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1. Trends in Agriculture in Africa

The agriculture sector is one of the main drivers for Africa's economies. Emerging industry trends include reforms, protectionism, efforts toward value addition and the increasing use of technology (especially mobile technology) to support farmers.

REFORMING AGRICULTURE

Angola's Ministry of Trade, its Ministry of Economy and Planning and UNCTAD recently discussed reforms to boost economic diversification through FDI. The discussions focused on reforms that would diversify the FDI portfolio, and develop projects aligned to Angola's needs.

Despite ambitious Angolan government efforts to reform its business and investment environment, the discussions identified specific issues. Current shortcomings include the "complex system for FDI entry and establishment, burdensome operational regulations, the persistence of restrictive business practices and a lack of institutional capacity and coordination."

Discussants identified measures to improve the performance of investments in agribusiness, and to increase the contribution to sustainable development. They requested "concrete measures to develop responsible investment and promote inclusive agriculture production." They also perceived needs to "strike a policy balance between food security and export development objectives, improve access to land and infrastructure, and promote entrepreneurship and skills development."¹

PROTECTIONISM IN AGRICULTURE

Some African governments recently implemented new protectionist measures to safeguard their local industries and preserve foreign exchange reserves. In August 2019, Nigeria's President Muhammadu Buhari instructed its Central Bank to stop providing foreign exchange for food imports. This directive seeks to stimulate agricultural output, reduce the country's dependence on oil exports, and conserve Nigeria's limited US dollar foreign exchange reserves. CBN policies currently deny access to foreign currency for several imported products.

This approach leads to the unintended consequences of pushing up commodity prices and increasing inflation. It will also increase the cost of imported food. Nigeria has spent ~US\$19.24 billion over the last six years on importing food. As importers of food products must obtain forex, demand in the parallel market for US dollars will lead to a weaker exchange rate for the naira. This will drive food prices up, which is likely to create social instability.²

In Botswana, protectionism emerged in a different form. Vegetable producers from the country called for a permanent ban on imports of tomatoes, potatoes, cabbages, carrots, beetroot and green peppers from South Africa and other vegetable exporting countries. Their argument was that local farmers could meet the national demand for these vegetables. To ensure a continuous supply, the farmers were in the process of developing contingency plans for the various crops. The farmers strongly believed that with the country's small population, sufficient supply of suitable land, and enough farmers, it would not be difficult to meet local demand for vegetables even if imports were permanently banned. As Botswana is a member of the Southern African Development Community (SADC), a permanent ban will be a violation of its agreements with the SADC.³

In Ghana, most rice consumed locally is imported from abroad. Such imports form 82% of all imports into the country and cost more than US\$1 billion. Ghana's Minister of Agriculture announced that importers of rice and poultry products will have to cease their trade in three years. The Government should complete building up local capacity to meet local demand within this period. Thereafter, merchants will have to trade with local farmers. Farmers will receive support to increase their productivity.⁴

The Rwandan government limited exports of unprocessed milk, following escalating conflicts over milk standards among producers and processors. Prior to the ban, Rwanda exported between 30-35,000 litres of raw milk daily to DRC, creating a serious shortage for Rwandan milk processors. Farmers with high rejection rates tended to export to the DRC. The directive bars farmers and informal milk dealers

from selling across borders. All milk for export must be from recognised dairies. Milk dealers and transporters are instructed to form co-operatives to boost milk collection and transportation. Milk transporters must also have a certificate of origin issued by a milk collection centre. Farmers get higher prices from buyers in the DRC, which exacerbates the problem.⁵

FOCUS ON AGRICULTURE AS DRIVER OF PROSPERITY

A leading economist observed that despite recent oil discoveries, agriculture remains the real game changer in the Ugandan economy. However, the sector does not receive sufficient attention and support. In Uganda's 2019/2020 budget, allocations to agriculture were lower than for health, infrastructure or other service sectors. These allocations are well below the 10% budget share for agriculture agreed upon by African governments during the Maputo Declaration, and insufficient to achieve stated objectives.

The economist compared the agricultural output and exports of Uganda with that of Israel. Israel currently exports ~US\$2.5 billion worth of agriculture produce per year while Uganda, with 30 times the arable land, exports only US\$840 million of agriculture produce annually.⁶

In 2003, African leaders at the Maputo Declaration committed to invest at least 10% of their annual budgets in agriculture. Very few countries in Africa have implemented that commitment. Ethiopia, which did meet this commitment, is experiencing rapid transformation in its agriculture sector.

The Nigerian agricultural sector needs investment of at least 10% of national budget, backed by a vibrant rural infrastructural network, to accelerate its transformation, according to Dr. Nteranya Sanginga, Director General of the International Institute of Tropical Agriculture (IITA). Unfortunately, the trend is reversed; Oyo state's investment in agriculture fell from ~7% in 1995 to ~2% by 2017.

Regarding rural infrastructure, Dr Sanginga observed that the government must improve rural roads to facilitate transportation of agricultural products to the markets. Government must also involve youth in agriculture, as inclusivity was imperative for sustainability in the agricultural development agenda of the state.

According to the governor of Oyo state, the four pillars for development in Oyo state are education, rural infrastructure, economic development, and security. Agriculture had to be transformed to attain economic development, as most of the state's people depend on agriculture for their livelihoods.⁷

USING TECHNOLOGY TO IMPROVE AGRI PRODUCTIVITY

Africa innovates in mobile phone applications for its industries, including agriculture. FarmSmart is a mobile application launched in Kenya at the end of October 2019. The app shares sustainable and climate-smart farming knowledge among Kenyan farmers. Based on location, soil type, season and access to irrigation, it provides farmers with tailored recommendations, such as what to plant.

FarmSmart takes the farmer through all stages of the growing process, including identifying pests and diseases, making organic pesticides, and on to post-harvest tips. It also includes links to chat groups, where farmers can communicate, share information and sell their produce. According to FarmSmart's founder, Alia Malik, the application seeks to empower anyone to be an agri-entrepreneur.⁸

Farmers in Zimbabwe use their mobile phones as an agricultural instrument. They use their mobile phones to buy inputs, sell their produce and maintain insurance policies. EcoFarmer, a mobile platform developed by Econet Wireless, provides innovative micro insurance that enables farmers to insure their inputs and crops against drought or excessive rain. They access these services on their mobile phones via SMS and voice-based messages. The services include weather information, suggestions on when to use fertiliser and how to protect their crops against pests. The digital services provide farmers with smart solutions that raise smallholder farmers' productivity, profits and resilience to climate change. A recent study reports that the untapped digital agriculture market in Africa could be worth as much as US\$2.6 billion. Approximately 400 different digital agriculture solutions serve 33 million registered farmers across sub-Saharan Africa.

Digitalisation in the agri sector is seen as a potential "game-changer in modernising and transforming Africa's agriculture, attracting young people to farming and allowing farmers to optimise production while

also making them more resilient to climate change.” Using these applications enabled farmers to increase their yields between 23% and 73%, and their incomes by up to 37%.⁹

Farmers in Uganda’s agriculture sector increasingly turn to technology to transform the agricultural value chain. According to Equity Bank, technological development has increased the velocity of the flow of goods and services among farmers and processors. Many farmers now communicate with the bank via SMS. Over 70,000 farmers in Kakira region have had their loans processed by Equity Bank and are digital. The bank itself is attempting to de-cash rural farming communities. In some sub-sectors, such as the dairy sector, 70% of the business is done by intermediaries, who need to be educated about the digital trail, liquidity management and the purpose of financial inclusion.¹⁰

Another recent development of a mobile application in the agriculture sector, is Musika. Musika is an agri-tech start up leveraging mobile technology, founded in 2017. It currently offers two services. Musika Solutions is an app-based agriculture marketplace that farmers can use to buy inputs at discount from Musika’s partners. Musika Express is a commodities and agri-alerts platform that aggregates and shares agricultural data. It provides users with daily price updates from the markets, disease alerts and weather updates, via WhatsApp. Farmers can also carry out trend analysis by commodity for up to five years. Musika currently reaches 10,000 farmers.

The revenue models of the two services are simple. Musika Solutions is a subscription and commission-based platform where suppliers list their products for a monthly fee. Musika then receives a referral fee for each product sold on its platform. Musika Express is an ad and subscription-based platform. While currently free to farmers, eventually they will pay a monthly subscription fee. Suppliers pay to place ad campaigns on the site.¹¹

Farmers face a number of challenges, such as not knowing how to use chemical products (fertilisers, insecticides, etc.), and such products are expensive. In Cote d’Ivoire, many farmers reportedly used expensive chemical fertilisers and insecticides without knowing the correct dosage. Three students at the University of Daloa, in Cote d’Ivoire, recently launched an app that teaches farmers how to transform organic waste into natural fertiliser and insecticides. Their “BioSave” app promises to help farmers become more independent, and 150 farmers participated in a first trial of BioSave in August.

As only 80 of the 150 farmers in the trial had a smartphone, the student organisers developed a voice-operated server that works with simple mobile feature phones. The instructions are transmitted as images and voice notes, enabling use by the largest possible number of people.¹²

POINTS OF INTEREST

- The agriculture sector is in need of not only diversification, but also of value addition. In some countries, exports of unprocessed food are prohibited. It makes economic sense — value added products not only generate higher revenues, but also create more meaningful employment opportunities. This policy also deters the subsequent re-importation of the value added product, saving foreign exchange in the process.
- There are a number of foreign investors who are keen to invest in Africa’s agriculture sector, and willing to investigate investment opportunities up and down the value chain. These investors require a stable investment climate, as well as a stable political environment. Many African governments have therefore gone out of their way to implement reforms to improve their rankings on the Ease of Doing Business rankings of the World Bank. It has been shown that improvements on this ranking increase investments from abroad. Africa needs this FDI to improve the productivity and scale of its agricultural activities.
- The protectionism in agriculture noted above falls outside the use of the typical tools of tariffs and subsidies. They do, however, have the same effect. It is not sure that Nigeria’s ban list has been effective. Also, banning the import of products from South Africa can lead to unintended consequences for Botswana, should South Africa retaliate. As stated, it is also against the provisions of the SADC. What governments should rather do is to support the local production of agriculture products, and call upon the local buyers to rather support local farmers. Dr Arkebe Oqubay from Ethiopia gained prominence due to his innovative policy recommendations to

industrialise agriculture. Most of Africa, however, is simply importing massive amounts of food because it is not producing enough in a cost efficient manner.

- Most governments in Africa have yet to meet the conditions of the Maputo Declaration, which requires them to invest 10% of their national budgets in agriculture. That is why agriculture is struggling with productivity, why the average farmer is poor and on average, 60 - 63 years old, and why the youth are leaving the sector. Given the prominence of the agriculture sector as an employment creator and GDP generator, governments should rethink their approach to the Maputo Declaration.
- As has frequently been seen, mobile technology is playing a continued role in supporting farmers to get access to cheaper inputs, funding, and markets. They mostly offer similar functionality, which includes, but is not restricted to, advice on what to plant, advice on pesticides, investment funding, information on the weather, information on market trends and where the best markets are, etc. This technology is playing a major role to help farmers. The stream of these mobile applications appears to be never-ending.

2. Geothermal Trends in Africa

Geothermal sources play a significant role in the provision of energy to East African countries such as Kenya. New sources in these countries are being discovered, while new countries are trying to develop their sources of geothermal energy to address their electricity shortfalls.

CREATING ADDITIONAL CAPACITY IN KENYA

Kenya's installed power generation capacity is 2,712 MW. Kenya will begin construction of the first of three geothermal power plants at the Menengai site in western Kenya in December 2019. The project was allocated to Sosian Energy, Orpower Twenty Two and Quantum Power East Africa. Each of these IPPs will design, build and operate a 35 MW geothermal power plant, which will collectively supply 105 MW to Kenya's national electricity grid.

Of these companies, only Sosian Energy completed the selection of a company to execute the engineering, procurement and construction (EPC) contract for its Menengai III geothermal power plant. Sosian selected Kaishan Renewable Energy Development from China. The plant cost is estimated at US\$65 million. State-owned Kenya Power (KPLC) will purchase the generated electricity under a Power Purchase Agreement (PPA).¹³

Kenya Electricity Generating company (KenGen) added 79 MW in July 2019 to the national grid from a new geothermal plant. The Olkaria V plant in Kenya's Rift Valley underlines Kenya's reliance on geothermal power. The remaining 158 MW from the plant was connected at the end of August. KenGen's total installed capacity from geothermal sources will now be 612 MW. It plans to add an additional 1,745 MW electricity from geothermal sources by 2025.¹⁴

Kenyan state-owned Geothermal Development Company (GDC) recently completed the first drilling on the Baringo-Silali geothermal project site. The project will drill a total of six geothermal wells, and is designed to produce 300 MW. The Geothermal Risk Mitigation Facility (GRMF) partly funds the project. GRMF will provide 40% of the drilling costs for two of the project's wells.

Implementation of the Baringo-Silali geothermal project, with an installed capacity of over 700 MW, will strengthen Kenya's position as Africa's leading geothermal energy producer. The Japan International Cooperation Agency (JICA) partly funded the ~US\$450 million project.¹⁵

DEVELOPMENTS IN OTHER REGIONS

KenGen recently signed a deal worth ~US\$52 million to drill 12 geothermal wells in Ethiopia and boost its energy supply. KenGen will also provide a water supply system and equipment. The World Bank will finance the project. Ethiopia has an estimated geothermal power potential of more than 10,000 MW, similar to Kenya's power potential. KenGen is the foremost geothermal energy provider in Africa, and the ninth largest globally. It currently has a market share of about 80% of the electricity consumed in Kenya.¹⁶

In another Ethiopian development, Reykjavik Geothermal and its consortium partners recently (September 2019) started drilling for the Corbetti and Tulu Moya geothermal projects. The two projects will collectively produce 1,000 MW at an investment of US\$4.4 billion. Reykjavik Geothermal's consortium partners are Africa Renewable Energy Fund, Iceland Drilling and Meridiam SAS.

The projects will be carried out in several phases with capacities ranging from 50 to 65 MW. The first phase of the Tulu Moya geothermal project will produce 50 MW and will require an investment of US\$260 million.¹⁷

In Tanzania, the government will invest US\$8.7 million in the geothermal project in Ngozi. The 600 MW project is located in the Beya region in the west of the country and is led by the Tanzania Geothermal Development Company (TGDC). The total cost of the project is US\$821 million. Other development partners include the Tanzania Electric Supply Company (Tanesco).¹⁸

GEOHERMAL ENERGY POTENTIAL IN NON-TRADITIONAL AREAS

Toshiba has pledged to support the government of Malawi in the development of geothermal energy. The Japanese company's pledge entails strengthening "the development of the energy sector in Malawi by building the capacity of the country's human resource in the sector."¹⁹

Kalahari GeoEnergy, a Zambian company, is exploring to find geothermal energy in the Kafue area of central Zambia. So far, the company has drilled eight geothermal wells in the area west of Lusaka, Zambia's capital. Drilling results to date provide strong indications that the drilling area *has the characteristics of a viable geothermal resource for electricity generation*.

There are six areas that demonstrate the potential to provide steam for power generation. Once the potential is confirmed, Kalahari GeoEnergy will launch a full technical and commercial feasibility study by the end of 2019. Zambia will then join African producers of electricity from geothermal sources. These are located mainly in the East African Great Rift (e.g. Kenya, Ethiopia, Uganda, Tanzania).²⁰

Zimbabwe's economy has faced power challenges and shortfalls for several years. Its supply of electricity is unreliable and at times, even non-existent. The country currently relies on imported power from South Africa and the Hydro Cahora-Bassa scheme in Mozambique. Some stakeholders in Zimbabwe seek active consideration of the potential for geothermal generated power.

Zimbabwe's positioning on the Great Rift Valley of Africa is ideal for geothermal exploration, as most geothermal developments occur in tectonically active areas. The valley is known to contain over 30 active volcanoes and countless hot springs. Despite optimistic estimates of its potential generating capacity, little is known about its true potential, as there are no in-depth studies regarding geothermal energy in the country. The thermal hot springs situated in Binga and Manicaland could be promising sites for exploration and feasibility studies. The heat generated from hot springs can often be used to generate electricity through geothermal power plants.²¹

POINTS OF INTEREST

- Geothermal energy continues to play a dominant role in Kenya's energy mix. It far outstrips the provision of energy via fossil fuel. However, the country is also increasing the capacity of other renewable energy sources, predominantly solar and wind.
- It is interesting to see the number of foreign companies playing a role in the provision of the technology behind geothermal energy. In addition to China (the by-now expected source of funding and technology), we see companies from Japan and Iceland. These countries are experienced in the provision of geothermal energy.
- New countries hoping to tap into geothermal energy sources include Malawi, Zimbabwe and Zambia. These are not the traditional countries one would equate with geothermal sources. However, they are all in search of cheaper and cleaner sources of electricity than coal. They are also struggling to obtain sufficient levels of electricity to provide in the needs of their industries and the local population. Their hope is that they are sufficiently close to the Great Rift Valley of Africa to benefit from the geothermal potential associated with this location.

3. Trends in Mining in Africa

Discoveries of mineral reserves continue to emerge across the African continent. These discoveries include gold, oil and gas. They drive shifting “power balances” — Ghana has taken over from South Africa as the major player for gold. However, even this new pecking order may change with discoveries of new reserves in other countries on the continent.

REGULATORY REFORMS

Tanzania's President John Magufuli is reforming the Tanzanian mining sector to optimise mineral trading. One of his reforms deals with the establishment of mineral trading hubs, which the government will control.

The hubs will provide greater transparency to the country's mining sector and help curb mineral smuggling. They will “provide a means of formalising the currently flawed trading system, giving small-scale miners access to a government-regulated market where they can directly and legally trade gold without the necessity of traveling to major cities.” The hubs will also allow the government to better regulate the industry and improve the collection of taxes from all industry stakeholders.

The hubs were necessitated by challenges such as smuggling, illicit mining activities, environmentally damaging mining practices, and tax avoidance. The envisaged greater transparency of the hubs will hopefully resolve these challenges over time.²²

In Zambia, the Minister of Mines recently announced Zambia intends compelling mining companies to procure from local suppliers for a fair share of their logistical and other needs. Up till now, government has been pushing mining firms to invest more locally. Foreign mining companies operating in Zambia include Vedanta, First Quantum Minerals, Barrick Gold Corp and Glencore.

The mining sector imported goods and services worth over US\$4 billion annually, but only 10% was procured from local suppliers. Zambia's main source of comparative advantage is in mining, which has the potential to stimulate growth in the whole economy.²³

BOOSTING THE GOLD SECTOR

In Nigeria, illegal mining activities, unhindered encroachment by Artisanal and Small scale Miners (ASM), and ineffective policy implementation in the minerals sector slows the pace of development, and has a negative impact on State revenue. According to experts, alignment of regulations, implementation of stability measures, and reforming tax and licensing regulations would boost the sector. Dr. Abdulkadir Muazu, Permanent Secretary (PS), Ministry of Mines and Steel Development, stated that with good policies and regulations, Nigeria could broaden its revenue base.

As it is, Nigeria has abandoned 20 older mines since the Second World War, leaving gold mining as a marginal activity. The PS stated that private sector collaboration would address this challenge and convert small miners into viable enterprises. Environmental protection would also gain attention.

According to the Dauda Yakuba, Director of Operations for the Standards Organisation of Nigeria (SON), the critical sector of the gold value chain is the refinery. The regulatory body has adopted, trained and certified companies operating refineries to comply with international standards.²⁴

NEW GOLD DEPOSITS

Mozambique offers rich mineral reserves: rubies, oil, gas and a multitude of other mineral resources. Recently it discovered large gold reserves in the Cabo Delgado Province, one of the largest in Africa and perhaps the world. According to Azghar Faqhr, MD of Mwiriti, a gemstone company active in Mozambique, indications are that these new gold reserves are about six times as large as those in South Africa. The find promises gold of almost 100% purity.²⁵

RUSSIA EXPANDING ITS FOOTPRINT IN AFRICA'S MINING SECTOR

Russian diamond company Alrosa recently signed a deal to explore and mine diamonds in Zimbabwe, making an initial investment of US\$12 million. They will invest more in future years depending on the outcome of the exploration. Zimbabwe's government embraced the deal as it intends to leverage the country's mineral resources to boost its economy. Despite having large diamond reserves, Zimbabwe's uncertain and volatile policy environment has turned diamond mining into a precarious affair for foreign investors.

In 2016, Zimbabwe's government dismissed six mining operators, accusing them of shady deals. Former President Robert Mugabe stated that ~US\$15 billion was illegally expatriated from the sector. The government then took over diamond mining operations, but decided in 2018 to allow new investors, but only if they partnered with the state. It also scrapped its controversial indigenisation policy that forced all foreign investors to cede 51% shareholding in all investments, with the exception of the platinum and diamond sectors, where investors are obliged to partner with government.

Zimbabwe's Minister of Mines and Mining Development, Winston Chitando, stated that Zimbabwe's vision is to produce 10 million carats annually and to earn US\$1 billion annually from diamonds.

Russian investors committed to invest US\$3 billion for platinum production in Zimbabwe under a joint venture with the government.²⁶

RARE EARTHS DEPOSITS GAINING GLOBAL SIGNIFICANCE

South Africa is home to some of the world's highest-grade deposits of rare earth metals. China produces the largest share of so-called "tech minerals", with a domestic output of 120,000 tons in 2018. China recently became a net importer of specific rare earths to meet its industrial needs. Some experts predict that China, to meet its own requirements, may export less of its tech minerals. South Africa's reserves could subsequently become an important source of these mineral resources.

The United States relies on China for about 80% of its rare-earth imports. Due to the trade war between China and the USA, China threatened to cut off the supply. This motivated the USA to find other sources for its rare earth requirements. Currently no rare earths mines operate in South Africa. The sector is largely undeveloped.

The Steenkampskraal mine is located about 350 kilometres north of Cape Town. Steenkampskraal is home to the world's highest grade Rare Earth deposit. It contains about 605,000 tons at an average grade of 14.4% Total Rare Earth Oxide. Steenkampskraal hopes to increase resource recovery within and beyond its current mining rights area. Once funding of US\$50 million is secured, the operator plans an initial production of 2,700 tons annually, with further plans to expand. The mine will compete with the USA, Australia, India, Russia and Vietnam.²⁷

COAL LOSING FAVOUR

Two trends drive the continuing decline of South Africa's coal mining industry. Coal users are preparing to reduce their reliance on coal, while the pace of global divestment from fossil fuels is increasing. Experts report that new energy technologies will replace coal-fired power sooner rather than later. In South Africa, Eskom and Sasol use 67% of the 250 million tons of coal produced today. Both will reportedly curb their use of coal.

India, Pakistan and South Korea, which collectively purchase more than half of South Africa's coal exports, are either moving away from coal or have limited growth potential. Shrinking global demand will also increase competition from coal exporters such as Indonesia, Australia and Russia. South African thermal coal exports reached R73 billion in 2018. Declining demand will hit the sector hard.

Various factors damage Coal's image, motivating a number of the world's biggest miners to divest their coal interests. These factors include the growing lack of competitiveness of coal-fired power, increased awareness of its social and environmental costs, and global pressure by climate change activism. This has also led many global banks, including three commercial banks in South Africa, to stop financing new coal projects. The latest bank to take this decision is the African Development Bank.

Renewable energy sources, especially wind and solar, are emerging in many countries. Experts report that renewable energy technologies will be cheaper sources of new energy generation than coal or gas-fired plants by 2030. According to the International Energy Agency (IEA), investment in renewables will amount to US\$322 billion a year through to 2025, compared to the US\$116 billion it expects will be invested in fossil fuel plants.²⁸

NIGERIA TARGETING THE OIL MAJORS

Nigeria seeks to recover US\$62 billion from international oil companies, based on a 2018 Supreme Court ruling. According to the government, the ruling enables it to increase its share of income from production-sharing contracts. This is parallel to efforts by President Buhari to boost revenue after a drop in the production and price of oil.

This is not the first time Nigeria has targeted foreign companies. In the recent past it fined mobile operator MTN almost US\$1 billion for failing to disconnect undocumented SIM-card users, and sued firms, including JPMorgan Chase & Co., in a corruption scandal.

In the case against the oil majors, the government asserted that the energy companies failed to comply with a 1993 contract law requirement that the state receive a greater share of revenue when the oil price exceeds US\$20 per barrel. This law required that its provisions be reviewed after 15 years, and subsequently every five years. The Nigerian government expressed its willingness to negotiate with the companies.

The oil companies will challenge the government's claims in the Federal High Court. Their argument is that the Supreme Court ruling does not allow the government to collect arrears. They also argue that companies that were not party to the 2018 case should not be subject to the ruling.²⁹

POINTS OF INTEREST

- The Zambian and Tanzanian governments have clearly decided to take an interventionist approach in their mining sectors. Given the prominence of the sector in both economies, their approach is understandable. It seems that allowing the private sector to self-regulate has not worked up till now. Developing an inclusive economy that benefits the whole population is important enough for the governments to intervene. One area that is a no-brainer is that of compelling local procurement. This will create more jobs and stimulate local economic development. Putting in place regional mechanisms to ease the regulation and trading of minerals is another intervention that will develop benefits. However, in order to facilitate activities in the mining value chain, the governments need to ensure that corruption and red-tape is not allowed to prosper. Governments should also understand that they need to implement just enough control to ensure that objectives are met. Governments do not have the skills set to run businesses and should refrain from trying to do so.
- Mozambique has been the scene of exciting mining developments. In addition to the discovery of very lucrative gas deposits, it now has discovered gold deposits that apparently puts that of South Africa to shame. It is not clear whether the Mozambican deposits are larger than those of Ghana, which is currently Africa's largest gold producer. What is important for Mozambique, is that it has put in place very clear policies to prevent becoming a victim of the resource curse. It must endeavour to maximise value addition to all the resources before exports take place. This will create much needed jobs in a population that is quite poor. Also, revenue from the mineral sector should be used to diversify the rest of the sectors in the economy to reduce dependence on the mineral sector.
- Mozambique also has a challenge in that both the gas and gold deposits are in the north-east of the country, in the Cabo Delgado Province, which is an area surrounded by dense forests with an impoverished population in isolated villages. There are now growing concerns over the spreading influence and activities of Islamist militants in this region. Whereas the insurgents initially only attacked villages since 2017, they now have started to also attack security forces in the region. This situation requires a two-fold response from the government, i.e. contain the insurgents and address the poverty conditions in the region.

- That coal is losing its favour is not new. The challenges of clean air, global warming and climate change have led to global financial institutions putting an end to the financing of coal-fired energy plants and coal mining activities. In the move from coal-fired generation, one would expect that liquefied natural gas (LNG) would become more prominent in many countries in the next decade, where after renewable energy sources will take over. The speed of the transition will be affected by the rate at which renewable energy technology is developing, as well as the rate at which the costs are reduced.
- African governments should be cautious that their actions against multinational corporations are not seen as a strategy to hold them to ransom, or if you want, as a form of extortion. In Nigeria the reality is that the price of oil has long gone beyond US\$20 per barrel. However, with oil prices beyond US\$100 a barrel, money was not an object. Now that prices are falling again, budgets are under pressure to find revenue sources. The timing just looks off. Nigeria is not the only country, one might add. Chad, a country with a current GDP of US\$11 billion (US\$10 billion in 2016), in 2016 fined Exxon the massive amount of US\$75 billion, more than 7 times its GDP. Tanzania, with a current GDP of US\$57 billion (US\$53 billion in 2017), fined Acacia Mining the amount of US\$190 billion. This amount was later reduced to US\$300 million, which raises questions about the legitimacy of the original fine.

4. Trends in Sustainability in Africa

Africa appears to be increasing its operational capability to respond to sustainability issues. Several African governments banned the use of single-use plastic bags. Other entities convert plastic waste into bricks to build schools (Cote d'Ivoire), and use it as an ingredient to build better, cheaper and longer-lasting roads (South Africa). We also see the use of bamboo to produce "organic" products.

BIOGAS FROM MANURE AND EXCREMENT

In Kenya, farmers use cow manure to develop organic fertilizer to use on fruit and vegetable crops. This compost is a by-product of a biogas production process.

The biogas is produced by using biodigesters, which are tanks made of masonry or plastics that act like mechanical stomachs. The resulting biogas is a clean, renewable energy source. Biogas can power cooking stoves, farm equipment, phone chargers and shower heaters.

Such activity will contribute towards controlling global temperatures while improving agricultural yields. Biogas is for all practical purposes carbon neutral. Its use helps reduce dangerous emissions and deforestation by replacing the firewood and charcoal traditionally burned in kitchens in Africa. The demand for wood decimated the forests of Kenya and degraded its soils. Approximately 15,000 people die annually from indoor air pollution. Biogas therefore addresses a need in situations where the status quo is dangerous.

Other East African countries involved in biogas production include Ethiopia, Uganda, Tanzania and Rwanda. With about 2 million farmers with cattle, the supply of "raw material" in Kenya is not a major problem.

Other biogas sources include human excrement, food scraps and slaughterhouse waste (which is mulched), and even flower offcuts. Local and foreign companies, e.g. SimGas (Netherlands), Sistema (Mexico), and HomeBiogas (Israel), are distributing new technologies in East Africa, enabling diversification from cow manure.³⁰

BIOGAS FROM WASTEWATER TREATMENT PLANTS

In the Ethiopian capital Addis Ababa, four entities recently signed an agreement to implement a system for the production of bio methane from wastewater treatment plants. Gaia, 4 R Energy, Lem-Ethiopia and Addis Ababa Water and Sewerage Authority will cooperate in a PPP to recover sludge from wastewater for conversion to biomethane for use by households in Ethiopia. The prognosis for success of the endeavour is bright — Ethiopia has a huge demand for affordable renewable energy.³¹

BIOGAS FROM MANGO WASTE

In Burkina Faso, a student researcher at Joseph Kizerbo University developed a technique to produce biogas from mango waste. The process uses anaerobic digestion of mango waste, especially peels. This mechanism facilitates production of micro-organisms that will help transform organic waste into biogas. The cycle takes an average of 20 days to produce biogas.

Raw material is not a problem, as Burkina Faso produces 300,000 tons of mangoes annually. Mango processing entities will now have access to the biogas they need to run their facilities. They no longer must buy butane gas. As with biogas production in Kenya, this process also contributes to the reduction of greenhouse gases.³²

BIOGAS IN MOROCCO

The city of Fez in Morocco will launch a biogas and biomass platform, currently under construction, in 2020. The facility will house laboratories equipped with pilot studies and demonstrators that will use new and adapted technologies to produce biogas. Biomass will mainly come from household waste. In Morocco, the potential of biomass is significant: 75% of household waste in cities and 85% of waste in

rural areas is organic matter. This raw material will facilitate the production of biogas through anaerobic digestion.

Implementation of similar projects in the country could generate nearly 10,000 jobs, and could lead to a reduction of nearly 8 million tons of CO₂.³³

ELIMINATING USED ENGINE OIL

In Kenya, Bamburi Cement, a cement manufacturer, wants to step up its efforts to eliminate used motor oil. To do this, it will rely on its subsidiary, Geocycle, which aims to increase its engine oil disposal capacity by 3 million litres per year. Used engine oil is a major source of environmental damage in Kenya. Geocycle hopes this initiative will help to eliminate all waste oils on the market.

Geocycle will rely on local stakeholders to collect the more than 30 million litres of used motor oil produced each year. Currently, Geocycle is already working with Total, which has 191 service stations throughout Kenya. Other collaboration partners include Vivo Energy Kenya, a subsidiary of Shell, the pan-African oil company Ola Energy, and Galana, Kenol Kobil and the National Oil Company. Geocycle intends to expand its collection of used engine oils to car manufacturers, dealers, major carriers, fleet owners and car garages.

The collected used engine oils will be transported to Bamburi Cement's plants, where Geocycle's "co-processing" process will be used to eliminate the used engine oils. The used engine oil will be used instead of oil and gas. The process reduces pollution and landfill space, thus contributing to reducing the ecological footprint of energy-intensive cement plants.³⁴

REFORESTATION IN AFRICA

The Ugandan government, through the water and environment sector, has started a mass bamboo planting exercise to address its depleting forest cover. The country's forest cover sank from 24% in the 1990s to 12.4% in 2015, one of the highest rates of deforestation in the world. Its current average annual loss of natural forest is 2% per annum, one of the highest in the world.

The greatest threat to Uganda's forests stem from the charcoal burning community. To save the remaining trees, the Ministry for Water and Environment will license charcoal burning communities and help them grow giant bamboo trees for use in their businesses. The same giant trees can also be used for timber, paper processing and making clothes, as is the case in China.

By April 2020, Uganda will have planted 500 million trees.³⁵

EXPANDING PLASTIC WASTE COLLECTION

In Cote d'Ivoire, Nestlé is collaborating with the Triechville City Council (a municipality within Abidjan) to implement a six-month plastic waste collection and recycling programme. Waste will be collected and sorted before being recycled. The intention is to eventually extend this programme throughout Cote d'Ivoire.

The target is to collect and recycle 12 tons of plastic waste over the next six months. This will make it possible to clean up the plastic waste of the two largest markets in the municipality.

During the implementation phase of the project, collection and sorting systems will be set up to facilitate waste collection. These will be collected from shopkeepers, merchants, consumers and wholesalers. Some 15 collectors have already been trained to achieve this. This project is viewed as timely as plastic bags are blocking the flow of water during the rain season, causing problems to the sanitation system.³⁶

POINTS OF INTEREST

- Africa is increasingly becoming innovative in dealing with challenges such as waste and energy. The case studies above deal with raw material such as manure, wastewater and fruit waste, as an input for the process of generating electricity. It has the added benefit, in some cases, of producing compost. As Africa's population is set to grow to 2.4 billion by 2050, the urban

population set to increase to 50% in the next 20 - 30 years, and the size of the consumer class growing fast, there are at least two factors that can be counted upon: household and industrial waste will increase (including wastewater), and the need for energy will grow. As it is, the number of Africans currently without access to electricity is at 620 million.

- We can therefore expect increasing attempts to deal with these challenges, not just because it is the right thing to do, but because everything possible needs to be done to deal with waste and energy problems. Waste will be recycled and put to good use. “Sustainable cities” will become increasingly visible until they become the new normal. Technologies to deal with these issues will also become more visible and more efficient (cost and otherwise).
- Governments are under severe pressure to provide electricity to their populations. The African Development Bank has adopted its High 5 Priorities, with the first one being “Lighting up Africa.” The African Union’s Agenda 2063 also touches upon the need to provide electricity to the people of Africa, with goals such as a high standard of living, quality of life and well-being for all citizens, healthy and well-nourished citizens, and environmentally sustainable and climate resilient economies and communities. The UN’s 17 SGDs also touch upon this priority.
- It is noticeable that an increasing number of African countries are adopting policies and mechanisms to address the issue of plastic waste. This issue has been addressed in previous African Digests, but the trends continues.
- Bamboo is an interesting plant. In addition to help with reforestation as it grows very quickly, it is a low-carbon material with the tensile strength of steel, and can be used for greening infrastructure. It can also be used to manufacture furniture and even bicycles. In China, bamboo is being used to build storm-drainage pipes, utility poles, street lights, wind turbine blades and shock-resistant exteriors for bullet-train carriages. Some also use bamboo for housing and as a fuel in biomass-fed combustion plants. Research has shown it can be used as an energy source by converting it into solid, liquid and gaseous fuels.

5. Technology Trends in Africa

The use of technology is frequently a principal driver of change, locally and globally. This technology includes mobile phones, artificial intelligence, 3D printing, blockchain, and the Internet, to name the obvious. While technology adoption in Africa lags the rest of the world some areas, the continent has embraced technology in a number of important sectors. These include the financial services sector, agriculture, artificial intelligence and e-commerce. Africans have also built 3D-printers from e-waste. Currently, some countries are investigating the adoption of nuclear technology as a source of energy.

TECHNOLOGY TO TRANSFORM AFRICA

Gartner recently released a report identifying three technological advancements that will change the way business is done in the foreseeable future. The article speculates about the application of the three developments in Africa.

The penetration level and speed of the Internet of Things (IoT) technology in Africa is currently low and slow, but has a high growth potential as more Africans connect to the Internet. As more countries position themselves to benefit from the IoT, the trend has increasing potential to transform Africa in a few years' time. Industries set to benefit include the logistics and haulage industry, the health sector, and the manufacturing sector. This will enable organisations to take decisions based on verified facts using real-time data. One critical requirement is the availability of and access to broadband Internet.

The concept of smart cities is set to grow strongly in Africa. Its cities are growing at a rapid pace. As digital technology becomes pervasive in Africa, huge amounts of data will be generated. This will enable the development of smart cities across Africa. Everything and everyone will be interconnected. People will be better linked to trade. They will close business deals without being physically present. African leaders who understand this are working towards smart cities. They view this trend as the answer to the challenges caused by Africa's rapid urbanisation.

Low-Earth Orbit is described as a fibre quality broadband that can reach anywhere in the world, including Africa. Until now, low Internet connectivity and limited broadband penetration has been stated as the causes of Africa's slow development. Over the next decade, many businesses in Africa will benefit from low earth orbit satellites, while governments will have the ability to track down crime and crush unrest wherever it occurs in Africa.

This low-earth orbit version of the Internet will feature low connectivity costs, low latency, and high data throughput. This innovation will not only impact the lives of the average African, but will also affect the way businesses and governments are run.³⁷

BLOCKCHAIN USED TO DEVELOP FOOD SECURITY

The Kenyan government will deploy block chain technology to boost food security. This will entail using artificial intelligence and other information technologies to track agricultural produce from seeds to the marketplace. They also plan to track the origin of food products and to report unsafe food.

The government created a taskforce in 2018 to develop a roadmap for emerging technologies in Kenya. This initiative will define the evolving fourth industrial revolution. The Cabinet Secretary for ICT, Joe Mucheru, stated that "blockchain technologies are expected to be disruptive and will change the way business is conducted in Kenya."

The use of blockchain and artificial intelligence technologies could transform key sectors in Kenya, including healthcare, agriculture, education and government services. The improved efficiency, transparency and accountability of blockchain can improve the quality of government services.³⁸

HEALTHCARE TECHNOLOGY IN AFRICA

The healthcare sector in Africa faces three significant challenges: accessibility, affordability, and quality. Mobile technology contributes to health sector efforts to address these challenges. In a previous African Digest, case studies in Cote d'Ivoire and Kenya were noted. SeekMed is a telemedicine platform where

patients with severe medical conditions can quickly get credible medical advice from a network of specialists and doctors from anywhere in the world - it brings the best in medicine and the best of technology together to serve the patient community. Development of the platform was driven by high consultation costs and the frequent lack of expertise in African countries.

Through the global platform, a patient living anywhere in Africa can find specialists for their needs, request and book appointments, upload their reports, make fee payments and have video consultations from the comfort of their homes. SeekMed's core objective is to "help patients get access to quality healthcare at a fraction of the cost, save time and most importantly, eliminate uncertainties around a doctor's availability on a given date." The platform uses a pool of highly qualified doctors. It is designed to make it easier for patients to seek expert medical advice and feel confident about taking control of their medical decisions.³⁹

In Kenya, global healthcare firm Merck recently acquired the technology of e-health start-up ConnectMed. After Merck takes over the company's telehealth applications and related management systems, ConnectMed will cease to exist. ConnectMed currently allows patients to access consultations with medical professionals via video link. Licenced practitioners are available for same-day consultations, and can provide prescriptions, sick-notes, and referrals. For doctors, the service allows them more flexibility and control over their work hours.

Merck plans to leverage ConnectMed's platform in connection with CURAFA points of care in Kenya. The CURAFA platform provides over-the-counter and prescription medicines, digital health solutions, insurance schemes, education and awareness and a technology-enhanced facility experience. Merck employed this new model to improve primary healthcare access for underserved population segments, while strengthening local healthcare systems.⁴⁰

TECHNOLOGY-ENABLED INVESTMENT PLATFORM

In mid-October 2019, global trading platform Chaka launched in Nigeria. The technology-enabled platform provides Nigerians the ability to invest in shares listed on NASDAQ, the New York Stock Exchange and the Nigerian Stock Exchange. It offers access to more than 4000 assets and indexes from companies such as Apple, Alibaba, Google and the S&P 500 index. Local investors will now have the opportunity to explore international markets and diversify their portfolios into African and global capital markets. It will also offer foreign investors access to local capital markets.

According to Chaka CEO, Tosin Osibodu, Chaka's goal "is to provide premium borderless trading and investment opportunities for Nigerian professionals and investors. Chaka facilitates access to assets listed on the Nigerian stock exchange, American stock exchanges as well as global blue-chip companies from 40+ countries around the world."⁴¹

ENTERING THE ARTIFICIAL INTELLIGENCE SECTOR

In a surprising move, Rwandan firm Shaka AI Ltd recently signed a contract with an American firm to provide services on a Knowledge Process Outsourcing model. Knowledge Process Outsourcing entails the allocation of relatively high-level tasks, to an outside organisation or a different group, usually in a different geographic location.

Shaka AI, a joint venture between two Canadian firms and a Rwandan start-up, targets the growing demand for AI services, especially in North America. The company has already secured its first client based in the United States and is negotiating contracts with several other potential clients.

According to one of the co-founders from Canada, their entrance into the Rwandan Market was encouraged by a growing pool of talent and skills, facilitated by institutions such as the African Institute of Mathematical Sciences and Carnegie Mellon University.

The firm's model also involves working with technology partners of multi-nationals and global firms who have a demand for AI services. It will also train Rwandans, who will in turn provide the skills on-demand in the sector.

According to Alex Ntale, the Chief Executive of the ICT Chamber of the Private Sector Federation in Rwanda, the entrance of Shaka AI into the AI ecosystem validates that Rwandans have the competence

to compete on a global scale in certain fields that previously would have been for only a select few countries.⁴²

POINTS OF INTEREST

- Embracing technology as a driver of change is one way for Africa to deal with its numerous challenges. It has already started with this process in a number of sectors. Kenya are world leaders in mobile money, dramatically increasing the level of financial inclusivity of the population from 40% in 2010 to more than 80% currently. This makes them the leaders in Africa on financial inclusion. They have been so successful they have become a serious threat to the retail divisions of large banks in Africa.
- E-commerce is another field in which Africa has grown its competence. There are a number of e-commerce platforms on the continent, of which Jumia is the largest. Jumia has also recently listed on the New York Stock Exchange.
- In spite of stated intentions, Africa is still a way off presenting smart cities. However, the technology and aspiration do exist. Huawei has started collaborating with South Africa's rain, a mobile data network operator, to commission Africa's first commercial 5G network, offering unlimited ultra-fast 5G internet using Huawei's 5G CPE Pro. This will help Africa to jumpstart its journey to create smart cities on the continent, in addition to supporting improved e-commerce abilities. With the USA placing limitations on Huawei in the USA, the company has turned towards Africa, amongst others. This is obviously to Africa's advantage.
- We once again see healthcare technology receiving attention on the continent. Given the vast distances, the poverty (in contrast to very high healthcare costs), the multiple burdens of disease, and the lack of sufficient numbers of healthcare personnel in Africa, we have not seen the end of new entrants into the telehealth sector.
- In addition to Huawei creating a footprint in Africa, other tech giants such as Google, IBM and Microsoft have already seen the potential and are all investing in Africa. German software development group SAP has also created a continental footprint. In Africa itself, there are literally hundreds of tech hubs, all making a contribution to the expansion and utilisation of technology as a development instrument.

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