastest-growing import markets in Cement for Ethiopia between 2020 and 2021 were Saudi Arabia (USD 435 thousand), United Arab Emirates (USD 294 thousand), and India (USD 54.7 thousand). However, there is no evidence that the country exports cement to offshore countries.

The cement industry faces efficiency challenges and produces much less than its design capacity. The cement manufacturers in the country face challenges such as limited access to machinery spare parts, shortage of supply of local coal, shortage of foreign currency, and electricity, which further restrict cement production and contribute to Ethiopia's low cement capacity utilization rate (Endale, 2021).. The logistics system is also highly impacted by the

current security situation in the country as it deter the lean movement of the commodity from the center of production to the vicinity of the consumers. It was evident that the recent war in the Tigray region has also affected production, particularly through the closure of the Messebo Cement Factory during the time of war. Messebo has continued to operate at its 50% capacity even after the peace was restored to a lack of forex to replace damaged spare parts.

Gestures to enhance the local capacity, however, have been evident including the USD 2.5 billion plant by National Cement in Amhara state, and plans by Ethiopian investor Worku Ayetenew to build a USD 1 billion cement plant, also in Amhara, both announced in 2022. Another development was the emergence of a Chinese cement services operator in June 2023, Sinoma, which announced it had won the contract to build a USD 290 million clinker plant for Derba Midroc in the Oromia region. The Ethiopian firm is also planning a 2.74 Mt/annum, cement plant in the Amhara region; Togoga Cement Factory is selling shares to local investors in a bid to build a 5,000 tonnes per day cement plant in the Tigray region that was initially proposed before the COVID-19 pandemic put a pause on development. Other firms in the market are planning extensions to increase capacity including the Pan-African player Dangote, East African Holding (National cement), and West China Cement in Lemi Amhara region, and Mugher Cement are aiming to increase their market share by boosting production. These investments and the continued demand for cement in the economy imply that there is strong potential for the growth of the sector by overcoming the challenges.

1.2.7. Glass and ceramics

There are three dominat ceramic producers in Ethiopia with varying capacity and one being under constructioin. These are Tabore Ceramic Products S.c which is located in Sidama Reginal state/Hawasa/Hawasa, Diyuan Ceramic PLC which is located in Oromia Reginal State/East Shewa Zone/Dukem Eastern Industry Zone , Arrerti Ceramic Manfcuring which is located Amhara Reginal state/North Shewa Zone /Minjare shenkora/Arreti twon , and Kam Ceraimc PLC(this one is under construction) which is located Oromia Reginal State/East Shewa Zone/Beshoftu Industry Zone. Data obtained from the MoM revealed that the Tabor Cermaic Products S.C has produced 1,252 tons per sanitary whereas Arrerti Cermamic Manufacturing which dominates the market has produced 21,879,852 tons/tile in 2014 EFY which is significant compared to 15,969,887 tons/tiles produced in 2013 EFY.

Ethiopia Exports of ceramic products was US$265,000.64 during 2020, according to the United Nations COMTRADE database on international trade. Ethiopia exports most of it's Ceramics

to Netherlands, Sweden and Uganda. And Ethiopia's glass industry is set to experience considerable growth between 2021 and 2026. Exports are expected to increase by 2.9% year on year, up from $314,420 in 2021 to $374,380 by 2026. This rate of growth has been consistent since 2003, when exports rose 7.8% year on year. In 2021, Ethiopia was ranked 117th in the world for glass exports.

With respect to glasses, there are three dominant producers in the country namely: Addis Ababa bottle & glass S.C which is located in Kolfe-Keranio sub-city, Addis Ababa; Ethiopian Hansom international glass PLC which is located in Nifas-Silk Lafto Sub-city, Addis Ababa and juniper industrials glass S.C. which is located in Debre-Birhan All the three factories were able to produce a total of 64,494 tones of glasses during the 2014 EFY which is significantly higher than the previous fiscal year at 42,051 tons per annum. The companies were able to employ close to 671 employees by the end of the 2014 EFY. Dissecting the performance among the glass manufacturers shows that juniper industrials glass S.C at 28885.65 tons per annum followed by Addis Ababa bottle & glass S.C at 23,133.00 tons per annum.

1.2.8. Oil and petroleum

Oil and gas in Ethiopia have a history that is a little over a century old. Although oil seep was discovered in 1860 for the first time, it was not verified till the 1920s. It was generally referred to as oil on the Red Sea coast but was later attributed to specific areas in the Ogaden basin. The Ogaden basin has since been divided into twenty-one separate blocks making it easier to award concessions to companies. Blocks attributed to oil are located throughout Ethiopia, in the northeast, southeast, and southwest of the country. So far, companies from all over the world have shown interest and received concessions in different parts of Ethiopia, including the Ogaden basin. In 2018, Poly GCL was fortunate enough to have struck oil at their oil field of Hilala at the Hamanlei formation, where they had drilled three exploration wells. All of the three wells have shown gas reserves with 2 of them having oil flows. The test production phase of Hilala will see Poly GCL producing 450 barrels of oil, daily.

In an area with a proven six to eight trillion cubic meters of crude oil, the Chinese company plans to construct a gas pipeline to Djibouti, where they will build a gas treatment plant, which will convert the gas into liquefied natural gas. The converted gas will then be loaded on special ships specifically built to transport this gas, which will be exported directly to China.

The data obtained from the National Bank of Ethiopia revealed that Ethiopia has imported about 3.8 million metric tons of petroleum products worth Birr 164.3 billion into the country

by the Ethiopian Petroleum Enterprise during the In 2021/22 fisical year. This value of petroleum import showed a 126.3 percent annual surge mainly due to an increase in import of jet fuel (140 percent), gas oil (127.5 percent), regular gasoline (120.4 percent) and fuel oil (65.3percent). Similarly, the total volume of petroleum imports increased by 3.5 percent owing to higher volume of jet fuel (11.9 percent), regular gasoline (3.2 percent) and gas oil (2.4 percent), despite the decline in import volume of fuel oil (6.9 percent) (See Figure below).

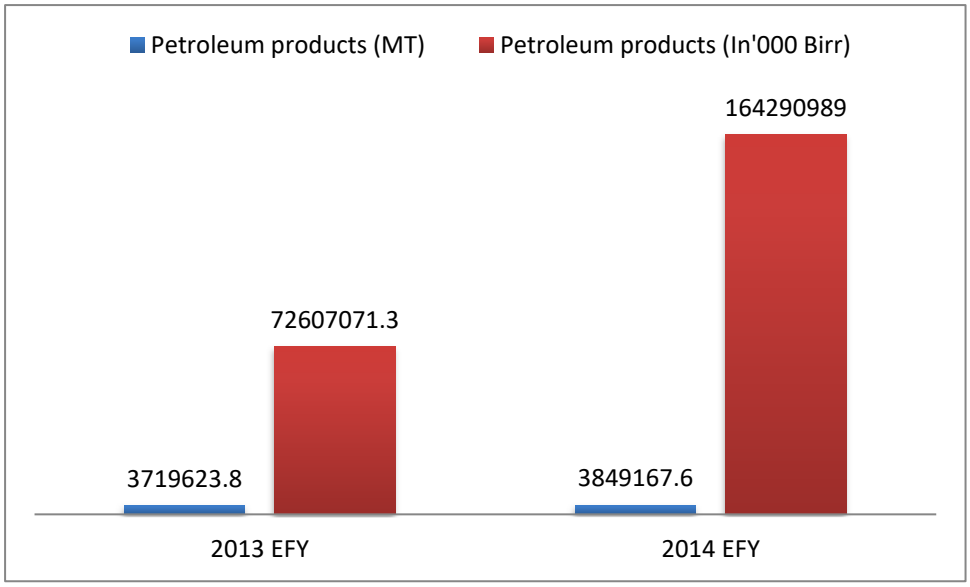

Figure 8: Volume and Value of Petrulem Import in Ethiopia (In MT and '000 Birr)(Source: Ethiopian Petroleum Enterpirse, NBE)

The figure above shows that there is a sigfnciant increase in the values of petroleum import in Ethiopia during the 2014EFY. In other words, Ethiopia imported USD 224 thousand in Crude Petroleum in 2021, becoming the 101st largest importer of Crude Petroleum in the world. In the same year, Crude Petroleum was the 761st most imported product in Ethiopia. The product was primarily imported from: United Arab Emirates (USD 224 thousand). The fastest-growing import markets in Crude Petroleum for Ethiopia between 2020 and 2021 were United Arab Emirates (USD 63 thousand). From the perspective of petroleum gas, the country imported USD 3.71M in the same year, becoming the 151st largest importer of Petroleum Gas in the world. In the same year, petroleum gas was the 321st most imported product in Ethiopia. The sources of supply were primarily from: the United States (USD 1.39 million), Kenya (USD 1.29 million), Algeria (USD 857 thousand), United Arab Emirates (USD 120 thousand), and Tanzania (USD 28.8 thousand). The fastest-growing import markets in Petroleum Gas for

Ethiopia between 2020 and 2021 were Kenya (USD 1.27 million), Algeria (USD 525 thousand), and United Arab Emirates (USD 77.3 thousand) (OEC, 2021).

1.2.9. Coal

Coal is the second-most used source of energy globally. Primarily used for power generation, it is the raw material of choice for 40 percent of electricity production worldwide. It is also a significant input in the production of cement as well. With an estimated 430 million metric tons of coal deposits in the country, the Ethiopian government is trying to utilize this resource by encouraging small- and large-scale coal producers and investors. The highest deposit potential with close to 200 million metric tons is located in the Yayu basin in the Ilu Ababa Bora Zone of the Oromia Regional State (Ahmed, 2007). In addition, a series of geological investigations conducted by the Geological Survey of Ethiopia underscored that the Delbi, Moye, and Yayu coal deposits were considered to be the best whereas, Chilga and Mush Valley coal deposits as significant deposits required further investigation. Other coal occurrences such as Gojeb, Chinda, Kindo, Halul, and Wake in the Southern People, Nation, Nationalities, and Wuchale in the Amhara, and Arjo, Nejo, and Mendi in the Oromia National Regional States are worth mentioning. From this, it can be considered one of the potential areas of investment in the country (Tegegne, 2019)

Improtwise, the country is on a declining version in the tons of coal imported to the land and the government is seen working towards substituting the imports with the local supply. Recent data published by GolobalEconomic.com indicates that the amount of coal imported attained the highest value registering 732.54 thousand short tons in 2018 compared to 509.3 thousand short tons in 2021. Despite the quality and security challenges facing the country, the country has managed to satisfy 40 percent of its annual demand from the local market, and the remaining part is satisfied through imports.

As one of the “dirty industries”, coal mining is seen to pose serious social, economic, and environmental impacts due to its location. Besides, the industry has also posed a challenge to local coffee production and threatens biodiversity which is directly associated with the very existence of forest in the area calling for a “balanced approach” (Suleman, 2017). For example, the Yayu Basin is located in the UNESCO Designated Biosphere. The security situation is another challenge facing the industry in the production, logistics, and distribution of products throughout the country. For example, the local supply of coal has sharply declined since May 2020 owing to the security situation determining mobility in Kamashi, a major coal mining belt

in Benishangul Gumuz regional state. This site is the most excavated site by large-scale investors. Furthermore, the quality of the local coal supply is also another critical challenge facing local manufacturers using local coals including the cement industry with implied hidden costs compared to the imported coal primarily from South Africa (the top coal producer in the African continent).

1.2.10. Fertilizer

An Agricultural sample survey conducted by Central Statistical Authority (CSA, 2021) revealed that 36.58% of the samples claimed that they did not buy chemical fertilizer whereas the remaining portion has used it. Those who purchased chemical fertilizer got it from government organistions (22.35%), Private organizations (1.42%), Merchants (32.83%) and 0.5% from other sources. From this one can understand that government and unions are the dominant suppliers of chemical fertilizers in Ethiopia (See table below)

Table 1: Sources of Chemical Fertilizer in Ethiopia

Source of Chemical Fertilizer	No. of resondents	Percentage (**%**)	**Cumul**ative percentage (**%**)
Government organizations	4 912 617	22.35%	22.35%
Private organizations	312 942	1.42%	23.78%
Merchants	1 387 507	6.31%	30.09%
Unions	7 214 902	32.83%	62.92%
Others	108 934	0.50%	63.42%
Didn't buy	8 039 359	36.58%	100.00%
Total	21 976 262	100.00%	100.00%

Source: CSA

Among the main reasons cited for not using chemical fertilizer by the respondents were the use of applied fertilizer (dominant reason), the lack of money, being sceptical of the outcome of using the chemical fertilizer, and the soaring price of the commodity (CSA-Agricultural Sample Survey, 2021). FAOSTAT (2022) attributes the reason to two main reasons: the price spikes and the logistics challenges facing the world primarily due to COVID-19 and the war outbreaks in different parts of the world including Ethiopia.

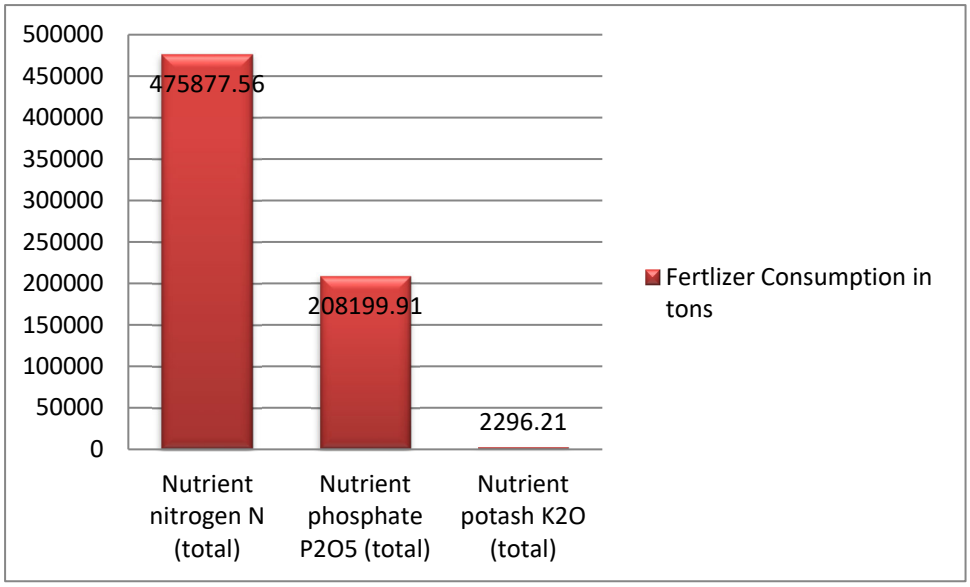

Figure 9 : Types of chemical fertilizer used in Ethiopia (Source: FAOSTAT)

As shown in the figure above, nutrient nitrogen is primarily consumed among framers in Ethiopia followed by nutrient phosphate. Potash is slightly used among farmers in Ethiopia. Studies indicate that fertilizers were the 12th most imported product in Ethiopia. The figure below shows the value and percentage share of imports among the imported commodities in Ethiopia.

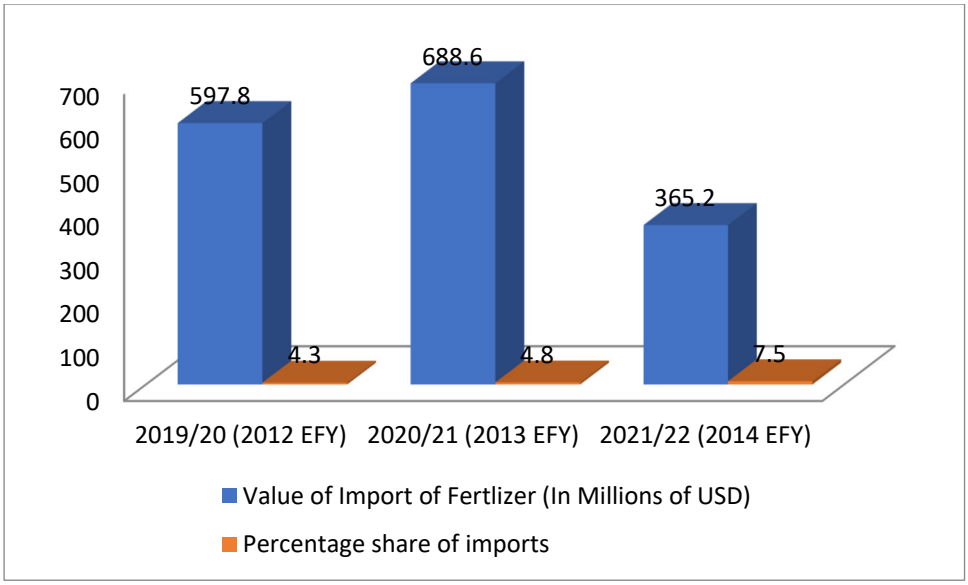

Figure 10: Value of import of Fertilizer and percentage share of imiports (Source: NBE & Ethiopian Custom Commission)

As shown in the figure above, the amount of dollar invested on importing fertilizer has incrsead from 2012 EFY to 2013 EFY. But, it has declined during the 2014 EFY. Price spikes, security situation, and war, slow bureaucracy in the procurement process, the lack of awareness of the farmers in the effective and efficient utilization of fertilizers may be the key challenges facing the dissemination and utilization of fertilizer in the country. Ethiopia imports Fertilizers primarily from: Egypt, Morocco, United Arab Emirates, Saudi Arabia, and China. The fastest-growing import markets in Fertilizers for Ethiopia between 2020 and 2021 were Egypt China, and Spain (EOC, 2021). Ethiopia's Mineral Business Investment Climate

Ethiopia has a very favorable investment climate when dealing with minerals, while royalty rates are mostly the same as other countries in Africa, equity and tax rates are incredibly low with a mere 5% equity requirement. However, among the key challenge facing the mining sector in Ethiopia both small and large scale its over-reliance on the gold industry, which has led to problems for the entire mining supply chain as the value of gold exports has fallen in recent years.

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