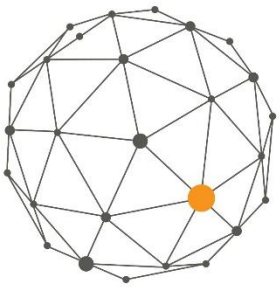


Instituto 17

Sustainable Manufacturing and Environmental Pollution: A Case Study of Food & Beverage Sector in Kenya

Local Consultant: Nancy Awuor Oduor

May/2021

UNITED NATIONS
UNCTAD

Part of the Program Sustainable Manufacturing and Environmental Pollution (SMEP)

Sustainable Manufacturing and Environmental Pollution: A Case Study of Food & Beverage Sector in Kenya

An outlook of Kenya's manufacturing Industry

Since independence, Kenya has grappled with the growth of its industrial sector despite several targets to expand the country's industrial scope. Despite attaining a relatively large industrial sector across the region, the country's industrial sector remains non-dynamic and generally challenged, hence unable to compete with other newly emerging economies (Ronge & Nyangito, 2000). The country's industrial sector lacked a robust value-addition, particularly for the broadly available agricultural and other products from natural resources under the previous policy regimes; - import substitution and market liberalization. In 2007, the government launched the National Industrial Policy (NIP) that targeted to foster rapid industrialization and to place Kenya in a globally competitive position through export orientation strategies. The policy aimed at fostering wealth creation and solving the unemployment jargon. Its main objectives was to establish and sustain within the manufacturing sector, a 15% annual growth rate that would set Kenya as a globally competitive and Africa's most preferred economy for industrial investment.

The World Bank in 2015 reported that Kenya, among 9 other developing countries had attained a Gross National Income (GNI) of $1,290 per capita, becoming a lower middle income economy (The Business Daily, 2015). Kenya seeks to become an industrialized and globally competitive economy by 2030. Under its economic blueprint dubbed as *Kenya Vision 2030*, the country aspires to become middle-income economy through expansion of the manufacturing sector. At inception, the country needed to grow its GDP by US$4-6 billion (~10%) each year. For a country with an average economic growth capped at approximately 5%, achieving a 10% growth rate posed a significant challenge. However, the Vision 2030 proposed interventions to facilitate manufacturing and expand industrialization. Such interventions include strengthening the capacity and local content of domestically manufactured products, to enhance, generate and utilize research and development to foster industrialization and manufacturing, to develop niche products to occupy existing and new markets, and to raise the share of Kenyan products in the region from 7% to 15% (Otieno & Washington, 2017). Along with the National Industrialization Policy and the Vision 2030, the government has in the recent past renewed interests in the manufacturing sector through the *Big Four Agenda* which seeks to expand the GDP contribution from the manufacturing sector from 8.4% to 15% by the end of 2022. Today, the manufacturing sector is the fourth largest sector in the country, contributing 11% of the country's total GDP (KNBS, 2019). The sector trails the agricultural sector, transport and communication sector, and wholesale sector. The private manufacturing sector created 7,700 new jobs registering 329,000, 24,300 and 3 million wage employments in private, public, and informal sectors respectively in 2019 (KNBS, 2020).

Food and Beverage Manufacturing Sector

Kenya is well-established agricultural economy that is spearheaded by a functional food processing and manufacturing sub-sector. Agriculture and agro-processing remains a central sector in the country's economy. The sub-sector contributes food to more than 40 million Kenyans besides serving as a sustainable source of livelihood to more than 17 million people, mostly rural dwellers. Despite this significance, the sector is primarily dominated by smallholder farmers dependent on rain-fed farming, and who contribute more than 75% of the total agricultural produce in the country. Also, markets for fresh agricultural produce have become increasingly volatile, seasonal, and unreliable, surrounded by poor infrastructure dominant in rural areas. As a result, post-harvest losses continue to affect farmers' returns on investments. Cognizant of these challenges, the Government of Kenya established within the Vision 2030, the Kenyan Industrialization Transformation Programme (KITP), which is responsible for designing strategic, comprehensive, integrated approaches towards achieving multi-sectoral industrial growth.

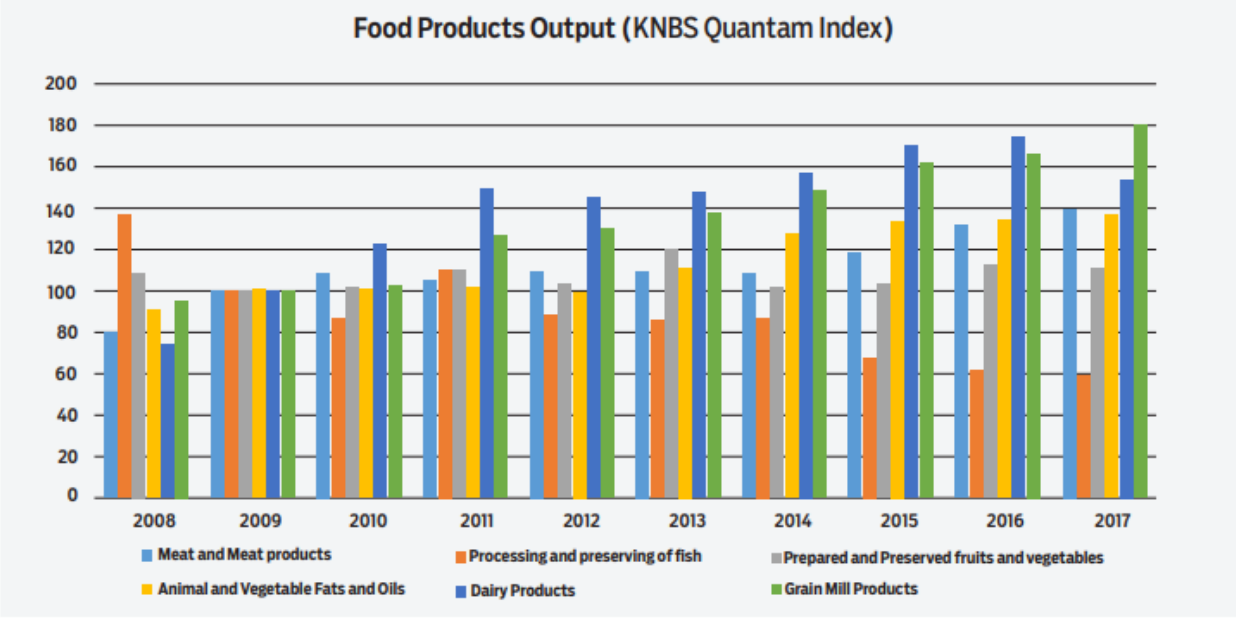
Both Vision 2030 and the Big Four Agenda center on manufacturing as a strategic sector on which to facilitate economic growth, expand job creation, and foster industrial development. Both economic blueprints recognize the importance of agro-processing, agricultural value addition, and food manufacturing as a viable intervention that will progressively impact the projected economic growth in a positively trajectory. In fact, of the four pillars constituting the country's vision 2030, '*Food and Nutritional Security*" and '*Manufacturing*' stand out (Imungi, 2018). There are ongoing initiatives implemented by the government to attract local investors, mainly women and youths into the food manufacturing (Otieno & Washington, 2017). Until the last decade, however, Kenya's food manufacturing industry has remained largely in the hands of large multinational corporates from various developing and developed countries, mainly from Europe and North America. Today, numerous small, medium, and large food manufacturing enterprises have emerged both in urban and rural settings making use of available agricultural produce such as legume mixes, dairy products, fruits and vegetables, and meat.

Definition of MSME in Kenya:

The definition of the regulatory and institutional framework for the Kenya's SMEs has been based on the number of employees and the company's annual turnover (MSMEs Act, 2012). The micro enterprises have been defined as enterprises employing less than 10 workers with annual turnovers of less than KES 500,000 and capital formation of less than KES 5 million for services or less than KES 10 million for enterprises doing manufacturing. Small enterprises on the other hand have been defined as enterprises that employ between 10 and 50 workers with annual turnovers between KES 500,000 and KES 5 million and capital formation between KES 5 million and KES 20 million for services or between KES 5 million and KES 50 million for enterprises doing manufacturing (UNCTAD Report 2013). Medium ones employing 51 to 100 workers (The Kenya Government Baseline Survey, 1999). Some definitions have also grouped and defined small and medium enterprises in Kenya's manufacturing sector are defined as enterprises with fulltime employees not exceeding 100 or annual sales turnover not exceeding Ksh 150 million (Mwirigi, P., 2007).

According to a manufacturing sector report published by Kenya Revenue Authority, Kenya's food and beverage manufacturing sub-sector hosts approximately 1,232 large, middle size, and smallholder businesses. (SOURCE) It is registered as the largest sub-sector that contributes approximately 13% of the country's GDP from manufacturing. According to a report published by the Kenya Association of Manufacturers Directory (2014), Kenya's Food and Beverage sub-sector comprises a KAM membership of about 181 (24% of total KAM membership). The sub-sector tops Service & Consultancy (12% of KAM membership) and Chemical & Allied Sectors which contributes a total of 9% of KAM membership. There are about 17 fish processing companies registered with the KAM, most of which can operate a capacity of 437 MT per day. There are also about 11 grain processing companies in the country, mostly dealing in maize fortified foods, baby formulas, rice, millet, sorghum. There are also about 9 in-built milk and dairy processing companies producing approximately 2.5 million liters each day. In overall, there are 187 food and beverage processing firms in Kenya (Kenya Association of Manufacturers, 2017). The number may have not risen much as earlier predicted as the areas has been highly hit with the COVID-19 pandemic seeing many businesses shutting down. The Food and Beverage manufacturing industries in Kenya is clustered as follows: dairy and meat processing firms, grain milling firms, edible fats and oils processing firms, beverages, fruits and vegetable processing firms, fish processing firms, wines and beer and spirits firms (Okello, 2010). The industry was employing over 200,000 family households and about 30% of the labour force (Obiso, 2011).

Food Product Output 2008-2017: Retrieved from Kenya National Bureau of Statistics, KNBS (https://s3-eu-west-1.amazonaws.com/s3.sourceafrica.net/documents/119074/Kenya-National-Bureau-of-Statistics-Economic.pdf) I was not able to find this chart in the KNBS report 2019.



While small and middle size food and beverage manufacturers operate within local markets, there are large food manufacturers with the capacity to explore the regional and international markets.

Collectively, the volume of exports from the Food and Beverage sub-sector in Kenya grew from US$ 253 million in 2009 to US$ 444 million in 2014, and to US$ 589 in 2019. This represents a compound annual growth rate of 11%. **The United States and the European Union** remain two of Kenya's largest export markets for processed food and beverage products. This trend of growth can be linked to Kenya's sufficient logistics and connectivity (three ports, improved road infrastructure, four international airports, and the 472 km long standard gauge railway line. Kenya also has a sound manpower scenario with relatively affordable wage rate, reliable power scenario (largest producer of geothermal energy in Africa), and favorable legal and regulatory framework. Current opportunities available in the sub-sector growth in Kenya include grains milling and marketing (maize and wheat), sugar, dairy, fruits (mangoes, pineapples and oranges), poultry, pigs and oil crops (sunflower, sesame, canola and groundnuts) (**International Trade Centre, 2015**). The industry is set to register a more robust growth trends.

Regional Food and beverage processing landscape

The regional and international trade landscape in Africa is increasingly becoming structured in the aspects of supply and value chains. Even in the food and beverage sub-sector, there exist constant efforts to address and implement a set of strategies to overcome specific barriers to trade integration and to facilitate the participation of small and middle size food manufacturers into region wide supply chain. Regionally, Kenya is a member of the East African Community (EAC), Intergovernmental Authority for Development (IGAD), Common Market for Eastern and Southern Africa (COMESA), and New Partnership for Africa's Development (NEPAD). The EAC and COMESA are increasingly attracting the participation of SMEs in food and beverage processing supply and value chain in attempt to facilitate the robustness, competitiveness, and sustainable development of the food manufacturing sub-sector.

The East African Community (EAC) not only views food and beverage processing sub-sector as leeway to a robust industrialization progress, but also emphasizes on the relevance of the subsector in enhancing food security, reducing poverty levels, and its contribution to the broad economic development of member countries. Currently, only 28% of the region's total agricultural produce is processed into value-improved products. Factors such as lack of companies with adequate capacity, inferior infrastructural framework, and inadequate supply of agricultural produce needed as raw materials have been linked with the stagnation of the sub-sector. In 2012, however, the region established the *EAC Industrialisation Policy 2012- 2032* which offers a roadmap leading member countries towards an industrialized economy. The overarching objective of the policy is "*Transforming the manufacturing sector with high value addition and product diversification, using competitive and comparative advantages of the region.*" The principle underlying the policy also apply to the food and beverage sub-sector and is set to foster regional value chains and to push the regions sub-sector to a global scale.

The COMESA Business Council, on the other hand, has in the recent past reported a robust annual real GDP growth of approximately 6.5% over the last five years. However, the council reported that this GDP has not reflected in a uniform economic transformation the entire trade region as

there still exist disparities among member countries. In its *Inclusive and Sustainable Industrialization Report 2017,* COMESA Business Council claimed that despite an improved nature of regional integration, lack of industrial diversification in the region has led to member countries trading more than 90% of its products with other parts of the world. To address this problem, the *COMESA Industrial Strategy* was established in 2015 to provide a clear pathway by which member countries can achieve progressive industrialization through value addition. Over the years, the 11th Joint COMESA Technical Committee on Infrastructure (Transport, ICT and Energy) and the 3rd COMESA Technical Committee on Industry have occasionally met to chat a way forward achieving a collective framework for the expansion of manufacturing and processing sub-sectors. Also, the 1st and 2nd COMESA Agro-Industry Dialogues have constantly attempted to address the challenges extant to Agro-industrial supply chain within the region in an effort to foster development in the food and beverage manufacturing.

Status of green economy and sustainable manufacturing in Kenya:

An early study conducted in Ruaraka, an industrial area in Nairobi, showed that manufacturing companies seem relatively green categorized under moderate to the medium stage of greening with the larger companies being generally greener compared to smaller enterprises. A large proportion of companies were found to be engaged in environmental management systems and also recognizes and seemingly have high interest of furthering green and circular innovation potentials.

Several strategies have been established among enterprises to ensure resource efficiency and end of the pipe (EoP) curative measures like adoption of more advanced green recovery and product innovations. In many industries, attention to the EoP technologies are have been on the wastewater treatment that is a central policy target and thus subject to environmental enforcement by the environmental authorities. Less attention is being given to air pollution and solid wastes with the later given to licensed collectors to take to local dumpsites without analysing for quantity and quality. Several enterprises have however installed waste water pre-treatment plants with up to 69% of large companies and 29% of smaller companies having their own plants (**Maj Munch et al., 2021**). The study also observed that up to 67 % of bio-based company's had wastewater treatment plants in Ruaraka. Most of these plants have however been shown to be in effective as witnessed by several waste water scandals in the area. Additionally, 11% of bio-based companies were established to have eco-design and recovery targets with 36% of SMEs compared to 8% of the large companies. However, reuse of waste-water and general recycling of wastes was observed to be very low with only 22% likely due to the water specificities of the production process. Some enterprises have adopted innovative value addition strategies to create new products, for instance, Del-monte utilizes the peels to make cattle feeds. Use of excess energy (heat and cooling) was also noted as a way of energy conservation. More SMEs also scored high in temes of possession of strong green competencies compared to large companies that scored 8% reflecting the presence of some dedicated green smaller/medium companies who are offering green products which fit with the eco-design scores.

Key drivers to sustainable manufacturing

As earlier mentioned, manufacturing is a significant sector in the Kenyan economy that contributes to approximately 11% of the national GDP and absorbs more than 103,000 Kenyans (52,000 in EPZ-based manufacturers and 21,000 in the local sector, and 30,000 informally attached to both sub-sectors) (KAM, 2014). According to Mwaura et.al. (2017), manufacturing activities in the country have accompanied specific negative impacts on the environment. These include overexploitation of natural resources, constant pollution, overconsumption of energy sources, waste disposal. In 2013, Kenya's global emission totaled to 60.2 million metric tons of carbon dioxide (MtCO2e), accounting to 0.13% of the total global GHG emissions. The agricultural sector produced 62.8% of the emission, the energy sector emitted 31.2%, the industrial sector produce 4.6%, and wastes emitted 1.4% (NEMA, 2015). As a signatory of the Kyoto Protocol on Climate Change, Kenya is bound to implement emission control efforts to reduce its total emissions by 42% by 2025 (NEMA, 2015).

Sustainable manufacturing (SM) by food manufacturing companies offers an opportunity on which national pollution control efforts can reduce the negative environmental impacts that emanate from such firms. Sustainable manufacturing entails integrated approaches of creating manufactured products using ways that minimize the negative impacts of the manufacture process on the environment. Sustainable manufacturing further targets to sparingly use natural resources to create manufactured products that are economically sound, and which enhance the safety of employees, communities, as well as consumers.

The concept of sustainable manufacturing uniquely brings together the aspects of financial or profitability viability, social equity, and environmental safety in the process of value addition through manufacturing. Mainly, SM incorporates strategies that contribute to pollution reduction, as well as waste reduction, and lower energy consumption across a product's value and supply chain. Mwaura et.al. (2017) explains that SM not only involves the 3R model of conservation (*reduce, reuse, recycle*) at the product stage, but focusses on the 6R model (*reduce, reuse, recover, redesign, remanufacture,* and *recycle*). Food and beverage manufacturers must consider incorporating within both product and process levels, strategies towards reduction of environmentally toxic wastes, elimination of occupational hazards, and reduce levels of energy consumption. At the last level, the system level, sustainable manufacturers strive to implement approaches that cut across the entire product supply chain. The stages include pre-manufacturing, manufacturing, over many life-cycles, and use and post-use stage. The East African Breweries Limited, for instance, has resorted to sourcing all paper and board packaging, as well as reducing packaging altogether, in an effort to reduce greenhouse gas emissions across the product supply and value chains through reduced channeling of waste products to landfills.

There is need to explore the driving factors for the adoption of sustainable manufacturing in the food and beverage manufacturing sub-sector in Kenya. **Fatoki (2019)** outlines that the driving factors of sustainable manufacturing can either be internal or external. Internally, a manufacturer's adoption of SM strategies can be affected by workforce skills and competencies, brand identity,

organizational culture, brand reputation, along with the ability of the firm to undertake environmental management (Fatoki, 2019). The specific aspects of internal factors that facilitate organizational adoption of sustainable manufacturing among food and beverage companies in Kenya include personal and organizational commitment towards pollution eradication, the level of knowledge and organizational culture, and knowledge management framework and as well as priorities of the organization's top management (Mwaura et.al, 2017). Manufacturers that implement sustainable manufacturing are more likely to reduce production costs, expand profitability, earn a competitive edge, benefit from energy efficiency and recycling of products, reduce pollution and carbon emissions, and utilize wastes better.

The external drivers of sustainable manufacturing include regulatory landscape, pressure from consumers, suppliers, or environmental advocacy groups, competitors, and communities (Fatoki, 2019). In Kenya, the government through regulatory bodies such as NEMA influence the environmental practice of food and beverage manufacturers and encourage them to implement environmentally viable production technologies to minimize pollution. In the recent past, for instance, Manji Foods has actively participated in a massive tree growing project at the Nairobi National Park, a project with which it aims to offset its carbon emission and to enhance environmental sustainability. By addressing deforestation and global warming in a simplistic approach, tree growing (**Manji Food Industries**, 2016).

Principle 10 of the *Rio Declaration* emphasizes the need for each global citizen to access public environmental information. In the wake of new milestones in climate change governance that have triggered progressive actions by government agencies, private organizations, and environmental activists both at the county and national levels, there needs to be in place an effective flow of climate change information to foster incredible adaptation actions from community level upwards (Ageyo & Muchunku, 2020). The Kenyan government has also influenced sustainable manufacturing in multiple manufacturing sub-sector through dissemination of valuable information on environmental issues and legislations (UNEP, 2017). The fifth section of the country's initial National Climate Change Response Strategy published in 2010 underscores the need for continued sensitization efforts targeting communities and organizations by use of diverse communication channels (Ageyo & Muchunku, 2020). The government also needs to expand and diversify its communication framework to touch on crucial issues such as sustainable manufacturing.

Nonetheless, the National Environmental Management Authority (NEMA) has in the recent past launched the *Rapid Results Initiative (RRI) on Effluent Discharge License (EDL)*, a framework within which the government monitors and imposes fines and penalties for manufacturers that do not comply with environmental policy climate in the sector (NEMA, 2021). Also, the Kenya's *Climate Change Act 2016* along with *the National Climate Finance Policy, 2018* and the *National Climate Change Action Plan 2013– 2022* demands strict adherence to environmental conservation policies by manufacturers in exchange for incentives such as government loans, tax concessions, and grants (Odhengo et.al, 2019). Collectively, these actions emerging from the government have

facilitated behavioral change as more food and beverage manufacturers increasingly adopt sustainability practices.

Another external factor pushing forward the sustainable manufacturing agenda among food and beverage manufacturers in Kenya is competition. The competitiveness of a firm emanates substantially from its ability to produce products that are perceived as safe and compliant to existing environmental control systems. Today market competitiveness is not solely linked to product quality, but also to factors relative to consumer's customers' awareness about environmental concerns. Remaining aware of the importance that consumer's environmental awareness holds as a source of competitive edge, C. Dormans, a middle-size beverage processing firm has developed a unique sustainable manufacturing framework that mainly involves improving coffee yields, cutting down on energy use, waste recycling, and offsetting (Food-Business-Africa, 2020). The company has an established partnership with Mt. Kenyan Trust to protect and serve the environment around Kenya's major coffee growing areas. The company also holds annual coffee quality competition in which farmers who implement best practices and acquire outstanding quality coffee get distinct rewards. The company's current partnership with Tatu City has availed 5,700 square meters of roof space to accommodate 2,880 solar modules with the potentials to produce 1.4 million kilowatt-hours of electricity per year (Food-Business-Africa, 2020). The project plays the double role of insulating the warehouse roof against climate misfortunes, but also enhances the production of clean energy used for the company's operations. Dormans' set of sustainability indulgences sets it as an example of a company that adopts sustainable manufacturing practices. The strong sustainability agenda adopted by the company sets it on a course to chart a new growth trajectory despite the current setback caused by the COVID pandemic.

Influence of Global Market to Sustainable Manufacturing in Kenya

The key export markets for Kenya outside the EAC, with high influence in sustainable manufacturing are in the European Union, Pakistan, China, India, UAE, and the United States of America. This is due to the preferential terms and conditions provided by the trade agreements. Kenya has been keen to retain these markets upon the expiry of the trade agreements. The domestic market in Kenya does not care about the environmental features in products apart from hotels, the pressure thus experienced from the international markets. The low income and demand for cheap food has made the domestic market to be dominated by the informal sector. Access to global market pushes eco-labelling and certification of products to meet the international environmental standards. These mechanisms address resource constraints, global climate change, and other pressing environmental issues. For instance, exporting to the EU and United States market, especially California, requires enterprises to meet strong environmental regulations in order to qualify for the US and EU Ecolabel standards. Enterprises like Del Momnte and other horticultural enterprises like Oserian, Naivasha. Another example is Kenya Meat Commission (KMC) that has managed to achieve sustainable manufacturing in order to get the *'Halal'* certification in order to access the huge market in the Middle East. KMC thus have to ensure that the 'Halal' conditions are met right from the raw material (animal) suppliers. The pressure of ensuring sustainable

manufacturing is however only application to formal medium and large enterprises with interested to access the external markets. In order to ensure compliance and sustainable supply of raw material, most enterprises work together with the government, NGOs and other private organization and offer support to the suppliers inform of financial incentives like soft loans, artificial insemination, transport services, trainings on production best practices, pest control etc. The suppliers (farmers) are also supported to form cooperatives where they can boost production through savings, warehouses and share knowledge. This is widely applied among milk, sugarcane, tea, coffee, and millers. The Kenyan government is currently striving to create environmental conditions through crating policies that enhances green economy investments to reduce wastes and climate change effects in order for SMEs to qualify for the global market. Other eco-labelling regional initiatives that is driving Kenyan SMEs to sustainable manufacturing are the African Eco-labelling Mechanisms (AEM's) and ECO Mark Africa (EMA).

Market Influence to Sustainable Manufacturing in Kenya:

The market has highly influenced the environmental attention especially among the medium and big food and beverage manufacturing industries. While the domestic market seems not to care about the quality of products but purchase preference given to cheap products due to their low income. The interest to access foreign markets has driven most industries to apply strategies that enable them to meet the standards of the international markets. Green purchasing leads to higher performance in the food and beverage processing sector in Kenya (Mosbei Bor et al., 2019). This involved the purchase of products that promote green environment, enhancing green production by suppliers as they try to comply promoting sustainable manufacturing. For instance the Lipton through Kenya Tea Development Agency influenced farmers' production by sourcing its teabags from Rainforest Alliance Certified™ certified farms making more farmers to comply with the certification conditions in order to access the market (*(No Title)*, n.d.)

Importing Countries influence to sustainable manufacturing:

Exporting to developed countries are always restricted by meeting specific standards of that country. Kenya's enterprises that are exporting to US and EU markets need to get certification labels from these regions. The same is applicable with the export of meat products to the Middle East. It is only after meeting the regions ecolabels that the product will be allowed in the market. The US through USAID, and EU governments have provided support to the Kenyan government to support its efforts towards green production. These are informs of joint ventures in providing technical and financial support to farmers, education programs, infrastructural development, conducting research and market access strategies. Financial support is given in form of soft loans with low interest rates, for instance, The AgriFI Kenya Challenge Fund (2018-2022) provided by the EU to agri-enterprises to enhance the capacity of smallholder farmers/pastoralists to practice climate-smart and environmentally sustainable agriculture. SOURCE!!!!

Bilateral Trade Agreements:

Kenya has signed bilateral trade agreements with several countries including US, Germany, Argentina, Bangladesh, Bulgaria, China, Comoros, Congo (DRC), Djibouti, Egypt, Hungary, India, Iraq, Lesotho, Liberia, Netherlands, Nigeria, Pakistan, Poland, Romania, Russia, Rwanda, Somalia, South Korea, Eswatini, Tanzania, Thailand, Zambia, and Zimbabwe (https://www.trade.gov/country-commercial-guides/kenya-trade-agreements). The trade agreements like Economic Partnership Agreements (EPAs), Africa Growth and Opportunity Act (AGOA) and Kenya – UK Free Trade Area (FTA) have helped Kenya secure markets for her MSMEs under preferential terms. Some of the trade agreements Kenya are listed below:

Trade Agreements Relevant to Food and Beverages MSMEs

Multilateral Trade System (MTS): The only international organization that deals with the global rules of trade between nations that has been a member since its inception in 1995 is the World Trade Organization (WTO). Kenya has been an active participant with the 10th WTO Ministerial Conference held in Kenya leading to adoption of the "Nairobi Package" involving issues on agriculture, cotton, and issues related to least-developed countries (LDCs).

African Continental Free Trade Area (AfCFTA): An economic integration of the continent involving about 50 countries signed to form a free trade area spanning Africa with Kenya ranked the third among the members to gain gain most from the continental free-trade zone according to the World Bank.

U.S. – EAC Trade and Investment Framework Agreement (TIFA): This was an agreement signed by US and with the East African Community (EAC) in 2008, and with the Common Market for Eastern and Southern Africa (COMESA) in 2001 where Kenya is a member.

Regional Agreements: These are agreements signed with other countries in the region to allow member countries enjoy preferential tariff rates on exports and imports. Kenya is a member of the East African Community (EAC), a trade agreement signed together with Burundi, Rwanda, South Sudan and Tanzania. It is also a member of the Common Market for Eastern and Southern Africa (COMESA).

ACP/Cotonou Partnership Agreement: This was signed between Kenya and EU and provides for the country's exports entering the European Union are entitled to duty reductions and freedom from all quota restrictions. Trade preferences included duty-free entry of all industrial products as well as a wide range of agricultural products including beef, fish, dairy products, cereals, fresh and processed fruits, and vegetables. This agreement thus provides a good market opportunity to MSMEs under Food and Beverage manufacturing sector.

African Growth and Opportunity Act (AGOA): Kenya qualifies for duty free access until 2025 to the U.S. market under the African Growth and Opportunity Act. Some of Kenya's major products that qualify for export under AGOA include textiles, apparels, and handicrafts.

Generalized System of Preferences (GSP): Under the Generalized System of Preferences, a wide range of Kenya's manufactured products are entitled to preferential duty treatment in the

Australia, Austria, Canada, Finland, Japan, New Zealand, Norway, Sweden, Switzerland, other European countries and the United States.

U.S - Kenya Free Trade Agreement: Announced in 2020, the United States and Kenya agreed to enter into FTA negotiations to seek a high standard agreement that will also complement regional integration efforts within the EAC and AfCFTA. In addition to the launch of trade negotiations, the United States and Kenya agreed on a Strategic Cooperation Framework to provide technical assistance and trade capacity building in Kenya with the aim of maximizing Kenya's utilization of the AGOA trade benefits for the remaining years of the preference program, which is scheduled to expire in 2025. The Framework will also support the development and competitiveness of key agricultural value chains in Kenya. (**www.ustr.gov**)

U.S.- Kenya Commercial Memorandum of Understanding (MoU): A bilateral agreement signed in 2018 between the two countries to work together to intensify commercial coopetition. The MoU was signed to identify and prioritize trade and investment opportunities in strategic sectors including energy, health, digital economy, infrastructure, manufacturing, and agriculture.

Apart from the above, the government is currently negotiating with several additional countries to expand its markets. These includes Belarus, Czech Republic, Ethiopia, Eritrea, Iran, Kazakhstan, Mauritius, Mozambique, and South Africa.

Knowledge of Climate Change and Measures Taken:

Previous studies conducted in the region indicated that most investors in SMEs in food and beverage industries are aware of the existence of climate change (Kihiko and Kinoti 2016). Most managers from manufacturing sectors are aware of climate change and expecting higher operating risks and costs and thus devising strategies for adoption. This is due to the fact that their raw materials are directly link to the climatic conditions that govern growth of crops, affect water availability and transport systems. The government, through NEMA and the Ministry of Environment and Mineral Resources (MoEMR) have been in the forefront of creting awareness of the need for tree planting, industrial pollution control, Environmental Impact Assessments (EIA) and systematic solid waste management in orde to encounter the environmental challenges.
Their efforts have been supplemented by individuals, civil society organizations and corporates who conduct environmental conservation education and awareness campaigns. The government has also been working with various NGOs and private sector like USAID, EU, and International Trade Centre (ITC) to create awareness on climate change and adoption strategies through various channels and reduction of greenhouse gasses. The study conducted in Ruaraka reported that managers recognised the existence of climate change and the fact that it was going to affect their production. The major impacts of climate change has been noted from increasing prices of raw materials increasing the cost of production. This is occurs because of destruction of raw materials, delayed crops maturity, increased production due to adopted strategies like irrigation, emergence of pests and diseases, destruction of infrastructure like roads and power supply (DANIDA, 2009)

Most enterprises have been shown to be aware of the climate change. For examples with the problems of water brought about by prolonged droughts. Enterprises are working with farmers to adopt to the climate change impacts through irrigation, use of energy saving cook stoves, producing their own raw materials to maximize supply. Some enterprises also offer support to farmers in terms of trainings, financials incentives and transportation (fish). SOURCE
About 80% of Kenya is under Arid and semi-arid areas, and the country is already experiencing water scarcity, the country is thus very vulnerable to climate change effects. Farming activities in Kenya has been highly affected by prolonged droughts and floods causing agricultural losses.

Kenya has very well established environmental management systems including policies and management institutions starting the national government through ministries of Environment and Natural Resources to the local sub-county levels. NEMA is however, the main authority to govern compliance of industries to the established policies, other existing institutions include Kenya Maritime Authority, Ministry of Public health, and Department of Fisheries and Agriculture, Arid and Semi-Arid Areas, etc all of which are associated with management f environment and emerging issues of climate Change.. There have been however overlapping roles and inadequacy of resources that have hindered effective implementation of environmental policies.

Country-level environmental programs/strategies

The National Environmental Management Authority (NEMA) constantly assesses how nationwide climate change elements such as constant rise in atmospheric temperatures, change in precipitation patterns, incidence of extreme weather, rise in sea levels, and constant seasonal shifts affect our day-to-day lives through floods, droughts, limited water supply, as well as poor air quality and resultant health conditions (NEMA, 2010). The report reflected some of the country's evidence to climate change incuding the persistent and extensive droughts, increased nationwide water scarcity, the constant rise in sea levels, receding rangelands, increased disease prevalence (TB, ebola, Lyme disease, and Rift Valley Fever), human-wildlife conflict, displacement and migration from climate disaster-prone areas, and distruction of some of the popular tourist attarction cites. Kenya has both adpatation and mitigation programs targeting multiple sectors including manufacturing, transport, and agriculture.

The National Forest Programme (2016–2030)

Supporting the industrialization goals echoed in the Kenya Vision 2030 is its emphasis on the dependence between industrial growth and the environment, natural resources, and the need for appropriate conservation strategies. The National Forest Programme is an instrumental aspect of the Vision 2030 that aims to sustainably manage, conserve, restore and utilize forests and allied resources for socio-economic growth and climate resilience in pursuit of industrial expansion goals (MENR, 2016). Through sustainable forest management, the programme intends to increase tree cover, facilitate forest-based economic, social and environmental benefits, foster value addition of forest products through capacity development and research adoption, and to create an enabling environment to facilitate the mobilization of resources to facilitate forest development.

The manufacturing sector relies upon forests for its role in energy production, sound food production, and the provision of a host of non-timber forest products that directly or indirectly contribute to industrial agility and productivity. Various players in the food and beverage subsector have contributed immensely to the gradual success of the programme in an effort to offset greenhouse gas emission within operations. The East African Breweries Limited, for instance, has partnered with Nature Kenya to plant 100,000 trees over a 250 acre space on Mount Kenya. Along with over 1 million trees planted to conserve the Ndakaini dam from where Nairobi's water supply accrues, the company the Mt Kenya project has attained over 85% success rate (EABL, 2020). Similar projects have been conducted by other food and beverage manufacturers such as Manji Fundi Industries.

Extant Market based approaches to sustainable manufacturing and environmental pollution control

Popular environmental policies conventionally integrate specified goal with specified means towards achieving that specific goal often linked through a political or regulatory process. In market-based models of pollution control, specific market signals are implemented to influence change of behavior, as opposed to conventional (command-and-control regulations) pollution control instruments. If adequately designed and strategically implemented, market-based interventions such as tradable permits (pollution charges) effectively lead to changed environmental behavior and encourage firms to design and implement pollution control efforts that align with internal policies and pursue own interests, but also meet policy goals (Stavins, 2001). The available alternatives for market-based control include pollution charges (levies), taxes, as well as tradable permits. Scholars such as Zhang (2012) have argued that market-based policies are more effective compared to conventional control instruments. This is because they lead to speedy reductions in carbon emissions and foster a faster delivery of ecosystem services.

Although gradual, Kenya has made notable progress in adopting and enforcing market-based solutions to pollution. One of the most outstanding market-based approach enforced waste banning of non-reusable polythene bags in August 2017 both by consumers and manufacturers for packaging purposes. Also, the recent launch of the Green Bond Programme – Kenya serves as an ideal market-based intervention to pollution. Although the programme does not directly involve food and beverage manufacturers, it aims at promoting innovation in the financial sector by initiating a green-bond market targeting financial institutions under the Kenya Bankers Association (KBA), Nairobi Securities Exchange, Climate Bonds Initiative (CBI), Financial Sector Deepening (FSD) Africa and FMO - Dutch Development Bank.

Combined with increased funding of renewable energy and offsetting pollution through afforestation, the aforementioned interventions to pollution are commendable as they promote sustainability and mitigating climate change that emerges from pollution. Besides, the GOK should consider enacting control approaches that encourage manufacturers to adopt modern transport systems with less carbon emission by assigning relevant tax/offering tax exemptions targeting

modern transportation means. In the long-run, it is hoped that the national efforts of pollution control will benefit immensely from market-based interventions.

Analysis of current environmental programmes/strategies

The plan to foster industrial growth through special economic zones (SEZS) has been a culture in Kenya over the last decades, and its relevance is echoed both in the industrialization Medium Term Plan (MTP II) (2013-2017) and most recently in MTP III (2018 – 2022). Like other players in the private sector, Food and Beverage processing industry is recognizing the role of SEZs in providing energy, water, telecommunications, transport, and waste management infrastructure that lacks in alternative manufacturing locations across the country (Khisa & Onyuka, 2018). However, SEZs concentrate manufacturers to a specific locality, hence extending the urgency to incorporate programmes that foster efficiency of resource consumption, innovativeness in pollution mitigation, and exchange of by-product through industrial symbiosis (UNEP, 2017). The overarching aim of such integrated strategies, especially among food and beverage manufacturers, is to push forward productivity, while lowering the total national carbon footprint, hence fostering competitiveness.

Unfortunately, the planning, design, construction, and operationalization of Kenya's special economic zones (SEZS) is not premised on the need to achieve industrial symbiosis, but broadly on the traditional wasteful linear industrialization frameworks. The traditional wasteful linear, which mainly encompasses the extraction or acquisition of raw materials, conducting value addition through manufacturing, and eliminating waste products accruing from manufacturing into landfills, results into a linear pattern in the flow of matter at each step of the value and supply chain (Khisa & Onyuka, 2018). Kenya is not a country endowed with an unlimited supply of agricultural raw materials to serve its expanding demand for food and beverage products, and urban regions that host SEZs lack unlimited land spaces for waste disposal. It therefore follows that the linear, yet wasteful economic expansion framework is not applicable to the country. Industrialization policymakers are gradually recognizing the need to abandon over-reliance on this model, hence the progressive efforts to incorporate integrated and more sustainable models that align with the international standards.

The United Nations Industrial Development Organisation (UNIDO, 2015) emphasized the need for developing industrial markets to implement industrial models framed on industrial symbiosis. Industrial symbiosis comprises of closed material, energy and/or water cycles within the clusters of co-located industries. In Kenya, the existing special economic zones such as the Athi River SEZ currently lack the design and architecture that cluster together industrial plants, and which can facilitate the exchange of wastes and by-products (Khisa & Onyuka, 2018). As such, the food and beverage manufacturers in such SEZs do not accrue the economic and environmental benefits that emerge from the implementation of such company-level resource efficient production models. Khisa & Onyuka (2018) postulates that without such a deliberate move to effect industrial symbiosis in emerging SEZ schemes across the country, Kenya cannot achieve its goal of attracting green foreign direct investments.

Nationwide Legal Framework toward sustainable manufacturing

Various global players, including the UNEP and the World Bank Group have in the last decade focused on promoting environmentally friendly eco-industrial economic zones by encouraging policy realignment to reflect resource use efficiency, cleaner production and industrial symbiosis. The benefits of such policies, as demonstrated in South Korea and China, is that countries embrace environmentally friendly economic practices, and hence design, construct, and operationalize eco-industrial parks with industrial ecology in mind (Switch Africa Green:, 2019). However, the current policy framework is weak and does not effectively drive the agenda of industrial ecology. There is an urgent need for a clear industrial policy that is focused on industrial ecology, and which prioritizes the transition of the country's manufacturing model from the traditional wasteful linear model to a more ecologically conscious model.

Within Kenya's industrialization policy is the Special Economic Zones SEZ Act (2015) that neither reflects the desire for sustainable manufacturing nor appears to foster an industrial ecology framework grounded on green and resource efficient for low carbon emission. Aside from that, the country's industrial legal framework does not clearly spell out its strategies on combating the problem of residual waste management, which is central to industrial ecology and sustainable manufacturing. In 2012, Kenya brought to attention the Green Growth agenda that has remained critical issue of focus for NEMA. The policy framework guiding green economy is an essential aspect of the Green Economy Strategy and Implementation Plan (GESIP), the National Climate Change Action Plan (NCCAP), the draft Kenyan Climate Change Policy of 2014, the Climate Change Act, Number 11 of 2016, and National Climate Change Response Strategy (NCCRS). However, the Green Growth agenda is not clearly outlined in the Kenya Vision 2030, Kenya Industrialization Policy, the amended Environmental Management and Co-ordination Act, EMCA 2015, and the SEZ Act of 2015, as a viable avenue towards achieving sustainable development goals (SDGs) (Khisa & Onyuka, 2018).

The country has made commendable efforts through policy restrictions, which have resulted to a significant increase in industrial waste material recovery, drawing the country close to achieving industrial symbiosis (G.O.K, 2017). However, Khisa & Onyuka (2018) noted that unfortunately, the end of lifecycle of both recovered and unrecovered waste materials is landfills, rendering such policies futile. However, these efforts have been marred, in most industrial zones, by non/minimum compliance, mainly emanating from the design and operationalization of SEZs. Also, the national government, through NEMA functions, and under *the Science Technology and Innovation (STI) Act* of 2013, has committed to align 2% of the national GDP towards National Research Fund (NRF). However, fulfilling this goal has appeared to burden the government. While the noble intentions of the country's industrialization policies have been spelt out, Kenya needs to implement a workable action plan toward aimed at gradually transitioning its SEZs into a closed loop supply chain industrial model.

Solid Waste Management/Pollution Control Programmes

A crucial component of the industrial objectives as mirrored in the Kenya Vision 2030 is the establishment of fully functional solid waste management systems in the industrial zones in an effort to towards a low-carbon and climate resilient industrial development model. Khisa & Onyuka (2018) noted that most SEZs in Kenya, particularly those within Nairobi Area possess the

requisite number of manufacturing and processing firms that can facilitate collaborative approaches to effective waste and by-product management. However, by design and operationalization, most of these SEZs do not accord to tenant companies the incentives to explore innovative solid waste management that could help divert such wastes away from landfills. The absence of integrated solid waste streams that cycle back wastes into the value addition process within such zones has led to unprecedented accumulation of solid wastes in landfills.

An inherent problem to solid waste management and pollution reduction efforts across SEZs is their over-reliance on the end-of-pipe approaches, as opposed to source-based prevention efforts (Khisa & Onyuka, 2018). Dutt & King (2014) suggests that developing economies need to proactively engage waste management solutions that intergrate innovative preventive approaches to waste production in the first instance. Food manufacturers, as compoents of various SEZs must play the crucial role of environmental stewardship within their zones. While there are a few frontrunners such as Dormans embracing industrial symbiotic practices by recycling of raw materials back to the value addition cycle and selling off wastes to other companies for reuse, the greater majority of food and beverage manufacturers are yet to embrace such approaches. At Athi River SEZ, for instance, the zone authorities have articulated policies controlling leakages, spillages and over flow of wastes, which constitute a major source of pollution (Khisa & Onyuka, 2018). However, the absence of a capable waste management hierrachy whose roles are grounded on fostering waste avoidance, reuse, recycling, and waste recovery, as opposed to waste treatment for final disposal, has paralysed polution control efforts in Kenya (UNEP, 2015).

A clear nationwide roadmap to eradicating pollution emerging from industrial solid wastes is yet to be established, although there exist well-articulated waste management policies. The Government of Kenya in 2017 initiated the proposed Greening Climate Fund in which it invited accredited entities to submit concept notes presenting programme ideas that would enhance sound design and operation of both existing and upcoming industrial zones, in line with the fundamentals of circular economy, and with the aim of mitigating the country's environmental burden. At the pre-feasibility study stage of the project, the government selected Athi River Export Processing Zone (Machakos County), the Mombasa EPZ (Mombasa and Kilifi Counties), the Ruaraka Export Processing Zone and Industrial Park (Nairobi City County), and the planned Samburu Special Economic Zone in Kwale County. The Athi River and Ruaraka SEZs are mature, enjoy developed infrastructure (including rail, road, telecommunication, power, and sewerage) (G.O.K, 2015). The two SEZs host a score of operational food and beverage manufacturers such as Kenya Breweries Ltd and Royyale Beverages Ltd. The proposed Samburu EPZ, which is at its planning stage, will also host several manufacturers with potentials for producing large solid waste products (Government of Kenya, 2017).

The Government of Kenya (2017) targets to use the interventions implemented in the zones to test its potential for effective waste and by-product exchange in an industrially symbiotic system. The outcome of such interventions have strong replicability for future SEZs throughout Kenya, the EAC, and Africa. In essence, food and beverage manufacturers operating in the target industrial systems may benefit from such initiatives by closing wastes through waste and by-product recycling, reuse, and recovery, and through efficient material use and minimal energy use. The

goal of such waste management approaches is to minimize solid waste generation at the source, in the first instance, and defining all other non-recycled waste products for marketing purposes (UNIDO,2015). The proposed interventions also need to put into consideration the need to adequately plan and analyze waste channels for a successful by-product exchange network to be implemented within these zones.

Civil Society's Perception on Environmental Pollution:

The civil society's commitment to environmental restoration, conservation, and protection started long time ago with Green Belt Movement (GBM) in 1970s. They have been critical in fighting for protection of environment like important wildlife area, as well as citizen rights through Human Rights Commission in Kenya. Currently there are several civil-societies that are fighting for climate change and reductions in the emissions of GHGs. Some other groups, for instance Center for Environmental Justice and Governance (CEJAD), African Sustainability Network and Green Peace Africa have also been fighting against lead and plastic pollution in the country. The KHRC also have also fought for workers protection and ensured good working conditions and compensation of workers. For instance in 2000, they sued Del Monte Kenya and requested them to address matters regarding their protection from chemicals, housing concerns and environmental pollution with success.

Social issues in Manufacturing Industry:

The social protection of workers is well defined in the Kenya's constitution and several Acts of Parliament. The constitution provides for the right to equality and freedom from discrimination. It also provides for labour relations and states that every person has the right to fair labour practices including the rights to fair remuneration; reasonable working conditions; form, join, or participate in the activities and programmes of a trade union; and going on strike.

The Work Injury Benefits Act of 2007 provides for the International Labour Organization convention compliant laws pertaining to employee compensation in the work place. Following enactment of this Act, many of the sections were annulled by the High Courts finding them unconstitutional.

The Occupational Safety and Health Act of 2007: The objective of this Act is to provide the legal framework for employers to maintain healthy working conditions and environment for their workers. The Act makes provisions for the safety and health of all workers in Kenyan workplaces and establishes the National Council for Occupational Safety and Health.

The Industrial Court Act No. 20 of 2011 The Act establishes a revamped Industrial Court that is the same status of the High Court as espoused in the Constitution of Kenya. The Industrial Court is established as a court of superior record. The Court is given powers to adjudicate over cases of employment and labour relations. It describes the qualifications, remuneration and security of tenure of the judges of the Industrial Court. It further establishes an Employment and Labour Relations Rules Committee for purposes of making rules for the Court in consultation with the Chief Justice.

Adopted from ILO - Defines the types of workers, workers legal duties, discrimination in employment, sexual harassment, prohibition about forced labour, wages and salary, deductions from wages, statutory deductions i.e. Every employer is required by law to deduct from each worker's wages a certain amount required to pay the National Social Security Fund (NSSF), National Hospital Insurance Fund (NHIF) and Pay as Your Earn (PAYE), working hours, overtime, leaves, health and safety of workers

Forced labour - The law states that it is illegal to use or assist any person in the recruitment, purchase and sale or use of forced labour. This includes the recruitment or compulsory employment of children.

Salary and wages - Under the law, every worker is entitled to receive full payment for work done.

Working Hours – Child labor - Generally, child labour is prohibited. However a child may be engaged to work where the work benefits the child's education and well-being and does not interfere with his/her education. A child who is aged sixteen or younger should not work more than six hours in one day.

Health and safety: the employer must provide a clean and safe working environment for the workers. Every factory must be kept clean and free from all forms of sanitary nuisance

- The employer must establish and make known to all employees clear rules for the handling of dangerous substances such as poisons and pest control products. Such rules must be in a language that all employees can read and understand.
- Adequately instruct and train workers in the use and handling of poisonous or dangerous substances or equipment. Make first aid facilities available to deal with any emergencies.
- Workers are entitled to Ensure own safety and healthy through co-operating with rules and regulations as set by the employer, wear protective clothing

Due to the high rate of unemployment in the country, most employers especially in the private sector have been reported to abuse the workers' rights. Several incidences have been reported in the private and informal sector where cases of violation inclusion unlawful dismissal, underpayment, poor working conditions, and overworking/long working hours have been reported. For instance, several cases have been reported from D**el Monte**. The company had been accused by human rights groups for exposing workers to hazardous conditions at the facility, poor sanitation, living and working conditions for workers and for intimidating trade union groups, workers termination threats lack of safety plans in events of emergency and underpayments (1999). Based in these, an Italian human rights group, Centro Nuovo Modello di Sviluppo (CNMS), began a campaign in Italy to boycott Del Monte pineapples for consumers after conducting research and confirming the situation, the campaign that was backed by Kenya Human Rights Commission. The KHRC have also assisted workers by fighting compensation for termination and unlawful dismissal

Activists' role - On 5 October 2000, the company was asked by the Kenya Human Rights Commission (KHRC) to cease intimidation of trade unionists with Del Monte Kenya. KHRC also requested that Del Monte Kenya address matters regarding worker protection from chemicals, housing concerns and environmental pollution.

Working conditions – working time – The working hours and conditions and Regulation of Wages (General) Order, subsidiary to the Regulations of Wages and Conditions of Employment Act, are well defined in the employment Act. The general working hours are 52 per week with modifications possible under collective agreements. Conditions for operations during overtime, public holidays, annual paid leave, maternity leave –sick leave, compassionate leave, study leave and Leave for trade union purposes or because of the holding of public office are also well stated.

Minimum age and protection of young workers**:** "Child labour" is defined in the Kenyan lwas as any situation where a child provides labour in exchange for payment (Children Act, 2001). The Employment Act, in part IV, accords special protection to juveniles. It defines a "juveniles" ia "child or young person"; and "'child' means an individual who has not attained the age of sixteen years", whereas "young person" means a person who has not attained the age of 18 years. The regulations states that Children under 16 should not be employed in any industrial undertaking or to attend machinery, unless they are apprentices or learners, at night except in cases of emergencies with registers required to be kept by employers engaging juveniles. The regulations also allow for light work with prior written permission of an authorised officer is however demanded to allow for the employment of children with a condition that the employment should not cause the children to reside away from parents without their approval. The permission to work in a bar, hotel, restaurant, etc., needs to be approved by the Labour Commissioner with annual renewal of such permits. The part of the Act, entitled "Safeguards for the rights and welfare of the child 'addresses child protection against economic exploitation and any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development. Any person who breaks the laws is culpable to fines of up to 50,000 shillings or imprisonment not exceeding 12 months or both.

Equality and Gender Equality: The Employment Act and the Constitution guarantees the right to equality in employment among men and women. It also prohibits discrimination of persons based on race, tribe, place of origin or residence or other local connection, political opinions, colour, creed or sex or disabilities. It also forbids night shifts for women except in cases of emergency. The Employment Act also stipulates equal remuneration for work of equal value for both men and women. Additionally, a draft Equality Bill is still pending at the Cabinet level. The Bill that if implemented will introduce an Equality Board and Tribunal, and recognition of equality rights in employment, education, health services, profession, and many other areas of private and social life.

Capacity Building Activities to Ensure Sustainable manufacturing:

Green Financing - Through the SUNREF Programme, the Association continued to provide financial solutions to green energy initiatives with the aim of mitigating climate change. The SUNREF is a French Development Agency (AFD) Green Label Programme.

Ocean Plastics Charter - In June 2018, the Ocean Plastic Charter was adopted by a number of countries in order to demonstrate their commitment to take action to address marine plastic litter. Kenya became a signatory to the charter at the Blue Oceans Conference in November 2018

Strategic Sector Cooperation (SSC) ***Ruaraka Partnership on greening the Manufacturing Sector -*** aims to assist Kenya in realizing economic and industrial growth and environmental protection by pursuing a green and circular economy road map. Launched in 2018 as a framework for present and future SSC engagements, the Ruaraka public-private partnership on environmental management and circular economy has become a strong platform, attracting and adding new partners and resources to the sector cooperation, such as research and commercial relations.

Customer Bora program – together with Dandora Hip-Hop City -Taka Banks Programme to facilitate sustainable collection of waste for recycling by establishing trial "taka banks" kiosks to serve as collection stations. The online platform dubbed Customer Bora will facilitate correspondence between groups in order to encourage uptake and flow of all communication about the program.

National Stakeholder Forum on Industrial Effluent Management -

TVETS- To unlock the potential of SME's participating in the financial market, the following actions need to be undertaken:

i. Encourage SMEs to formalize their business through training and awareness creation.

ii. Capital Market Authority to reduce the costs associated with the implementation of corporate governance framework for SME's.

Agenda three: Enhance access to finance SMEs face significant financing gaps that stifle growth. In recent times, the government has made deliberate efforts to resolve the challenges facing SMEs in access to finance. Through the National Treasury and Planning, the government has developed a draft Public Finance Management (Credit Guarantee Scheme) Regulations, 2020 whose key objective is to promote enterprise development through access to quality and affordable credit to MSMEs. The targeted credit support to MSMEs businesses will lead to growth in output with the potential to uplift the lives of many Kenyans through job creation.

To enhance access to finance for SMEs, the following actions are proposed:

i. Ensure allocation of funds towards the SME Credit Guarantee Scheme.

ii. Incentivize private incubators, research, and development organizations to nurture startups and SME's.

Skills development - c) **Agenda three: Pro-industry skill development** - The gap between the industry's skills demands and training provided by institutions calls for enhanced collaboration between them in curriculum development. By so doing, the country will be placed at a better position to offer demand-driven training programmes that are focused on the needs of workers, and industry as well as facilitate development of a pool of skilled workers in all the sectors of the economy. On its part, the private sector has expressed its interest in supporting initiatives to establish Industry apprenticeship programs where university and technical school graduates are recruited into industry for training. KAM already supports these initiatives through the Technical,

Vocational Education and Training (TVET) apprenticeship program, while encouraging manufacturing firms to take on students from TVET institutions on internship programs.

To further reduce the mismatch between training institutions and industry, the following actions should be undertaken:

i. Fast-tracking operationalization of Sector Skill Advisory Committee to guide in the development of occupational standards and influence curriculum development.

ii. Driving the Sustainable Development Goals (SDGs) through skills development and capacity building.

iii. Supporting skill-based job creation through Technical, Vocational Education and Training.

iv. **Training and capacity building** - Established in the year 2000, the Kenya National Production Centre is part of the global UNEP/UNIDO National Cleaner Production Centre program, currently registered in Kenya as a Trust. The Centre is mandated to build industry capacity in Resource Efficient and Pollution Prevention through information, training, in-plant production process assessment, projects implementation and policy advice

v. Courses: EIA/EA; Solid Waste management; Environmental Compliance Assistance Course; Effluent treatment, plant management, Wastewater management and Industrial Wastewater Management Course; Plastic Waste Management Course; Energy Management Course

Agenda seven: Enhance digitalization in manufacturing- As Kenya gears towards transforming itself into an industrialized middle-income economy by raising the contribution of its manufacturing sector to the national output, adoption of Industry 4.0 technologies will be key towards this endeavor. The fourth industrial revolution refers to the application of information and communication technology in facets of manufacturing process. By employing data analytics and robotics, industry 4.0 technologies transform business models and processes to enhance productivity, induce innovation, and enhance resource efficiency among firms. The World Economic Forum (WEF) 'Readiness for the Future of Production Report 2018'clusters Kenya as a nascent economy with a limited production base today and a low level of readiness for the future. 6 WEF defines readiness as 'the ability to capitalize on future production opportunities, mitigate risks and challenges, and be resilient and agile in responding to unknown future shocks. To enhance the resilience of the manufacturing sector through digitalization, the following measures need to be undertaken:

i. Support a well-embedded manufacturing ecosystem of start-ups and technology hubs.

ii. Support upskilling of industry personnel on digitization for increased industry competitiveness and productivity.

iii. Design and implement appropriate core processing systems (Enterprise Resource Planning solutions) with a bias towards manufacturing verticals.

iv. Design and implement appropriate data analytics and robotic tools for use by the manufacturers.

v. Build resilience (IT disaster recovery and business continuity planning) information systems and information processing systems for manufacturers. This includes assurance over the IT security around the core processing systems. vi. Strengthen internal control environment for the manufacturers. This will be achieved through design, implementation and embedding of Enterprise Risk Management.

Incentives to SME - Incentivize prompt payment culture –

- The National Treasury's Committee to validate and clear outstanding refunds in 2 months' time to publish the report and implement immediately.
- Implement the 60 days payment period provided for under the Public Procurement and Assets Disposal Regulations for 2020

Avail long term Financing to Manufacturers – to Drive firms' longterm liquidity during COVID-19 recovery period

- Incentivize saving institutions and pension funds to invest in the manufacturing sector.
    - Design an inclusive framework in the Kenya Development Bank to serve all sizes of manufacturing enterprises from startups, SMEs to large enterprises.

Public Governance and sustainable Manufacturing:

Environmental protection concerns started in Kenya long time ago from Parliament's passage of the Environmental Management and Co-ordination Act (EMCA) of 1999 and the creation of the National Environmental Management Authority (NEMA) (EMCA, 1999 part II § 7) to govern the environmental regulations. NEMA was charged with enforcing EMCA's provisions and the subsequent legislations. The government has established several policies legislative and institutional frameworks on the areas of water quality, waste management, controlled substances, biodiversity, wetland, river and seashore, and environmental impact assessment (EIA) regulations. These legislations are expected to govern all business activities to ensure environmental protection. NEMA is thus mandated to review and issue licenses and ensure compliance with existing environmental regulations. Additionally, the Kenya's constitution also expresses the rights of individuals to clean and healthy environment and assigns the obligation of individuals and the state on matters of environmental protection, conservation, well use of resources and ecologically sustainable development (United Nations, 2019).

History of environmental policies in Kenya: It has been argued that -Kenya's policy makers formulate major environmental policy measures and programmes only in response to international environmental conferences. For instance, it is the 1972 United Nations Conference on the Human Environment at Stockholm, Sweden, that resulted in the first ever National Environment Secretariat in Kenya. Similarly, the 1992 United Nations Conference on Environment and Development held at Rio de Janeiro, Brazil, resulted in Kenya's adoption of the National

Environment Action Plan in 1994. In the same vein, the passing of the Environment Management and Coordination Act in 1999 and the subsequent establishment of the National Environment Management Agency in 2002 came on the heels of the 2002 Earth Summit in Johannesburg, South Africa. There is an apparent lack of the requisite internal commitment and political will to follow these policies through their implementation.

Infrastructure Conditions:

Poor infrastructure in terms of roads, internet and basic services such as electricity, water supply, wastewater management and waste management are part of the challenges affecting sustainable manufacturing in Kenya. A study conducted in an Industrial area in Nairobi indicated that there is one energy utility and one combined water and wastewater utility, and no waste utility, though hazardous waste is incinerated in one central plant in Nairobi. There are no public recycling schemes for solid waste (Andersen et al., 2021). All non-recycled waste is taken by licensed trucks to the local dumpsite 'Dandora', Africa's largest dumpsite, which lies close by, where informal recycling is widespread and to a high degree run by the cartels. *The environmental infrastructure conditions* reported from an industrial site indicated a severe resource supply problems (energy and water shortages and blackouts) with less challenges for sinks (waste and wastewater handling). The conditions that seemed to drive the focus on innovations for resource productivity including resource savings, and circular innovations as well as strong perceived interest into circular innovations. There are some interesting indications that the Kenyan economy when it comes to materials (but less so on water and not in energy) may already be on quiet a strong circular technological trajectory relative to their degree of economic development. But the picture is varied, and more studies are needed to investigate this. There are, overall, still high potentials for green and circular innovations and none the least green product innovation, recognized by the companies' themselves.

REFERENCES

AfDB. (2020). African Economic Outlook 2020. Supplement- Amid COVID-19. African Development Bank Group. https://www.afdb.org/sites/default/files/documents/publications/afdb20-04_aeo_supplement_full_report_for_web_0705.pdf#page=60

Ageyo, J. & Muchunku, I. G., 2020. Beyond the Right of Access: A Critique of the Legalist Approach to Dissemination of Climate Change Information in Kenya. *Sustainability*, 12(1), pp. 2530-2541.

Anne, M., Nicholas, L., Gicuru, I. & Bula, O., 2017. Factors Influencing Sustainability Among FoodManufacturers in Kenya. *International Journal of Sustainability Management and Information Technologies,* 3(1), pp. 1-9.

Barczewski, B., 2013. *How Well Do Environmental Regulations Work in Kenya? : A Case Study of the Thika Highway Improvement Project.* Nairobi, Kenya: Center for Sustainable Urban Development.

Chege, J., Ngui, D. & Kimuyu, P., 2015. *Scoping paper on Kenyan manufacturing.* Nairobi, Kenya: Kenya Institute for Public Policy Research and Analysis.

COMESA, 2018. *Inclusive and Sustainable Industrialization.* Lusaka, Zambia: Common Market for Easter

Dutt, N., & King, A. A. (2014). The Judgment of Garbage: End-of-Pipe Treatment and Waste Reduction. Management Science, 60(7), 1812-1828. doi:10.1287/mnsc.2013.1827n and Southern Africa, COMESA.

EABL, 2020. *East African Breweries Limited in 2020.* Nairobi, Kenya : The East African Breweries Limited.

Fatoki, O., 2019. Drivers and Barriers to Sustainability Manufacturing Practices By Small and Medium Enterprises in South Africa. *Academy of Entrepreneurship Journal,* 25(3), pp. 1-8.

Food-Business-Africa, 2020. *DORMANS COFFEE – 70 years of investing in growth and quality enhancement.* [Online]
Available at: https://www.foodbusinessafrica.com/dormans-coffee-70-years-of-investing-in-growth-and-quality-enhancement/

Government of Kenya. (2017). Greening Kenya Industrial Zones: stimulating competitiveness and investments in the face of resource scarcity and climate change. Nairobi, Kenya: United Nations Environment Programme (UNEP) | Kenya .

Kenya Association of Manufacturers-KAM, 2014. *Kenya Association of Manufacturers Directory 2014.* Nairobi : Kenya Association of Manufacturers.

Kenya National Bureau of Statistics, 2019. *Economic Survey 2019.* Nairobi, Kenya: Kenya National Bureau of Statistics (KNBS).

Khisa, K., & Onyuka, A. (2018). Greening Kenya's Special Economic Zones and Industrial Parks: Achieving their Competitiveness in the face of Resource Scarcity and a Changing Climate Regime. International Journal of Innovation and Economic Development, 4(4), 31-46. doi:10.18775/ijied.1849-7551-7020.2015.44.2002

KNBS. (2020b). Economic Survey 2020. Kenya National Bureau of Statistics.

MANJI FOOD INDUSTRIES LTD, 2016. *MAINTAINING A GREENER ENVIRONMENT BY PLANTING TREES.* [Online]
Available at: https://yellow.co.ke/manji-food-industries-ltd/blogs/maintaining-a-greener-environment-by-planting-trees

Manufacturers, K. A. o., 2018. *Manufacturing in Kenya Under the 'Big 4 Agenda': A Sector Deep-dive Report.* Nairobi, Kenya: Kenya Association of Manufacturers.

MENR, 2016. *National Forest Programme 2016–2030.* Nairobi, Kenya: Ministry of Environment and Natural Resources, Republic of Kenya.

NEMA, 2010. *National Climate Change Response Strategy: Executive Brief.* Nairobi, Kenya: Government of Kenya.

NEMA, 2015. *Second National Communication to the United Nations Framework Convention On Climate Change.* Nairobi : National Environment Management Authority,Government of Kenya.

NEMA, 2021. *Launch of RRI on Effluent Discharge License.* [Online]
Available at:
https://www.nema.go.ke/index.php?option=com_content&view=article&id=284&catid=2&Itemid=464

Newman, C. et al., 2016. *Manufacturing Transformation: Comparative Studies of Industrial Development in Africa and Emerging Asia.* London, U.K: Oxford University Press.

Odhengo, P. et al., 2019. *Climate Finance in Kenya:Review and Future Outlook.* Nairobi, Kenya: The National Treasury.

Otieno, G. & Washington, B., 2017. *Agro-industrial Development Policies:What Nexus to Climate,Food Security, and Trade? Kenya.* Geneva, Switzerland: CUTS International.

Plitzer, M. & Krishnaswamy, R., 2007. The Role of Food and Beverage Sector in Expanding Economic Opportunity. New York, N.Y: FSG Social Impact Advisors.

Ronge, E. E. & Nyangito, H. O., 2000. *A Review of Kenya's Current Industrialization Policy.* Nairobi, Kenya : Kenya Institute for Public Policy Research and Analysis (KIPPRA).

Stavins, R. N., 2001. *Experience with Market-Based Environmental Policy Instruments.* Washington, D.C: Resources for the Future.

TheBusinessDaily, 2015. *World Bank confirms Kenya's lower-middle income status.* [Online]
Available at: https://www.businessdailyafrica.com/bd/economy/world-bank-confirms-kenya-s-lower-middle-income-status-2091060

UNEP, 2017. *Enforcement of Environmental Law: Good Practices from Africa and Asia (Volume II).* Nairobi, Kenya: United Nations Environment Programme.

UNEP. (2015). Sustainable Consumption and Production: A Handbook for Policymakers. Nairobi, Kenya : United Nations Environment Programme.

UNIDO. (2020). World Manufacturing Production, Statistics for Quarter I, 2020. United Nations Industrial Development Organization. https://www.unido.org/sites/default/files/files/2020-06/World_ manufacturing_production_2020_Q1.pdf

UNIDO. (August 2015). Economic Zones in the ASEAN: Industrial Parks, Special Economic Zones, Eco-Industrial Parks, Innovation Districts as Strategies for Industrial Competitiveness. Hanoi, Vietnam: United Nations Industrial Development Organization.

Zhang, B., 2012. Market-based solutions: An appropriate approach to resolve environmental problems. *Chinese Journal of Population Resources and Environment*, 11(1), pp. 87-91.