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Accelerating Evolution of Exports-Oriented Industries in Africa: The Case of Tile Industry in Employment Provision in Uganda

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Abstract: Uganda is seeking a growth strategy that will break the bottleneck of prevailing economic structural that has perpetrated high unemployment and poverty levels, and unmet economic targets. Despite prioritization of the development of construction materials due to the country's history of the sector's performance, new discovery of more non-metallic deposits and products expanding demand in Africa, queries on the strategy to adopt and viability of the intervention remain. This study sought to evaluate Uganda's ceramics industrial capabilities and export market potential. Specific objectives were to i) to evaluate the Uganda's capabilities of developing an export oriented ceramics tiles industry; and ii) to identify viable opportunities for expanding and diversification employment in Uganda. Both primary and secondary sources of data were adopted. Secondary sources of data including the use of UNDESA's global trade data (UN COMTRADE) Consultative and Key Informant Interviews gathered information from bricks and other construction industry's stakeholders in Kampala, Uganda. Descriptive statistics showed the ceramics tiles demand among the East Africa countries has been on rise from 2004 to 2021 with imports value estimated to have expanded from US\$50 million to above 200 million annually. Uganda has been a critical actor with re-exports estimated at over US\$300,000 annually over the duration. Potential of upgrading the brick industry that contributes about 1.9% of the country's GDP, employs over 93000 individuals among other returns, exists. Through government financial and infrastructural support and following Morbi Cluster (India) example the country can grow a competitive ceramic tiles industry. Necessary interventions include policy support, incubation of the industry, synergic approach in developing the oil and ceramic industries, networking with equipment manufacturers; and continuous integration of the country among regional trade blocks.

Keywords: ceramics; industrialization; non-metallic; economic transformation; sub-Saharan

1. Introduction

A new trade policy framework that will expand and diversify the Africa's access to export markets while also strengthening intra-regional trade is needed to increase continents global trade that has remained below three percent (Coulibaly et al. 2022). The proposed trade dispensation should also facilitate the continent's participation in international trade and global value chains to increase employment opportunities for its bulging population and reduce poverty on a large scale ultimately transforming its members' economies. Agricultural development has had its share of successes and failures with it's over dependency attributed to the current economic malaise, necessitating development of other productive sector industries that would be compatible to resources availability, competitive potential and marketable products. Uganda is seeking a growth strategy that will break the bottleneck of prevailing economic structural that has perpetrated expansion of sectors that are unable to absorb the rapidly growing labour force. Prioritization of the

ceramics development in Uganda has been attributed to the fact that The World Bank (2015) identified and recommended agriculture and construction as the most probable activities for addressing the high unemployment levels. Discovery of more non-metallic deposits posits potential for the industrial sector (Nyakairu et al. 2002). Moreover, bricks and tiles are experiencing expanding demand with Africa market growth being the highest at 18% between 2011 and 2012 (Ceramics World Review, 2013).

If efficiently exploited the Uganda's mineral resources could play a critical role in socio-economic development of the country through provision of employment opportunities, raw materials for local industries, export earnings and attraction of foreign investments (UNECA, 2013). Despite confirmation of existence of these resources in Uganda, available information fails to illustrate how the resources are being used to meet the country's economic potential. The country's history provides a good lesson of the sector's performance potential where in 1960s it used to contribute a third of the country's exports and seven percent of GDP (Obwona et al. 2014). More discoveries have been made (NPA, 2020) and prospects are high for more findings in the undifferentiated gneissic terrain (Central and Northern), Archean greenstone belt (around L. Victoria) and the cabonatite ring complexes (eastern) for more minerals. Despite economic potential presented by the mineral sector, the country is experiencing unemployment crisis, over-dependency of poor rewarding agricultural sector and stagnating manufacturing sector (NPA, 2020). As opportunities for development of tradable sectors of the economy appear diminishing, the country is struggling to find new frontiers for revamping economic transformation, job creation, revenue sourcing and export boosting (NPA, 2020). At the same time the country remains unindustrialized and a net importer of finished commodities hindering structural transformation an important ingredient of social transformation (ADB, 2013; UNDP, 2014).

Consensus among global development agencies and leading researchers points to an urgent need for intervention on employment creation among developing economies for social harmony and sustainable economic growth (ADB, 2013; UNDP, 2014). Uganda's construction industry growth has remained positive and promising since independence in 1962 (Obwona et al. 2014) albeit sector's dependence on inputs importation. Exploration of the available metallic and non-metallic minerals in Uganda (Hinton et al. 2018; MEMD, 2018; Talavera et al. 2023) presents a unique opportunity for enhancing the construction sector performance. Furthermore, recent research finding (Hausmann, et al. 2014) concur that construction material industrial development portends the best growth strategy considering the Uganda local demand and its landlocked position which only allows it to competitively export to its neighbouring countries. Moreover, the expanding construction potential among its neighbours and trade agreement partners (UNECA, 2013) provide an opportunity to integrate the subsector into export related and intensify labour demand within its boundaries thereby addressing the pervasive unemployment challenge (Golub and Hayat, 2014).

Development of ceramics industries provides the best opportunity for Uganda's transformation from subsistence agriculture to an industrial economy considering its stage of development, population and constraints to structural transformation. The bottlenecks to structural transformation has already been identified (NPA, 2020) and include; dominance of primary commodities over industrial products resulting to failure of the economy to contribute significantly to value added export; slower than desirable growth in industrial and agricultural sector; growth sectors that are not absorbing the rapidly growing labour force; capital markets that are not effectively intermediating capital and slow accumulation of core production infrastructure such as energy and transport. Breaking the structural transformation bottleneck will require adoption of facilitative strategies that encourage micro-, small and medium enterprises (Page and Söderbom, 2015) that are labour intensive, require low capital outlay, opportunities for clustered production, import substitution potential, export oriented, and requiring simple technology with potential for improvement. The industrial sector developed should be able to attract direct foreign investment to input technology, management skills, and global production networks, and manage the regime for

direct investment in order to get the most capacity building for local workers and firms (Dollar, 2008).

The United Nation Economic Commission for Africa (2018) published an Africa Mining Vision which proposed a mineral development-industrialization linkages. The vision acknowledges the opportunities and challenges mineral resources exploitation could achieve in spurring industrialization, economic growth and poverty reduction. UNECA 2013 identified the constructions industry as one of the fastest growing sector in Eastern Africa. Construction was the leading sector in six out of 13 countries, and among top three fastest growing sector in the five of the remaining countries in the Eastern Africa. The same study ranked mining as among the least developed sectors of the Eastern Africa countries. In Uganda, mining was ranked as the worst performing economic sector. In their efforts to argue on how globalization has developed exponentially over the past 20 years, generating multiple and opposite effects for local and regional development LoRD, (Parrilli et al, 2012) provide a case of ceramic tile and glazing industry cluster in Castellon, Spain as a practical example that could pull together the global value chains (GVCs) and global production networks (GPNs) approaches.

Indian ceramic industry evolution opportunities and challenges is also provided (Prahalthan et al. 2013). Key highlighted challenges of the Indian ceramic industry included raw materials' importation, industry being controlled by non-organized players, bulkiness of transportation, prices of fuel and cost of raw materials. Reliance of imported raw material for Indian ceramics industry is a pointer of opportunities for Uganda to develop this industry due to its endowed resource availability. ANRC (2021) prioritized development of the ceramic industry in Rwanda as the second among those with potential for diversification and import substitution. Golub and Hayat (2014) recommend integration into the global economy and exports of labour-intensive products as being vital in boosting the local demand for labour.

The Uganda National Industrial Policy (MTIC, 2020) provides long-term perspectives for spurring industrial development, economic transformation and guides country's industrialization, employment and wealth creation agenda. It also envisions building an industrial sector that is fully integrated into the domestic, regional and global economies. Review of the clay and kaolin in relation to construction industry addresses two of the four principle focus of the policy. The focus of address included i) exploiting and developing natural domestic resource and promoting competitive industries that use local raw materials and ii) engineering for construction materials. Non-metallic based industrial development was identified as having the best opportunity for expansion in Uganda within shorter time duration (MTTI & UNIDO, 2007). The choice was done by multi-sectoral investors during an industrial development analysis for competitiveness, growth potentials and investment opportunities.

Positive results have been observed with Uganda's large-investment component of construction industry (limestone processing). The industry has attracted FDI culminating to cement exports to the neighbouring countries expanding exponentially (UBoS, 2020). The country's construction industry has depended largely on brick making (Nyakairu, et al. 2002). Although brick making has been associated with both economic and ecological impacts, the magnitudes on these impacts have never been evaluated (NPA, 2017). Yet opportunities of improving brick making to a more high-value commodities outputs (tiles, refractory bricks and pipes) exists with use of the appropriate mineral and slightly improved technologies (Kuhtz, et al. 2010). A comparison of brick and tile production technologies, market potential, export potential and employment provision raises a question on the opportunities for upgrading the brick making to tile production. Does brick making and improved technologies on clay and kaolin processing (tiles production) compatible with the facilitative strategies for breaking the structural bottleneck of Uganda's economy?

Both clay and kaolin are non-metallic industrial mineral available in Uganda (MEMD, 2018) and raw material for high quality tiles production. Commercial tiles production has been observed to support micro-, small and medium enterprises (MSME); labour intensive; whose products are tradable in the global market; and with potential for clustered production (Silva and Leite, 2024). So far clustered zones of the non-metallic minerals production have been recommended in some

significant regions of the country including Wakiso, Jinja, Mukono, Mbarara, Masaka, Tororo and Hoima districts where deposits of varying quality and abundance have been discovered (Nyakairu et al. 2002). Targeting the development of the two minerals coincides with the recommendation that Uganda should concurrently develop more complex industries within reach of current capabilities and which promises great demand in the context of an oil boom (Hausmann et al. 2014). Furthermore, the tile industry will be a direct beneficiary to efforts of increasing value-addition on the oil and gas sector by using both the products and by-products (MEMD, 2008) hence increasing the economic welfare and mitigating on environmental costs (NEMA, 2013) of the oil industry. The proposed intervention potential in responding to structural transformation, spurring industrial growth and employment provision notwithstanding, little is known about the necessary strategies that the government needs to undertake to actualize the probable benefits.

The goal of the study was to evaluate the potential of bricks and tiles making in industrial growth and employment provision. The specific objective being addressed include i) to evaluate the existing opportunities for social and economic upgrading of the bricks and tiles components of construction industry and subsequently present ceramic tiles global production network; ii) to evaluate the Uganda's capabilities of developing an export oriented ceramics tiles industry iii) to identify viable opportunities for expanding and diversification employment in Uganda.

2. Methods and Analysis

2.1. Data sources: Sources of data used included both primary and secondary sources

2.1.1 Primary data sources

Primary sources of data included both consultative meetings and focus group discussions with the construction industry stakeholders. Stakeholders were shortlisted through stakeholder mapping process.

i). Focus Group Discussion: Focus groups discussions were held with brick makers around Kampala City. Bricks making clusters sampled included those found in Wandegaya between Makerere University and Murago National Hospital. Others were along the Northern By-pass around Kisaasi. The choice of the cluster were influenced by their access in Kampala, and group's willingness to share their production information. Each of the focus group had between 8 to 14 members. Information of interest from the brick makers included process of brick making; economics of brick production and marketing; and opportunities and challenges bricks production in Uganda.

ii) Consultative meetings and Key informant interviews: Various key stakeholders were consulted through a pre-set checklist of questions including traders (merchants, importers and retailers of construction materials including tiles, cement and sinks among others), trainers on ceramics skills and individuals reminiscent on the operations of African Ceramics Company (ACC).

2.1.2 Secondary Data Sources

United Nations, Department of Economic and Social Affairs Statistics Division (UNDESA) Commodity Trade (UN COMTRADE) statistical data sites <https://comtrade.un.org/data> provided information on imports and exports by Uganda and other East African Countries. The data was accessed in January and February 2023.

Literature Review: Document review was undertaken to provide insights on the global tiles industry and opportunities for Uganda to participate in its global production chain. Review of existing literature was also meant in filling the information gaps on available primary and secondary data; and present appropriate case studies for Uganda.

2.2. Conceptual framework

This study adopted the global production network analysis approach (Henderson et al. 2001) Global production network or global value chain (GVC) analysis are becoming popular analytical frameworks for understanding the overall structure of industries, their geographical dimension,

actors driving the industry, and the ability or difficulties for countries and firms to economically and socially upgrade. Using global production network analysis (Parrilli et al. 2012), opportunities for social and economic upgrading of tile industries in Uganda is evaluated.

3. Results and Discussion

3.1. Overview of ceramic tiles utilization and markets in the East Africa region

The use of ceramic tiles in Uganda and in extension the East Africa as components of house constructions has become a necessity. Tiles are used to fulfill house-owners desire for a good quality finishing of a house. Majorly tiles are used to add beauty to houses, cover-up poor workmanship on the houses surfaces, increase the value of a house, mitigate costs associated with painting and for sanitary reasons. Tiles are mostly specified based on the place of use and quality. In Uganda tiles are largely classified as being used as for the house floor or the walls. Tiles are specified based on whether they will be used in the kitchen, bathrooms, toilets or the other rooms (sitting or bedroom). Use of tiles also allows the user to match their finishing with the colour of choice and also that of furniture.

With time, ceramics tiles' users are able to differentiate specifications for various types including for walls, floor, bathrooms and quality status. Hence not only is the demand of tiles increasing in Uganda and among other East African countries, but also taste in quality and choice of use. Understanding the tiles and other associated products' market provide insight on opportunity for manufacturing sector development. Tile production, a major sub-set of ceramic associated with construction industry is prioritized, notwithstanding other products. Other ceramics products include pipes, roofing tiles, building bricks, refractory brick and sink etc. as shown in figures on market trends. All the ceramics construction products and tableware are manufactured through related process and raw materials. While Uganda could indulge in any of these products' production, which their market trend among East African countries are analysed, prioritization of tiles is recommended. Tiles global market has recorded the highest expansions and enjoy the largest market share compared to other ceramics (Abiola, 2023). Its production is less complex and allows for differentiations for customer utilities' preference especially at the final fabrication (glazing) stage (Albors-Garrigos and Hervas-Oliver, 2019). They are less bulky and easy to package. Due to their relative closeness in production process to bricks, they become the first choice if brick makers were to be upgraded.

3.2. Market status of ceramics tiles and other products in the East Africa region

Adoption, production and marketing of ceramics tiles in Uganda and among the neighbouring countries will depend on the availability of demand. The size of the commodities' demand and its potential for expansion will attract ceramics manufacturers and other value-chain actors (Albors-Garrigos and Hervas-Oliver, 2019) to invest in the industry. Thereby growing the employment potential, national income and the desired industrial and export diversification (Shinyekwa et al. 2021) and the structural transformation (Chen, 2020). The existence of the market, availability of the raw material and other factors of production; and the technological know-how may not assure Uganda success in the industrial. The country's preparedness through policy that assure ease of business operations, the macro-economic environment and the entrepreneurs competitiveness (Mashingaidze et al 2024) are critical for a country to seize the market opportunity.

3.2.1 Ceramics commodities importation in the East Africa between 2008 and 2021

Figure 1 shows values of ceramic imports and associated annual increment in the East Africa region from 2008 to 2021. Importation of ceramic products among East Africa counties rose from US 30 million in 2001 to US\$ 226 million in 2021. The highest regional import (US\$ 251 million) was recorded in 2016. The region has seen a sevenfold growth on ceramics' import in the two decades. Over the study duration, an average annual increment of ceramics import was 13% per annum. The annual increment in import value showed the highest as a 54 percent 2007, while 2017 was the lowest (-19%). Although the annual trend shows a regular fluctuation in the levels of imports, the

rate of change in numbers and regularity of negative increment seem not to deter the improved imports and trade in ceramics.

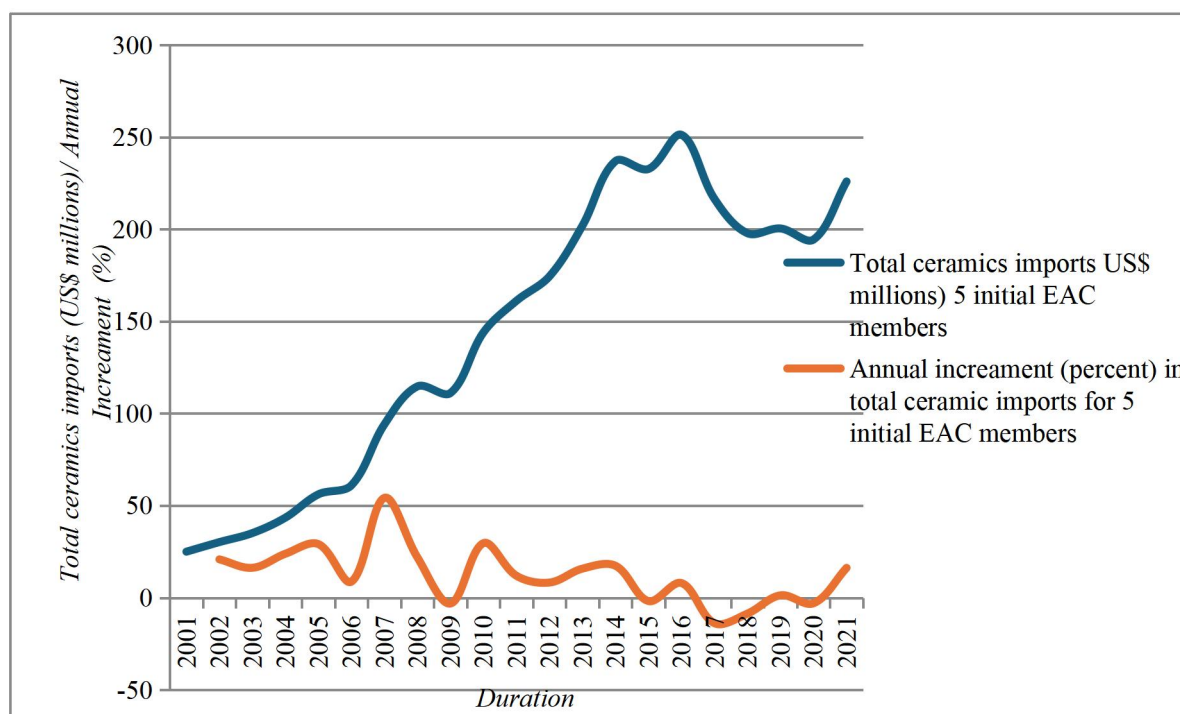


Figure 1. Aggregate ceramics imports and rate of increment for East Africa Community Countries (Source, UNDESA (2023) database)

High prospects for ceramics market and hence trade was observed among the East Africa Community Members. A two decade expanding importation of these commodities points to a sustainable market. Moreover, opportunities for expanding the trade across other neighbouring countries, the entire continent and globally exist. The African Continental Free Trade Area (AFCFTA) being promoted (UNCTD, 2021a) presents a major opportunity for the ceramics trade. The AFCFTA will create the largest free trade area in the world measured by the number of countries (55 countries) and population of above 1.3 billion people (World Bank, 2020). The combined gross domestic product (GDP) of the AFCFTA members is valued at US\$3.4 trillion. The continent bulging youth population and a population growth rate of 2.4 percent depicts an expanding market for all commodities. The urbanization rate is expected to be the highest in Africa by 2050 with a 58% growth (World Bank, 2015) exhibiting expanding demands for housing at both short and long term basis. Ceramics value chain actors are observing business opportunity as exemplified by Ceramic Africa which hosted a conference in Nairobi in 2023. According to the organizers the conference brought together exhibitors from across the globe and attracted more than 7000 visitors.

While the region market provides a good picture of the prospects especially considering the countries' membership to East Africa Community (EAC), information by countries is critical as they allow for deeper analysis. Figure 2 shows the specific EAC countries import of ceramics from 2002 to 2021. Tanzania and Kenya imported the most of ceramics among the EAC. The two countries accounts for the regional landing ports for imports. In any of the year, import values by Uganda accounted to about a half or less than a half of those by Kenya and Tanzania. The proportion represented by Rwanda and Burundi were marginal in relation to those of the other EAC members. Between 2002 and 2014, Tanzania led other countries in values of import, while after 2015 those for Kenya have been the most. Tanzania and Kenya has the highest population among the EAC members, followed by Uganda, Rwanda and Burundi. Identical to population ranking among members is the countries land sizes. Kenya is the biggest economy based on gross domestic product

(GDP) followed by Tanzania. Other countries GDP sizes include that of Uganda, Rwanda and Burundi respectively.

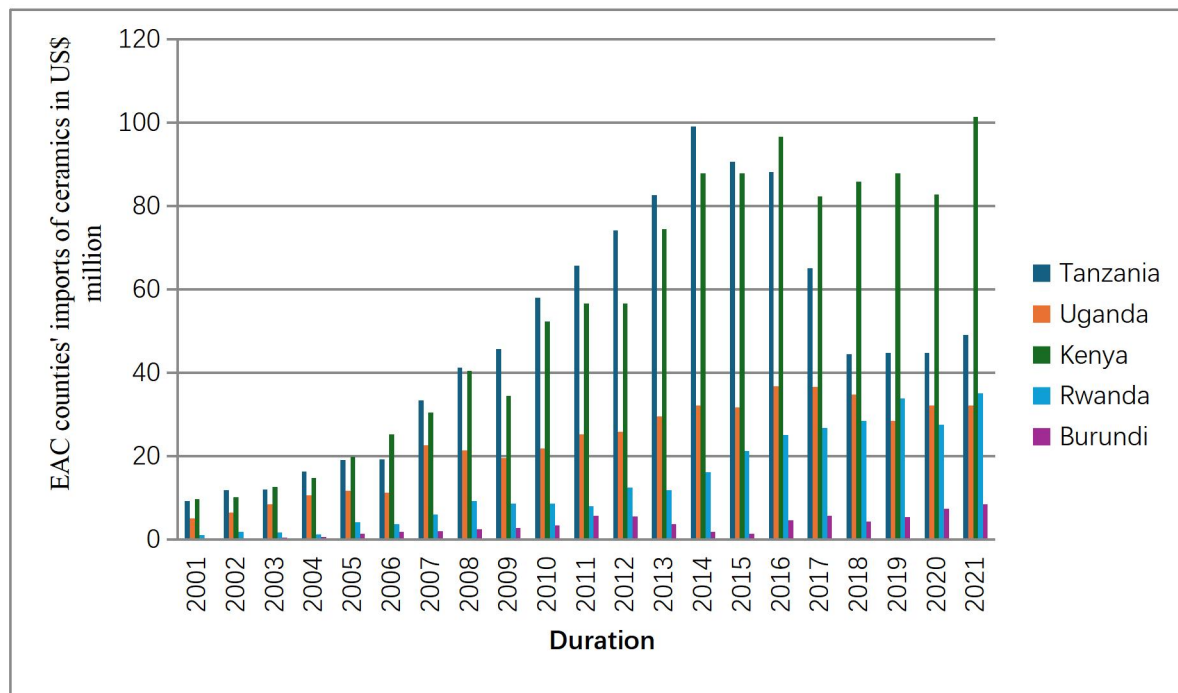


Figure 2. Ceramics commodities imports in East Africa between 2001 and 2021 (Source, UNDESA (2023) database)

All the countries reported increased importation of ceramics commodities over the study duration. The value of imports rose gradually over the years in all the countries. Rwanda imports surpassed the Uganda's in 2019 and 2021, the countries' GDP, the size and the population notwithstanding.

3.2.2 Uganda ceramics commodities exports

The UN commodities trade data showed Uganda to be involved in both ceramics importation and exportation. While the values of export, import and re-export have been recorded, the latter data was not frequently reported especially in the most recent years. Figure 3 shows the value of Uganda's export for aggregate ceramics between 2008 and 2019. Despite the Uganda's value of ceramics' exports being generally on increase between 2009 and 2019, the rate of increment fluctuated. The value of exports recorded in 2019, 2017 and 2015 were lower than for any of the value reported between 2010 and 2013. The lowest reported export value was US\$ 391 thousand with the highest estimated at US\$3.1 million. Although the export values present opportunity for the ceramics industry development, drivers of the observed export market evolution could not be estimated. First, the trade appears to have been sporadic with caustic factor being inherent in Uganda, import country or both the exporting and importing countries. Also since Uganda is ceramic net importing country, the drivers for observed changes could have been influenced by other major products' dealers in the world. Market shifts could have been as a result of globalisation including development in communication technologies.

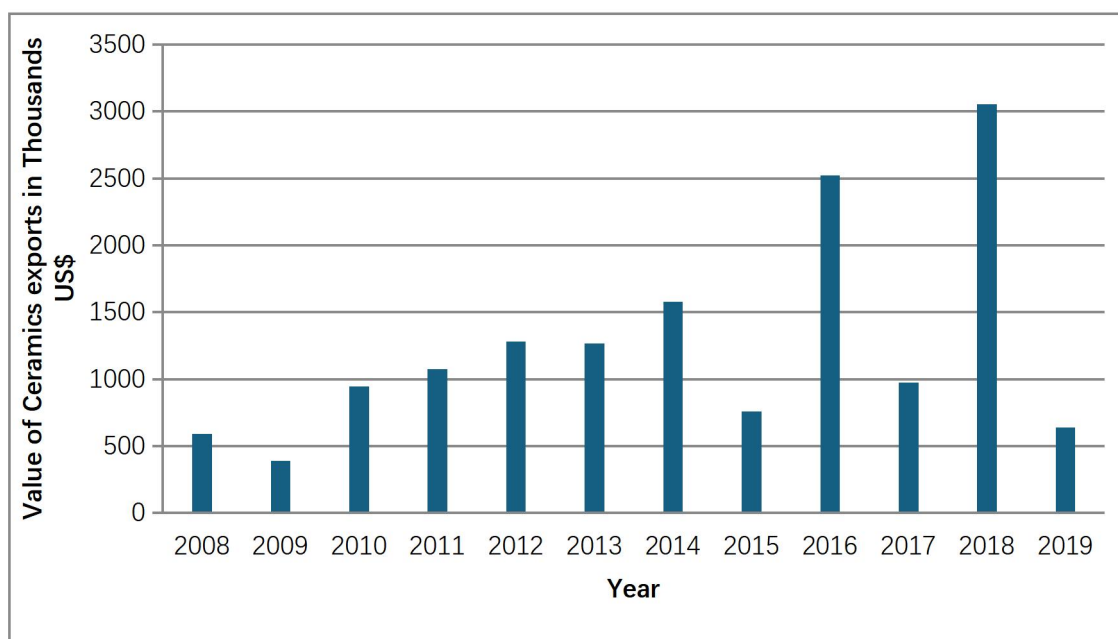


Figure 3. Uganda aggregate ceramics exports between 2008 and 2019 in thousands US\$ (Source, UNDESA (2023) database)

Uganda's strategic location geographically or its ability to influence the neighbouring countries markets could have influenced the re-export/export trade. Uganda export status in ceramics commodities which are largely imported presents two major contradictions. First re-exports commodities' prices are always higher than directly imported to the end-users. Secondly, Uganda is a landlocked country hence indicating that the commodities have passed through another port country either Kenya or Tanzania. According to Jones and others (2020) re-exports was attributed to a re-exporting countries filling information gaps which matched foreign importers to supplier country through ranges of services (e.g. evaluating and monitoring of quality of goods from suppliers, and helping suppliers get market abroad); superior logistics services provided by international shipping hubs of re-exporting economies; and possibilities of avoidance (within the law) of taxes, tariffs, and quotas. Another factor which could be a concern for a country attempting to indulge in ceramics' products production is the low capital availability by re-importing countries to finance upfront fixed trade costs associated with the supplier export trade.

Figure 4 shows categories of ceramics' commodities traded in the international markets and the value of those exported by Uganda. In international trade, commodities considered as ceramics are generally categorized into 14 as shown in figure 4. The commodities are classified into different classes of goods or products. Despite different in values as per specific product's prices and quantities, Uganda is involved in export of goods associated to each of the ceramics commodities. The ceramics commodities are largely used in construction industry, household wares and ornamentals. Ceramics are used for residential, commercial and industrial buildings. While annual earnings for most commodities exported were less than US\$ 100 thousand, other including refractory bricks, building bricks, unglazed ceramics flags and paving, glazed ceramics, ceramics sink and porcelain tableware exceeded that limitation. All these commodities exceeding the US\$ 100 thousand export value except porcelain tableware, were involved in construction industry.

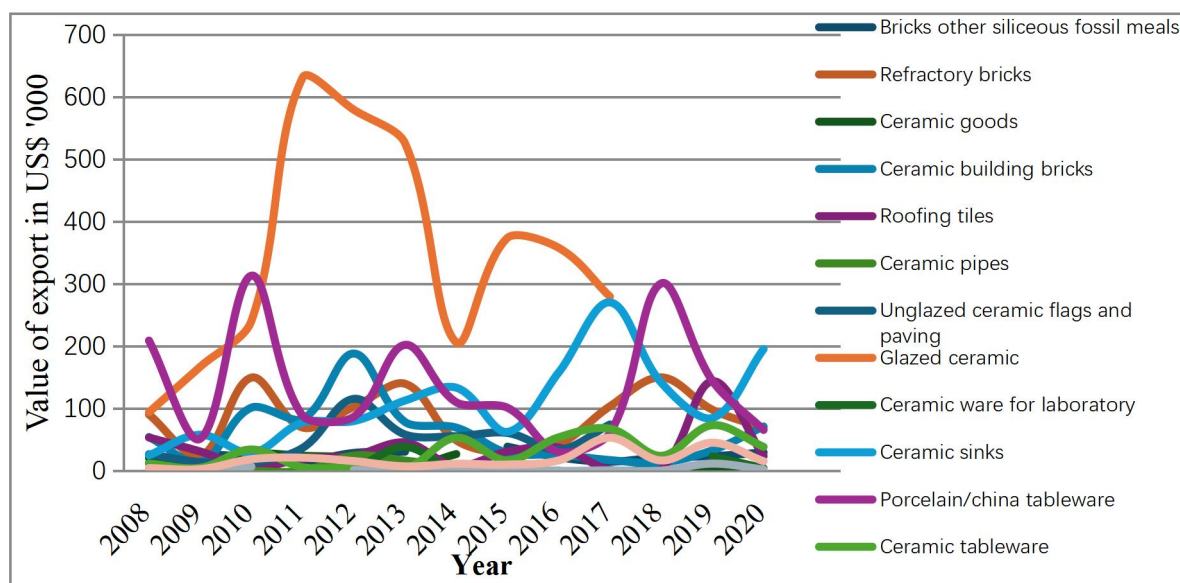


Figure 4. Value of specific ceramics commodities exported by Uganda between 2008 and 2020 (Source, UNDESA (2023) database)

Figure 5 shows proportional of various ceramics commodities exported by Uganda between 2008 and 2020. Over the duration, the main commodities exported included refractory bricks, unglazed ceramics flags and paving, glazed ceramic, ceramic sinks and porcelain. After 2018 the proportion of unglazed ceramics flags and paving rose abruptly to be the dominant export commodities. The rise in export of unglazed ceramics corresponded with sudden reduction on that associated to glazed, an observation that was suspected to have been an outcome of mixture of the two generally associated with biscuit tiles. Except for the initial three years that recorded porcelain as the leading export, all the others showed glazed ceramics outperforming others. Refractory and building bricks, and ceramics sink reported a modest exports proportion for Uganda across the entire duration.

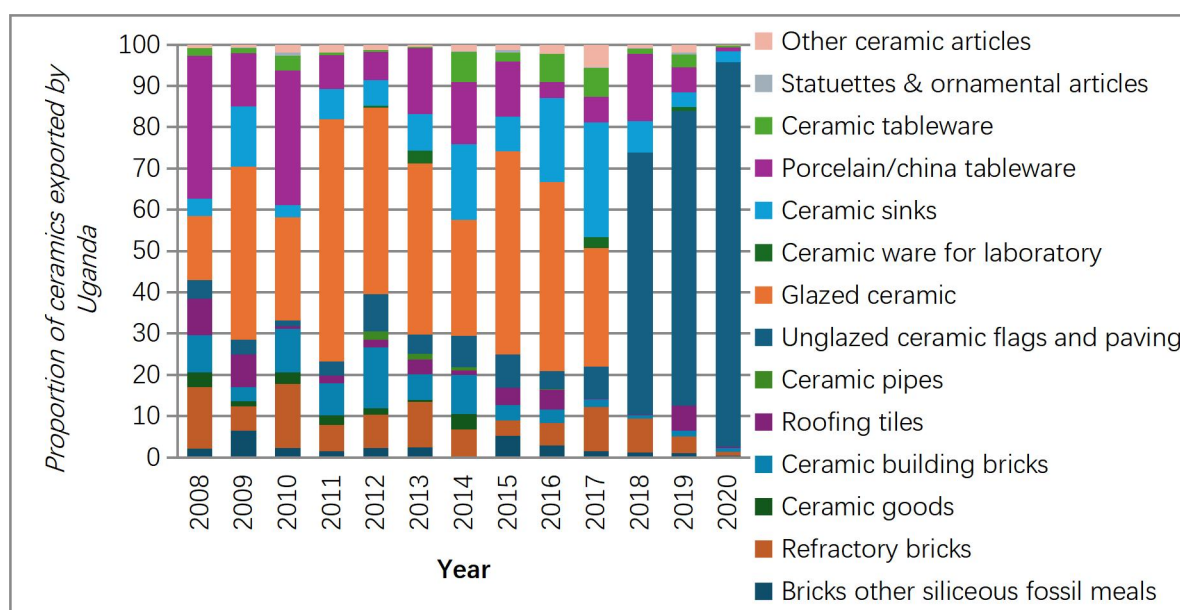


Figure 5. Proportion of ceramics export values for Uganda between 2008 and 2020 (Source, UNDESA (2023) database)

3.3 Ceramics commodities capacities development in Uganda

Uganda tiles production development will necessitate building capacities especially those associated with human resources. Insights in the requisite capacities for the ceramics industry development entails understanding the countries ceramics commodities production history and its brick industry status.

3.3.1 Uganda Ceramics Industry Capacities

Critical insights onto opportunities and challenges for tiles production as an entry point for ceramic industry capacity development in Uganda is provided by historical efforts for local manufacturing and human resources technical building. Understanding the wall bricks production, an activity that is targeted for upgrading offers lessons on the requisite interventions.

3.3.1.1 History of glazed ceramics production in Uganda

Africa Ceramics Company (ACC): ACC was started in 1968 and was owned by the Ugandan government through Uganda Development Corporation (UDC). In 1972, ACC closed due to departure of workers after a coup detat in 1971. In 1980, ACC was among the few companies targeted by development partners for revival. Development partners were instrumental in building the capacity of the employees for the company and designing a formula for mixing ingredients of clay. Human resources for ACC was built on industrial aspects of ceramics through training done in United Kingdom and Japan. The company was revived and by 1984 it was back in operations and continued being a major producer of ceramics tableware, sanitary ware and pipes. In 1986, another change in government culminated to departure of experienced employees of the company. Departure of the top management supported by an overseas company led to major financial and operational constraints to the company. To remain operational ACC resulted to importing processed ingredients of clay as no capacity was locally available to handle ingredients mixing. The company collapsed in 1988 mostly due to challenges associated with human resources and liquidity.

ACC was established to manufacture tableware, sanitary ware and pipes. The factory was located at Sonde, Namugongo in Kampala. Tableware manufactured by ACC included cups, plates and other ceramics utensils. Sanitary ware product lines including sinks, ceramic toilet, sink. ACC used to derive its raw material from various locations in Uganda as shown in Table 1. Mostly the raw materials were components of clay which included kaolin, feldspar, clay ball and quartz.

Table 1. various components of clay used by ACC and their sources within the country.

Mineral component	Sources	Region
Kaolin	Mutaka, Bushenyi/ Namasere, Masaka/ Bwabo, Luwero	Western, Central
Feldspar	Mutaka	Western
Quartz (sand)	Diimu, Masaka/ Entebbe	Central
Clay ball	Mukono, also available in most Ugandan swamps including Kajjanzi and Mbale	Central

Source: Author with information sourced through KII

By 1985, ACC had realized the need for production of wall and floor tiles using scraps from manufacturing processes of table ware, sanitary ware and ceramic pipes. Through support of development partners, ACC employees were sent to Inax Japan to learn how to manufacture tiles for about a year. At its peak in 1985, ACC was well equipped in production and distribution of the products across the country. It had equipment for rolling and molding tableware, sanitary ware and pipes; driers for enhancing the process of products drying and a kiln for firing products.

3.3.1.2 History of training on ceramics

Uganda Technical College situated at Bushenyi, in South Western Uganda was established in 1956 by the Ankole Kingdom Government. The college that was known then as Kahaya Memorial Rural Trade School admitted students with basic primary education who were trained in carpentry and joinery, and bricklaying. In 1958 the college expanded areas of training to include leather tanning, shoe making, pottery and ceramics. By 1974 its name was changed to illustrate upgraded training methodology to a technical school. Later in 1982, the institution was elevated and renamed Bushenyi Technical Institute. Key among the changes implemented was the raising of the standard entry requirement to holders of an ordinary secondary school certificate (O level). Two years after, the institution upgraded again to Technical College and was renamed Uganda Technical College. The student's admission requirements also rose to include Advanced Secondary Education Certificate (A levels). By 2015, annual enrolment of students to the institution had reached about 500 students. About two third of the students were largely supported by the Ugandan government for their studies. The number of students pursuing industrial ceramic remains low at below ten per year of enrolment.

Other tertiary institution including Kabira Technical Institute in Bushenyi District and Kyambogo University in Kampala have initiated Diploma programmes on ceramics production. However, the interest among learners remains low. The capacity to build technical human resources for development of the ceramics industry is in place, however, the population need to be inculcated into the industry.

3.3.2 Current status of bricks production in Uganda

Bricks production in Uganda is largely informal, contributing about 57% of 8.2 billion pieces reported annually (UBoS, 2020; DFID, 2018). The crafts of bricks making is extensive across all the communities in the country with at least 61% of the total estimated 6.2 million houses' walls made of bricks (UBoS, 2024a). Although information dearth prevails in the informal sector of brick trade, it was estimated that Uganda exported 241,000 building bricks, primarily to Democratic Republic of Congo and South Sudan in 2019 (UBoS, 2020) earning about US\$4600. Employment in the industry has been estimated at 4.5% of household heads (UBoS, 2020) and 93,000 (Barreto et al. 2018; DFID, 2018) with an annual income of about US\$583 million accounting for 1.9% of the gross domestic production (GDP) in 2015 (Barreto et al. 2018; DFID, 2018). Demand for bricks still existing with the increasing population necessitating more houses and prevailing backlog of 1.4 houses and deficit of 140,000 units (UBoS, 2024a). Despite women contribution in brick industry accounting for 15% of total employment, their earning are about 8% of total economic benefits.

Based on the scale, brick making could be considered as artisanal domestic, small-scale and commercial produced. Domestic artisanal production occurs when an individual or a household in need of construction assemble all the materials and proceeds in making the bricks that are only meant to meet their specific project's needs. Small-scale producers are artisan whose main economic activity is brick making. They are contracted by individuals to produce bricks for the customers' construction projects. Their business enterprises grow mostly based on customers' referrals as being timely in meeting agreed deadlines; quality products judged based on brick colour, feel and numbers of broken; and also cost of the assignment. Other small-scale artisans produce small to moderate volumes of bricks, mostly between 1000 to 10,000 pieces and wait for customers. The small-scale bricks' production is disjointed, mostly associated with seasons of economic booms and is largely carried out on wetlands and river valleys. The land where bricks production is done is either owned by public, absent land-owners or in very rare cases leased. Simple field and built kilns are used in brick firing. Unlike in Kampala and its neighbourhood where small-scale producers are only involved in wall bricks, those in western Uganda undertake roofing tile production (Kayamba and Kwesiga, 2017). Informal bricks' production faces challenges including low returns, high cost of fuel, low capital base and limitation to finances. Return to investors are always less than 40% with labour, fuel wood, water, leasing and other cost accounting for at least 60%.

Commercial bricks' production is a fast expanding business in Uganda where large companies with significant capital base, equipment and market prospects are engaged in bricks' making. Production is on a large scale in complex fabricated permanent factories located on land owned by investors. Significant numbers of employees with varied professional backgrounds are hired including casuals, drivers, technicians, accountants, managers and marketers. With expansion of the commercial brick producers, branding and opening of sales outlets across the country has been observed. Sourcing of raw materials including clay and fuelwood is at large scale. While the history of brick making in Uganda is vague, commercial brick making were initially associated with Christian Missionaries in the late 19th and early 20th Century. Later on, a public company Uganda Clay has pioneered the industry since 1950 with two production plants in Central and Eastern Uganda. The commercial production has largely been involved with both roofing and wall bricks production. Quality specification for commercial bricks and its assurance is by Uganda National Bureau of Standards (UNBS). Brick quality specifications are largely based on dimension, density and strength.

3.4 Accelerating the evolution of Ceramics tiles production in Uganda

The government should be the genesis of the initiation of the ceramics manufacturing and associated industrial clusters. In the current national development (NPA, 2020) the government has succinctly committed to invest in infrastructural development and create a competitive business environment. Despite some hitches associated with governments' initiated special economic zones (SEZs) including in Kenya (Laryea et al. 2020), Silicon Savannah (van Noorloss et al. 2019), India and China (Wei and Balasubramanyam, 2015; Gupta and Biswas, 2020) and Dubai (Lectard and Woldemichael, 2019) some levels of successes have been reported. The India's SEZ reported an increase of total employment from 134,704 to 1,778,851 between 2006 and 2017 (Karmakar and Bharti, 2023). The Economic Processing Zones in Kenya recorded exponential expansion in number of firms. an increase in employment from about 10,000 to 40, 000, and export earnings from about US\$30 million to US\$249 million between 2000 and 2004 (Laryea et al. 2020). It is imperative for Uganda to domicile its own unique situation with lessons elsewhere (UNCTD, 2021b). With oil revenue expected to driver and finance, infrastructure (roads, energy, water etc.) and safeguard funds for incentives; the emirates example provide a befitting case (Lectard and Woldemichael, 2019). With the incentives approach the government could be able to signal its preferred industrial mix for the clusters. However due to limitations in resource base, after initiation the government should attract firms, institutions and other actors to drive the development.

Conversation has been ongoing on the Uganda firm's competitiveness in export markets as per Porters model (Mashingaidze et al 2024), the outcomes have not been comprehensive and timely (Shinyekwa et al. 2021) to provide clear guidance. Even as the research pursue the capabilities of the country to indulge in global market, national statistic shows export expansions in value and commodities (UBoS, 2024b). The exports have recorded an expansion rate of less than 2% (2009) to 16.4% (2022) to reach US\$4.1 billion (UNDESA, 2023). Export commodities have included agricultural produce, fish and fish products, plastic products, petroleum products, electronics, soap, mineral water, cement, beer, iron and steel, gold and gold products and other commodities (UBoS, 2024c). More export has been reported including vehicles, textiles, machineries stones, and chemicals (Shinyekwa, 2021); multiple other products including tiles and services (UNDESA, 2023) and bricks (UBoS, 2020). The local enterprises have been involved in the exports with about 40% of export among regional markets being small-scale cross border trade (Rauschendorfer et al. 2022). Despite their operational weakness in export trade (Shinyekwa, 2021), including the below expectation integration in global trade (Rauschendorfer et al. 2022); their contribution in trade can't be ignored. Moreover, the cluster industry is oriented for local and regional market where the enterprises in Uganda have operated with some levels of success.

Uganda entrepreneurs have been observed to be competitive (Shinyekwa et al. 2021) and can seize the opportunity if the government ignite the process. Sserwanga and Rooks (2013), distinguished high potential entrepreneurs able to recognize and effectively exploit opportunities and with capability in planning and initiating innovation. Entrepreneurs were stipulated as being

able to strengthen their firms' competitive position within global value chains. Uganda micro-small and medium enterprises (MSME) were considered as being moderately healthy in entrepreneurial skills (57%), demonstrating highly positive attitudes (88%), a strong willingness to grow their businesses (79%), and perceptions of adequate human capital (78%) (MTIC, 2020). Area of urgent action and support including simplifying business registration, improving access to finance and technology, and strengthening market linkages were highlighted.

Although the performance of local entrepreneurs' point to capabilities to indulge in the ceramics tiles value chain operations under clusters, foreign global leaders in the value chain should also be invited. A review of ceramics factories in Africa including Kenya, Cameroon, Tanzania, Ghana, Zambia, Senegal, South Africa, Nigeria and Ivory Coast, and even in South America points to an identical brand and investment by a matching companies, which also operate in Asia ceramics clusters. For example, out of the eight tile manufacturers in Nigeria, six were 100% Chinese while the others two were Indian (Abiola, 2023). Beyond the financial returns expected from the oil industry in Uganda, its operational actualization from exploration, infrastructural developing (pipeline and refinery), exploitation and marketing has and is expected to expand partnerships and networks that are critical for attracting more foreign investors (Langer, 2020). New partnership including foreign investors need to be sought to induce capital; technology, skills and expertise in ceramics production and marketing; and catalyze more investment into the clusters. Critical to attraction of the investors to develop the ceramics and other cluster's associated industries, the government must ensure sufficiency in energy provision, transport network and improvement on governance indicator that will provide confidence and hence ease of business.

Power and thermal energy demand for ceramics tile production is high and its supply in quantity and timeliness need assurance. A synergetic relationship is expected between the refinery and the ceramic manufacturing. The refined petroleum products will provide fuel for tile kiln firing, while the ceramics plants will ensure the usage or market for refinery output. The synergy in oil and ceramic industry will assure efficiency driving full potential for oil wealth and desired economic transformation (Langer, 2020). Although the planned refinery daily capacity has been set at 60,000 barrel, the storage facility and the 211km pipeline from the refinery to the storage facility has been set, the disposition of refined products' markets is missing (Riak, 2025). Electricity provision and utilization remains a major challenge with an energy mix that shows only 29% reliance. It has therefore been considered as either being inadequate, inaccessible, unreliable and unaffordable (Wabukala et al. 2022). Despite what could be considered as an excess supply during peak load of 511 MW, the total installed capacity of 1269 MW is quite low for wider distribution and powering ceramics' plants. Even the country's proposed generation potential of 5300MW needs to be expanded for power assuring capacity for industrial, commercial and domestic usage considering the development aspirations and population expansion (NPA, 2020). Electrification spurs economic development through job creation, facilitating industrialization, facilitate value-addition and is critical in addressing both income and energy poverty therefore ensuring firms evolution and accelerating their growth.

Ceramics industry raw material mining, high energy use and demand for water is a recipe for land degradation, pollution and greenhouse gas emission. With the country commitment to green growth and significant contribution of biodiversity to economic growth particularly through tourism (NPA, 2017), undertakings within the ceramics and oil industry require assessment to ensure compliance to environmental regulations.

3.4.1 Case studies of ceramics clusters for Uganda industrial development

3.4.1.1 Morbi Cluster India

Morbi, a small industrial town in Gujarat, India provides insights for the ceramic industry for Uganda's clusters evolution and acceleration. Morbi is the second largest tiles manufacturing cluster in the world after Foshan Ceramic City, Guangdong in China. Both Foshan and Morbi Clusters are recognized for quantity production with the Italian, Sassuolo Cluster being globally popular in quality, and characterized by innovations and flexible, small to medium sized

enterprises. Morbi has significantly contributed to Indian ranking as the second in ceramics at 8% of the world production, with the cluster accounting for 90% of India's ceramic tile total outputs. Tile market share among ceramic products is 78%. The town is well connected to other cities through road and railway network and globally through two waterway ports (Karmakar and Bharti, 2023). By 2019, Morbi had above 700 ceramic units (Das, 2019) involved in manufacturing of wall, vetrified, floor and roofing tiles, and sanitary wares. Morbi is estimated to contribute about 13% of global ceramic tile export. Capital has largely been privately secured, and locally grown through profits. The cluster continues to attract new actors including large global leaders in the ceramics industry (Karmakar and Bharti, 2023).

Morbi ceramics tiles production was accidental after the collapse of the wall clock and clay roof tiles manufacturing by 1979, and a dam burst which flooded the town causing huge financial loss and outmigration. The initial town and associated industries were planned by the government. The start of the ceramic tiles was associated to entrepreneurs who imported discarded machinery from Italian and Spanish Clusters in the mid-1980s (Das, 2019). Enablers for evolution of the ceramic tiles cluster includes:- support to access investment and loan by state and central governments; availability of land; sufficiency in provision of electricity and natural gas; availability of both skilled and unskilled labour force; access to the required raw materials; provision of infrastructural facilities and connectivity through access to roads, railways and waterways for export; and continuous policy supports through subsidies, lower interest rates and tax incentives (Karmakar and Bharti, 2023).

The majority of business actor are small and medium enterprises (SME). The manufacturing sector is composed of informal segment dominated by unorganized players, and a well-organized formal sector which differs in size and complexity of their operations. The units are also classified by the type of product specialized in including wall, floor, and vitrified tile or sanitary ware, and their production capacity. The cluster's production of ceramics tile in 2020 was estimated at 2 billions m². Direct total employment in the cluster has been estimated at around 70,000 individuals with indirect employment across India approximated at about 600,000. The Morbi small and middle scale enterprise have been mutually supportive in sharing bulk orders through in-cluster subcontracting; small-batch production to cater to niche markets; and/or using workers from another factory (Das, 2019). Implying increased business upgrading through competition and cooperation with facilitative functions by the local industry association

Clays used is mostly sourced in the neighbourhood, and further away in Gujarat and Rajasthan a distance of about 122km and 700km respectively. Other raw materials include feldspar, silica, sand. Despite its critical importance, frequent electricity outages are reported. The thermal energy sourcing has evolved with time as influenced by access and prices, with natural gas, charcoal, lignite, coal and biomass (including saw dust and briquettes) being currently in use. In early 1990s when the cluster started, kerosene was the most adopted, later in mid-90s liquefied petroleum gas (LPG) was preferred. In 2000 coal was adopted, later natural gas become popular especially after it become readily available in Morbi.

Equipment used for manufacturing including kiln and polishing machines are imported from Sacmi, Italy and Modema, China. Information on the equipment is sourced through attendance of international ceramic fairs and contacting suppliers. One of the major prevailing challenge is the availability of skilled manpower with plant expansion shadowing training of manpower. Maintenance and repairing of equipment is by its suppliers with international companies having technical representatives in Morbi. The new technology providers have been slow in implementing their innovations to local workers. The ceramics production entails largely informal labour force with a technical officer able to work in 5 to 10 ceramic units. Energy use efficiency remain a major concern for Morbi, coupled with pollution (BEF, 2020).

3.4.2 Nigeria tile industry

Despite Nigeria leading the way for the sub-Saharan African in the number of ceramic tiles plants and levels of production, attributable to its high quality and significant raw material abundance and ability to attract investors (Chen, 2020), the country is only able to meet a meager

11% of its existing demand. The country's ceramic tiles import budget was about US\$600 million in 2015, with the country ranked as the 6th leading global importer (Abiola, 2023). In 2019, it imported 65million square meters of ceramic tiles. Its' daily production ranges between 42,000 and 45,000 m² despite having capacity for 100,000 to 150000 m². Nigeria's clay, kaolin, silica, quarts, feldspar allow for diversification of ceramics beyond floor, wall and porcelain tiles to white ceramics, vetrified bricks and coloured vases. The challenges of Nigeria ceramics industry are associated with lack of government support, insufficiency labour force with general and technical abilities, limitations of opportunities for entry; lack of awareness, ceramics education, technology and the engineering; lack of contemporary production facilities and technology; and poor infrastructure (water, roads and electricity) (Abiola, 2023). Despite its expanding demand attributable to increasing population, demand for housing and adoption of ceramics tiles use, ability for the country to meet its demand and participate in export trade is unfeasible without strategic interventions.

3.5 Uganda's role and its prospectus in ceramics tiles global production network

Figure 6 shows the global value chain across countries for existing glazed tile industry which could be upgraded after Uganda entry in tiles export production and trade. The key actors in this network are highlighted by various country's operational roles include the innovation leaders, lead tiles manufacturers or suppliers' actors, landing ports for Uganda's imports and destination points for re-export commodities passing through Uganda. Although Uganda is considered as a distribution points for the neighbouring countries, local consumptions of the tiles exists. The lead manufacturers or suppliers' actors for East Africa ceramics products were mostly in China, India, Italy and Spain.

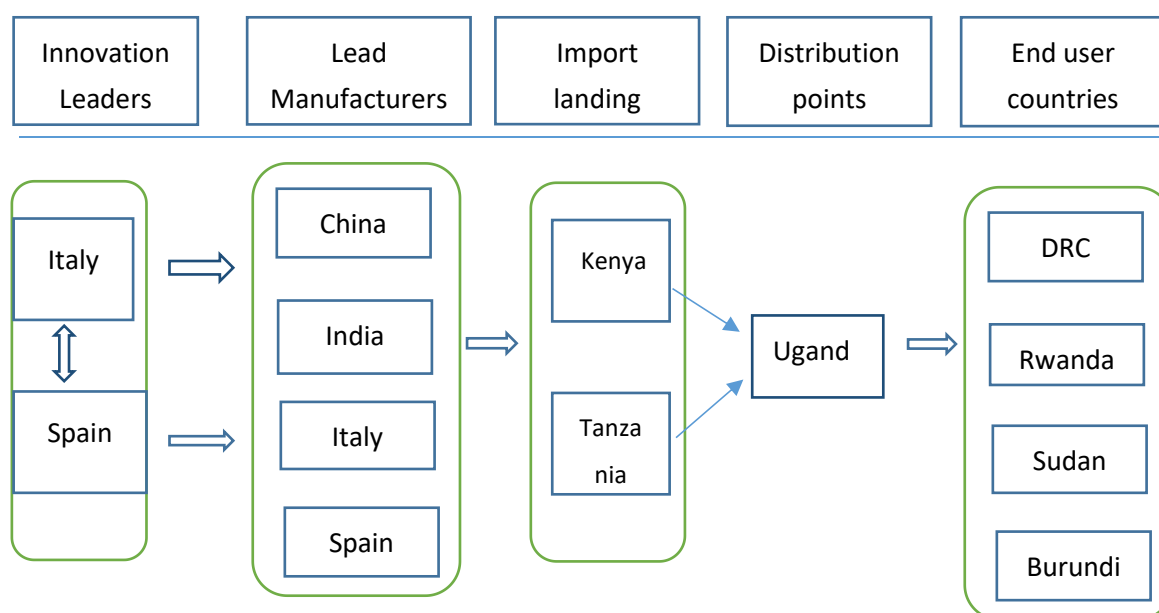


Figure 6. Global production networks (GPN) for tiles in Uganda.

Table 2 shows the characteristics of the global ceramic tiles industry, trade implications for prospecting country and the opportunities for Uganda entry into the industry. Unique features for the tile industry is its newness and its dynamism that enables any country willing to enter opportunities to do so without historical restrictions. The global market is yet to aligned quality, taste, preference and orientation to any particular product source. Tiles products are being processed and refined to differentiate them and hence create markets with specific features thereby developing customers' experience. In such a scenario, innovation from any location and successful products' design based on predicted customer preferences will carry the day. Globally the tiles industry is driven by two countries, Italy and Spain (Albors-Garrigos and Hervas-Oliver, 2019). The

two countries' ceramics technologies and clusters have driven tiles production in various leading regions including China, India, Brazil and USA. Any other country wishing to enter the production requires to import equipment technology (mostly from Italy) and chemical technology (mostly from Spain) or both from either. Tiles therefore produced by different manufacturers appear as a copyright of the existing lead innovators with variances in designs and customer services. Since global value chains are evolving, any country entering the industry and performs efficiently is a candidate of becoming a major actor in the chain.

Table 2. Global tiles industry, investment implications and opportunities for Uganda entry

Tile Industry characteristics	Implications for investment	Uganda's Opportunities
Globally industry new, and very dynamic	Late-comers not impeded significantly.	Entry for Uganda very opportune
Technology drivers	Locally competitive (rivalry) within clusters with:- a). Italy leading the capital good manufacturing b) Spain leading the glazing material production	Importation of technology and latest design easy with technical knowledge provided by competing technology innovators.
Enjoying strong growth in production, utilization and export	Global consumption rose by 5 % between 2011 and 2012. Africa's consumption rose by 18% in the same duration	No record of African front-runner in tile making. Uganda should seizure the opportunity
Industry depends on clay, kaolin, quartz and feldspar	Not all countries have these minerals	Presence of the mineral in pure state or mixture
Manufacturing sectors not evolved to brand name strategies	Tile bought once resulting to problem of information asymmetry Opportunity for growth providing marketing	No country or company with undue advantage
Strict Standard restrictions not important as in other industries.	Industry still evolving in terms of standard	Uganda could establish and grow with other countries
Powerful global value chain actors missing	No lead country or company in the industry	Uganda could establish and growth with other countries
Upgrading mostly at commercialization	Marketing efforts mostly required for market niche	Country in a region with expanding market
Upgrading opportunities through effective local governance	Fierce local rivalry Collective efficiency (cooperation) Effective collective action (cooperation)	Allows clustering Public-private institutions for developing sector

While glazed technology production and transfer spearheaded by Spain has made it easy for production entry, Uganda's rich deposits of the clay resources (kaolin, quartz, bentonite and feldspar) provide opportunity to effect efficiency and opportunity for other ceramics based products including tableware. Moreover, the wide distribution of the minerals across the country presents an opportunity for clustering in the sector development, thereby creating competitive local units which will ultimately enhance efficiency, governance and innovations.

4. Conclusion and Policy Implications

Uganda has an inherent opportunity for entry into tile production for export. Possibilities of Uganda upgrading to the production (supplier) tile global value chain is presented by its already strategic role of being involved in re-exporting of the ceramics products to the neighbouring countries. By being a re-export hub, the country's supplies will follow the established trade pathways in the tiles industry. The fact that by importation of tiles production technologies from the lead innovators (Italy and Spain) can propel any country to be a tile global supplier presents an ease route for industrial diversification for the country. However, the country tiles production capabilities will be influenced by among others the human resources capabilities, other essential resources to support the sector including availability of clay and affordable power, supportive policy environment and potential market. The country's ceramics and brick production history and status provides a pointer to how the industry should be implemented. Despite the availability of the resources, human resources capabilities and shifts in policy due to socio-political instability brought down the ceramics tableware industry. Commercial brick producers provide the best entry point for the tiles manufacturers, however electricity should be adopted for the necessary globally tradable volumes, efficiency and economic survival.

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