



PROMOTING LOCAL AGRO-PROCESSING IN NIGERIA: WAY FORWARD

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Abstract

Despite the economic growth reported in recent years, many African countries including Nigeria are facing an economic setback. Nigeria is importing a lot of processed foods despite its enormous potential in producing huge raw materials from the abundance of natural and human resources. Processing of locally grown crops and promoting the production and consumption of underutilised and locally processed crops will widen the horizon of the country's economy and improve the nutrition, health and livelihoods of the majority of the population. The article is intended to propose broad plans that will provide a seamless direction on how the local agro-processing industry will be holistically promoted. The ideas in this research were gathered from the pool of literature published online between 2016 and 2021. Promoting agro-processing will offer solutions to many Nigerian social and economic problems; will reduce postharvest losses and make more foods available, reduce poverty by increasing employment, reduce rural-urban migration, improve utilisation of local raw materials, increase government revenue, improve local technology, diversify the economy and preserve foreign reserve by reducing imports. The potentials of local agro-processing will be realised when a conducive atmosphere is granted for large-scale production in addition to the provision of the right knowledge and skills, adequate access to loans, developing local technologies, provision of basic infrastructure in rural areas and enacting policies that will promote local agro-processing. Achieving this require sincere commitments from the leaders at all levels of government.

Keywords: *small-scale processing, smallholder farmers, local processing, economic diversification*

Introduction

The economic transformation of Africa is among the debatable topics in the present world, the AU *Agenda 2063* with the title “*The Africa We Want*” is advocating for economic transformation in the continent (Richard *et al.*, 2018). The African economy is growing in the last two decades, an annual average growth of 5 % was reported during this period and four African countries; Ethiopia, Rwanda, Tanzania, and Uganda are among the ten fastest-growing economies in the world (Woldemichael *et al.*, 2017). It was projected that business-to-business spending in the African manufacturing industry will hit \$666.3 billion by 2030 (Signé and Johnson, 2018). Despite these developments, some African countries are still experiencing low and declining economic growth (Moyo, 2017). Some African countries produce huge raw materials for export but industrialisation in this part of the globe remains unsustainable and exclusive

(Moyo, 2017). Asogwa and Onyegbulam (2021) reported that agricultural value-added output in sub-Saharan Africa reduced the level of unemployment in the region by only 0.102 % between 2000 to 2017. More efforts are needed as most African countries including Nigeria depend largely on Asian and Western countries for processed and raw agricultural commodities (Mwinyihija, 2016), even though agriculture remains the main occupation for over 70 % of rural dwellers in Africa (Osuji *et al.*, 2020). The shortcoming resulted from the compounding issues bothering these countries. To mention but few, Adebowale (2016) reported that over 60 % (5.2 million tonnes) of the rice consuming in West Africa is imported despite the enormous production potentials. Crop production in the region is still characterised by low yield (Coker and Aliyu, 2019). Agricultural lands in Nigeria are small and scattered and farming activities are still in crude form (Abbas, 2019). Almost all the raw materials for the production of

various sugarcane products and by-products in Nigeria are imported despite a huge production advantage and foreseeing profitability (Oni, 2016). Other important challenges are food shortage caused by drought due to climatic changes and postharvest losses due to poor storage and transportation systems (Clark and Hobbs, 2018). The negative impact of the Covid-19 pandemic on the economy, nutrition, health and wellness, particularly among rural dwellers (Udongwu and Okeowo, 2020), is also worth mentioning. The foreseeing danger of climate change on the lives and economy of these countries is also of great concern (Ebele and Emodi, 2016). Inadequate finances, power challenges and corruption are among the major obstacles hindering the development of processing industry in Nigeria (Igwe *et al.*, 2018). Nigeria has all the needed resources for achieving food security (Abbas, 2019; Matemilola and Elegbede, 2017). Nevertheless, it is high time for the country and other African nations to change their economic landscape by ending the idea of importation and engage in local processing of their agricultural commodities (Evbuomwan and Okoye, 2017). The dwindling price of oil is an important reason that Nigeria needs to diversify its economy and reduce its over-dependence on oil revenue and import (Woldemichael *et al.*, 2017). Adama *et al.* (2016) and Matemilola and Elegbede (2017) reported that oil discovery in Nigeria discouraged agricultural activities, increased the level of hunger, malnutrition and diseases and cut down commodity export which contributed over 90 % of government revenue in the 1970s. The annual food production growth rate between 1970 and 1982 was stagnant at less than 1 % and there was a sharp reduction in the export rate during this period (Abbas, 2019). Since then, food import bills continue to increase swiftly. Ewetan *et al.* (2017) noticed a negative relationship between economic growth and agricultural outputs. Besides, it is unfortunate to mention that only a small fraction of the population is benefiting from the bulk of the oil revenue while the majority of the population hardly afford imported foods (Matemilola and Elegbede, 2017).

The Needs for Economic Diversification through Agro-Processing

Experts are optimistic that agro-processing will be the fastest-growing economic sector in Africa with a projected revenue increase of \$122 billion (Signé and Johnson, 2018). Woldemichael *et al.* (2017) opined that the best and easiest way for economic transformation in Africa is through agro-processing. Most African countries including Nigeria have a bunch of underutilised crops with many potentials, promoting the consumption of these crops, through domestication, commercialisation and processing, will certainly improve the nutrition status and economy of many African countries (Omotayo and Aremu, 2020). Moreover, a boost in food production is necessary to meet the need of the rising population (Abbas, 2019). The crop-production sub-sector represents 90 % of agricultural production in Nigeria (Evbuomwan, 2016). The food processing arm of the agro-processing

industry is multi-functional with many actors along the supply chain. When given due attention, the sector will contribute immensely to economic development and human wellbeing (Emeafor and Okpoko, 2018). With the huge transformation in the agricultural sector, the Nigerian government needs to tilt its attention to agro-processing, staple food processing zones should be established in rural areas (Evbuomwan and Okoye, 2017), this will benefit the farmers by increasing their profits and also benefit the consumers by reducing the price of the commodities. This seems sensible since 80 % of the rural population in sub-Saharan Africa are smallholder farmers (Senbet and Simbanegavi, 2017). In addition, small-scale food processing businesses are important to the economy of developing countries (Igwe *et al.*, 2018), they provide employment, reduce postharvest losses and improve food safety and quality (Uzojinwa *et al.*, 2016). Elikwu and Adio (2016) reported that agro-allied value chains are important to the growth and development of Small and Medium Enterprises. The move by the African Development Bank to collaborate with Federal and State governments and establish agro-processing zones is a welcome development, \$520 million was mobilised for the take up of the Phase I of the project in Kano, Kaduna, Kwara, Imo, Cross River, Ogun, Oyo and Abuja (ADB, 2021). The frequently occurring economic recession either due to the global economic meltdown or resources mismanagement is another important motive for economic diversification through agribusiness (Ajie and Uche, 2017). Engaging the rapidly growing youth population in agriculture will solve the employment problem and make raw materials for agro-processing more available (Yeboah and Jayne, 2018). Nigerian youth have a passion for agriculture and agribusiness. For instance, the findings of Akinngage and Ogundele (2019) revealed that about 98 % of youth in Ondo State have a positive attitude towards agriculture and most of them engage in grains and vegetable farming.

Promoting Local Agro-Processing

1. Education and Training

Providing adequate agricultural education remains the only absolute way for transforming agriculture and guaranteeing food security in Nigeria (Adama *et al.*, 2016). Achieving food security requires not only technological interventions but also behavioural change among farmers and other stakeholders along the supply chain (Clark and Hobbs, 2018). Meeting market demands in terms of quantity and quality required people with the right knowledge and skills (Ihemeje *et al.*, 2020a). Uncertainties can be adequately managed when managers are sufficiently trained on risk management (Lawal *et al.*, 2018a). Education of the labour force is a leading factor that determines the productivity of SMEs in Nigeria (Igwe *et al.*, 2018). Agribusiness education and vocational training are central to employment creation in Nigeria (Ogunleye, 2017). Agricultural education should be made compulsory to nurture the minds of the younger generations (Owoade, 2019). It is only through proper education new entrants can cope and withstand the

challenges in the market space. Nkhonjera *et al.* (2016) reported that starting agro-processing requires a deep understanding of the challenges in the value chain, including the historical development of the sector and the strategies adopted by existing competitors to survive and maintain their position in market space.

Going into agro-processing requires adequate knowledge, information, training and retraining (Khoza *et al.*, 2018). Sadiq *et al.* (2021) reported that the profitability of small-scale rice milling is determined by education level. Similarly, annual income in cocoa production depends greatly on the educational level (Segun, 2016). Akpan and Akpan (2020) also opined that the processing of oil palm can be improved by educating the processors through regular training. The potentials of youths will only be realised when the government invests hugely in the education and agricultural sectors, this will create multiple chances for youth and expand the horizon of job opportunities (Yeboah and Jayne, 2018). Eje *et al.* (2021) reported that the implementation of practical oriented curriculum at all levels will assist in reducing unemployment by producing graduates with excellent practical and conceptual agricultural skills. Vincent *et al.* (2021) reported that skill acquisition through entrepreneurial training contributed significantly to food value addition in Nigeria. The present tertiary entrepreneurship education was reported to be inadequate in moulding the student to become self-reliant (Elikwu *et al.*, 2018a). A thorough assessment needs to be conducted among youth before policy development and implementation, since many agricultural programs such as the Children in Agriculture Programme (CIAP) and Youth Employment in Agricultural Programmes (YEAP) failed to yield positive results (Umoh *et al.*, 2016). Educated youth can be attracted into the farming carrier by given them primacy while awarding intervention. Oratokhai and Eweka (2020) reported that more than 90 % of Fadama III program beneficiaries in Delta State are educated. Akinwekomi *et al.* (2017) also reported that 91.3 % of the youth engaged in agribusiness in Ogun State have tertiary education. Engaging educated youth will be advantageous since it is easier to communicate with them; it is also easier to teach them new techniques and to convince their psyche to accept new inventions. Improving the processing of locally grown crops requires a symbiotic relationship between research Institutions and the private sector (Abass *et al.*, 2018). Akintelu (2018) reported that rice processing industries do not interact with other stakeholders in the rice supply chain. It is important to establish a platform that will connect all the stakeholders in agro-processing, this will allow sharing of ideas, technologies and findings. The activities of organisations such as that of the National Office for Technology Acquisition and Promotion (NOTAP) should be expanded. Agro-processing companies should be enlightened on the importance of collaborating with NOTAP and other similar organisations, this will solve problems troubling small and medium agro-processing firms and contribute in bridging the gap between theory and practical. Agro-

processing industries can as well collaborate with research Institutions, Universities, Colleges and Polytechnics for technology transfer, researches and demonstration on the pilot and large scales processing. The adoption of new technology depends to the great extent on the educational level of the farmer (Omolehin *et al.*, 2020). Farmers should be ready to accept the technological innovations that are underway, researches are ongoing in the areas of agro-robotics and the use of artificial intelligence in many areas of food production (Osuji *et al.*, 2020). Commercial farmers and agro-processing companies should liaise with institutions of learning for cutting-edge researches in this respect, taking into account the peculiarity of our local farming and processing activities. Individuals in small and medium agro-processing should be educated on the importance of joining cooperative societies and maintaining good business relationships with suppliers and consumers (Adeleke *et al.*, 2020). Active cooperative societies are indispensable in promoting small-scale production and processing (Anka and Lohana, 2017).

2. Developing Policies that will Encourage Agro-Processing

Owoade (2019) reported that poor implementation of agricultural promotion policy remains the major hurdle against sustainable agricultural transformation in Nigeria. For Nigeria to benefits from any trade collaboration, the country must come up with a policy that will shun the importation of goods that are produced or can be produced internally and adequately support local processing industries (Oke *et al.*, 2019). Sustainable agribusiness that will address market demands requires establishing policies that will sustain the agricultural transformation agenda, which is said to be realised when a Nation achieved sustainable food security, generate more employment and reduces the incidence of poverty among the rural populace (Owoade, 2019). Developing a viable environment for successful agribusiness in Nigeria depends largely on the commitments of the State and Federal Ministries of Agriculture and Rural Development, Science and Technology and Finance. Developing cohesive policy that will play a leading role in promoting food production, technological growth, access to credit and a conducive export-based trade environment is necessary (Adenle *et al.*, 2017). Asogwa and Onyegbulam (2021) called for the development of policies that will promote job creation and regional integration in sub-Saharan Africa through value-added outputs. Investors can also be attracted by developing and promoting policies and strategies that will make agriculture less laborious and more profitable (Ewetan *et al.*, 2017). Nigerian government should concentrate on developing policies that will accelerate economic development and subsequently boost agriculture (Owolabi *et al.*, 2017). Lack of sustainable agricultural policy over the years tends to distract the progress in achieving food security. The present state of food insecurity, hunger, malnutrition and low earning from agriculture is an indication of failed agricultural policies (Igwe and

enterprises in Nigeria (Uzoejinwa *et al.*, 2016). Inadequate finance management skills make many new entrants fail (Nkhonjera *et al.*, 2016). The provision of adequate resources and sensitisation platforms will encourage youth to participate in agro-processing (Akinagbe and Ogundele, 2019). The provision of interest-free loans and interventions by government and donor organisations and training on financial risk management will certainly protect both new and existing businesses from collapsing. Many agricultural interventions were put in place by the Nigerian government and international organisations to burst agricultural production and facilitate agro-processing. This was done to ensure self-sufficiency in food production and to reduced dependency on oil revenue which is no longer reliable due to the instability of oil price in the global market. The Anchor Borrowers' Programme introduced by the Federal Government in 2015 provide farm inputs and cash for labour to smallholder farmers in Nigeria, the farmers were linked with agro-processing companies to sell their product after harvesting. The program recorded huge success in many locations. In Kebbi State, about 78,000 smallholder farmers in rural areas benefited from the program and many of them realised millions of Naira by selling their harvest to the connected integrated rice mills (Evbomwan and Okoye, 2017).

The report of Jenkins *et al.* (2018) revealed that agricultural interventions can improve farmer's income, but it cannot alone move rural farmers outside the poverty threshold, therefore, farmers need other sources to complement the shortfall and cross poverty border. Akinrinde *et al.* (2018) reported that the increasing incidence of poverty among rural people forces many to diversify their income. In the same vein, Echebiri *et al.* (2017) discovered that 65 % of Abia State rural farmers do not meet their daily food requirements. Income from off-farm businesses can have a negative influence on participation in agro-processing (Khoza *et al.*, 2018). Agbarevo and Nwankwo (2018) are confident that off-farm businesses will improve the income of rural farmers, likewise, full-scale processing and value addition through preliminary processing operations such as cleaning, sorting and grading and minimal processing under hygienic conditions can as well hike up the value of their harvest and uplift their income. Oni (2016) opined that the monopoly and import dependency in the sugarcane processing industry can be eradicated by providing small-scale sugarcane farmers with technology that will allow them to produce and processed sugarcane into various finished products and by-products. Agricultural-based economic growth will be achieved through proper maintenance of credible macroeconomic policies and debt-equity swap in the sector (Ademola, 2019). There is a need for the Nigerian government to come up with a loan policy that will allow small and medium agro-allied businesses to acquire heavy-duty technology, expand their present capacity and ensure food security in the country (Adeleke *et al.*, 2020). Another favourable alternative for financing small agro-processing is by equity financing,

government should provide this and make it easily accessible. Processors should be educated on the benefits of equity financing as an important catalyst for business growth and expansion (Ihemeje *et al.*, 2020a).

4. Enhanced Production

The success of agro-processing depends greatly on the ability to get the required amount of inputs regularly at a low cost (Nkhonjera *et al.*, 2016). Most agro-processing plants are running below their installed capacity, Akpan and Akpan (2020) reported that oil palm processing plants in Akwa Ibom State have a mean capacity utilization rate of only 53 %, indicating capacity utilization gap of 47 %. Promoting food production and processing is also necessary at this critical time when the level of malnutrition is increasing in the country (Evbomwan, 2016). Promoting the processing of crops such as sorghum which are majorly processed locally, mainly for traditional dishes (Deribe and Kassa, 2020), will provide diverse raw materials for food and feed industries. Achieving a modernised and commercialised processing industry and developing a poverty-reducing economy requires the implementation of a full-scale mechanised system (Mrema *et al.*, 2018). The use of mechanised devices is necessary for Nigerian agriculture to meet the needs of the accelerated population (Umar *et al.*, 2021). Self-sufficiency in food production can only be achieved through intensive investment in mechanised production and the use of modern processing equipment (Adebowale, 2016). Adopting mechanisation in the production of raw materials will increase yield and crash the cost of raw materials. Muinga and Marechera (2018) reported a 5-fold increase in the yield of cassava produced by mechanisation. Mechanisation can revolutionise farming and make the sector more industrious (Elikwu *et al.*, 2018b). High cost and lack of spare parts and experienced technicians continue to be the major impediments in using mechanised equipment in Nigeria (Umar *et al.*, 2021). Promoting irrigation is another way of multiplying harvest. Okwudili *et al.* (2020) reported irrigation among determinant for improving agricultural processed value chain and job creation in Nigeria.

5. Provision of Infrastructure

Developing an agricultural processed products value chain requires the provision of adequate infrastructure and storage facilities (Okwudili *et al.*, 2020). Proper postharvest handling and storage are prerequisites to successful value chain development (Ibrahim, 2017). The poor infrastructural facilities in rural areas, which are the agricultural base of Nigeria, continue to be the retarding factor for sustainable agricultural transformation (Owoade, 2019). Developing the agro-processing sector require a comprehensive strategy that will simultaneously coordinate market and physical infrastructural developments (Kumar *et al.*, 2020). Akinrinde *et al.* (2018) opined that the provision of infrastructures in rural areas will make farmers focus more on agricultural activities. Establishing agro-allied industries in rural areas will also improve their livelihood by providing basic infrastructure (Oraka *et*

Nwadike, 2021). The present constraints to the food production in Nigeria resulted from the failure of the government to come up with reliable and sustainable programs and policies over the years that will consistently maintain the food production rates according to population growth (Abbas, 2019). History shows that most agricultural development policies in Nigeria collapse before achieving meaningful success, this includes National Accelerated Food Production Project (NAFPP, 1972), Operation Feed the Nation (OFN, 1976), Green Revolution Program (1980), Directorate of Food, Roads and Rural Infrastructure (1986) and National Special Program for Food Security (2002) (Okunola, 2016). Mechanisms must be put in place to checkmate this persistent failure and ensure everlasting success in the present agricultural policies (Igwe and Nwadike, 2021). Nigeria should come up with a workable Agricultural plan and policy, also enact pro-agricultural laws that will ensure massive transformation of agriculture into a reliable commercial venture that will guarantee self-sufficiency in food production and secure huge foreign exchange through export (Fayomi and Ehiagwina, 2019). The recently introduced Agricultural Promotion Policy (APP) in 2016 by the Federal Government is expected to unlock many potentials in the agricultural sector and open extra doors for rapid economic growth and development. The policy identified the major challenges in the Nigerian agribusiness and come up with strategies that will solve the problems. The policy touches all the areas of agribusiness, the priority areas including ensuring safety and quality along the supply chains, partnership with the private sector, improving productivity, improving local technology, engaging government at lower levels, gender and age balances, education and training, opportunities for establishing agro-processing in rural areas and research and development (Odunze, 2019). The policy paves the way for attaining self-sufficiency in food production and an increase in foreign exchange earnings (Lokpobiri, 2019). The policy should be presented to the National Assembly for enactment into law to avoid the persistent practice of poor or partial implementation or even collapse (Lokpobiri, 2019). Okunola (2016) reported that the success recorded so far in the existing agricultural policy is due to either legislation backing or donations from the international organisation. Atteh (2021) also reported that National Special Programme for Food Security performed well in Niger State, the program should be expanded to include agro-processing and provision of storage facilities. Policies should be developed to reduce gender disparity in agriculture. The findings of Elem and Eugene (2019) and Obinna and Ejike (2017) revealed that women can contribute to socio-economic development through many businesses including agro-processing. The happenings in some places proved that, for instance, cassava processing is predominantly a woman's business in Kwara (Olatinwo *et al.*, 2018) and Ogun (Labi *et al.*, 2016) States. The majority (85%) of people in the maize processing business in Ife, Osun State are also women (Alabi *et al.*, 2018). Onuekwusi *et al.* (2020) reported agro-processing as the leading

occupation chose by women in South East Entrepreneurship Development Programme. Nevertheless, cultural and social barriers are limiting their participation in many areas of agribusiness. Priority should be given to women in all areas of agribusiness, Obayelu *et al.* (2020) observed a wide gender gap in this regard, women hardly own farms or processing plants they mostly work at their husbands' farms and in many cases without any pay. Given women the right of precedence while disbursing intervention and support will encourage their participation in agro-processing. It is also important to stop the rural-urban migration by checking the present situation of insecurity, farmer/herdsmen crisis, price and income instability in rural areas among others (Fayomi and Ehiagwina, 2019). This will reduce the burden on the cities and improve the economy of rural areas through farming, agro-processing and other related businesses. Recent happenings show that people in the cities cannot efficiently manage agricultural activities even if they have the financial means probably due to the dearth experience.

3. Adequate Access to Loan and Credit

Inadequate financing remains the major obstacle to the development of the agro-processing value chain in Nigeria (Okwudili *et al.*, 2020). Access to sufficient credit and disbursement irregularities are among the major constraints faced by farmers (Oratokhai and Eweka, 2020). Loan allocation to the agricultural sector fell from 19.6 to 3.7 % between 1996 and 2014 due to poor management and inadequate capital in the Bank of Agriculture and lack of interest by commercial banks (Evbomwan, 2016). Many farmers in the country cannot adequately invest in the business due to their hefty social responsibilities (Segun, 2016). Smallholder farmers in rural areas can be out of subsistence when they have adequate access to loans, intervention and effective technology that will improve their productivity (Owoade, 2019). Serious commitments are needed in this regard similar to that reported by Nduaguba (2016) in poultry, fruit and maize value chains in Enugu State and that reported by Fadairo and Alarape (2020) in *Psaltrey*; a cassava out-grower scheme in Oyo State. Huge capital investments and innovative ideas are needed to increase productivity and create more value addition in the agricultural sector (Olomu *et al.*, 2020). Evbomwan (2016) reported that only 3.0 % of the National budget was allocated to agriculture between 1981 and 2014. The desired growth in agricultural productivity will only be achieved if the credit size allocated to the sector is expanded (Ademola, 2019). Implementing a 7.23 % total factor productivity growth rate and adherence to 10 % funding to the agricultural sector will have positive impacts on the country's economy (Coker and Aliyu, 2019). Government should inject more capital into the Bank of Agriculture, more branches should be open across the country and more competent and experienced personnel should be employed (Muhammad *et al.*, 2017). Financial constraints and lack of management skills are the major challenges facing small-scale food processing

al., 2017). This can be achieved through the diffusion of new technology, provision of basic infrastructure, provision of modern irrigation facilities and addressing postharvest losses (Rahman and Awerije, 2016; Senbet and Simbanegavi, 2017). It is also important to ensure an even spatial distribution while designing any rural project or during resources allocation. Lack of spatial focus truncated success in promoting agro-processing (Tinubu *et al.*, 2017). For instance, rice milling is characterised by a good profit turnover ratio in Niger State, but unfortunately, the enterprise is not fully explored in this location despite the huge harvest (Sadiq *et al.*, 2021). Provision of physical infrastructure in agro-processing zones will as well facilitate agro-tourism, people interested in the processing activities will be trooping for information gathering and processing demonstration (Emeafor and Okpoko, 2018).

6. Promoting Indigenous Technology

In setting any agro-processing industry emphasis should be given to indigenous technology, upgrading and modernising these technologies will promote their adoption, expand their market at regional and international trade and attract foreign investors (Ogunleye, 2017). The main obstructions to the competitiveness of locally processed commodities are poor postharvest storage and processing technologies (Adebowale, 2016). Postharvest handling, storage and processing of perishable is bandage with persistence and tricky problems (Elikwu and Adio, 2016). Postharvest problems are also affecting stable products such as maize, grains processing industries are suffering from huge wastes which lead to limited output (Alabi *et al.*, 2018). Farm produce can be processed into stable products immediately after harvesting to avoid deterioration due to the shortage of suitable storage facilities. This will provide finished products with superior qualities and increase the income of the farmer since some raw materials can be completely converted into valuable products. For example, the whole yam tuber can be converted into food; in addition to the yam flour produced from the flesh, the peel which is fed to the animals in some places is also converted to flour and used as human food in other places (Oladipo *et al.*, 2020). Agglomeration of small-scale agro-processing companies into clusters can better their potentials, a great lesson is seen in Abakalaki rice processing clusters which also serve as trading markets (Ibrahim, 2017). Other examples are rice processing clusters in Kura, Kano and groundnut processing clusters in Dawanau, Kano. The internationalisation of small-scale agro-processing companies requires broad experience and international knowledge in addition to product quality and business profitability (Tetty, 2018). Innovations and creativity are key factors for sustainable technological development in agro-allied businesses (Ihemeje *et al.*, 2020b). The efficiency of the existing local technology can be improved by studying the strength and weaknesses of the local processes and the machinery, special training that will offer permanent solutions to the identified deficiencies will then be

organised to educate the processors as recommended by Olatinwo *et al.* (2018) in the case of cassava processing in Kwara State. Higher exchange rates limit the importation of many raw materials and processing equipment (Samuel *et al.*, 2017). There is a need to boost and improve local technology through process/product standardisation and fabrication of processing equipment. Ampah *et al.* (2021) reported that the provision of incentives by the government at various levels will surely facilitate local fabrications of food processing equipment. Exponential growth in agro-processing will be realised when locally manufactured chemicals and processing equipment will be used, this will prevent supply delay and ensure stability in the price (Signé and Johnson, 2018). This will definitely provide solutions to many local problems, improve utilisation of local raw materials, increase consumption of home grown commodities and more importantly preserve foreign exchange by reducing the cost of importation. The present success recorded in the rice processing sector is an indication that Nigeria has solutions to most of its local manufacturing problems. Akitelu (2018) reported that 65.7 % of the technological innovations in rice milling are indigenous and more than 82 % of the firms perform technological innovations themselves. Likewise, most of the unit operations involved in the processing of yam and cassava are successfully mechanised (Oladipo *et al.*, 2020). With the take-up of African Continental Free Trade, indigenous technologies may perform well and surpass in the African market. African Continental Free Trade is expected to offer greater market opportunities for many African indigenous products and technologies (Apiko *et al.*, 2021). Promoting indigenous technology and agro-processing is crucial to the Nigerian economy since the country has the largest market in Africa. Failure to promote local production will favour the influx of processed agricultural products and this will not favour local agro-processing. A similar scenario was observed by Oluwusi (2016) when ECOWAS Common External Tariff was implemented in 2015. Nigerian policy should favour only the importation of raw materials that do not grow under local climate (Samuel *et al.*, 2017).

Food processing wastes can be converted into useful materials with wide industrial applications through anaerobic fermentation. Significant amounts of methane and CO₂ can be obtained from slaughterhouse, dairy and beverage effluents (Alayu and Yirgu, 2018). Other essential products including single-cell protein can also be obtained through solid-state fermentation from various solid food wastes (Abdullahi *et al.*, 2021). The power supply can be improved in rural agro-processing zones by decentralising the national grid, provision of mini-grid adjacent to processing Estate will make maintenance easier, reduce tariff cost and lower transmission losses (Uzoma *et al.*, 2021). Power can also be generated from processing wastes. Wastes from agro-processing and food production are potential substrates for biogas production (Kemausuor *et al.*, 2018). Energy from food wastes is now used as a

convenient source of power for households and industries in some parts of the globe, e.g. China is powering 20,000 households from 40,000 m³ of biogas produced from agro-processing wastes (Alayu and Yirgu, 2018). Rupf *et al.* (2016) reported that food wastes can contribute up to 26 % of total energy production from biogas in sub-Saharan Africa. The issues of environmental pollution and climate changes must be given due consideration while promoting the indigenous technology, production of raw materials and their processing should not be energy extensive and should, by all means, possess the lowest possible ecological footprint (Dunmade, 2020). Agro-processors need to be educated on proper handling and discharge of processing wastes. Discharge of raw or inappropriately treated wastes is deleterious to the environment (Ebele and Emodi, 2016) and can affect production yield when discharged onto active agricultural lands. Palm oil processing effluent alters soil biological diversity (Atu *et al.*, 2017), cassava processing effluent has toxicological effects on the ecosystem, can lower soil and water qualities (Izah *et al.*, 2018; Lawal *et al.*, 2018b).

Recommendations

1. Nigeria is blessed with numerous agricultural commodities which when properly utilised will catalyse rapid economic development. The potentials of the numerous underutilised crop need to be explored and their tendencies for generating revenue through agro-processing need to be studied by researchers in Agronomy, Food Science and Agribusiness.
2. The minds of the upcoming generation can be persuaded by teaching agribusiness education in schools up to the undergraduate level, this will make them to develop an undying interest in agro-processing and kick off the business at any slight opportunity.
3. Modern farming that will provide multiple harvests in a year should be embraced by local farmers. Adopting emerging agricultural technologies such as hydroponic farming will increase production rates, allow the production of many crops year-round, stabilise the cost of raw materials, ensure their availability year-round and make farming more profitable.
4. It will be good for people involved in agro-processing and farming business to engage in other farming-related businesses that will maximise their profit, for instance, farm wastes and processing wastes and by-products can be used as animal feed when livestock keeping is embraced as a side business.
5. Reverting to the early agro-dependent economy operated in the 60s and 70s will propel the Nigerian economy and help the country to regain its position in global trade.
6. The supply of industrial raw materials such as staple grains and tubers, oil seeds and nuts and perishables that are very seasonal can be improved by providing farm machinery to smallholder farmers at a subsidised price.
7. Nigerian Agricultural policy at both federal and state levels should favour only the importation of raw materials that do not grow under the local climate.
8. Farmers and agro-processors should be encouraged to join cooperative unions since the disbursement of credit and other supports is done through the organisations.
9. For our locally processed foods to favourably compete with imported brands the local food regulatory agencies must ensure production of foods with acceptable quality and safety.
10. Government should come up with policies and projects that will change the mind-set of Nigerian youths to be more entrepreneurial and be ready to take risks in agribusinesses, this will make them more optimistic about agro-processing and willingly engaged in the production and processing of agricultural commodities.
11. Proper implementation of the 2016 Agricultural Promotion Policy by the Federal Government will overhaul the agricultural sector and catalyse rapid economic growth, but this will only be achieved when there are sincere political will from the leaders at all levels.
12. Implementation of continental and international policies by Federal and State governments shall be done with the assurance that they will favour our local agro-processing.
13. Government and private organisations should shun vague conditions while collaborating with foreign partners since history shows that some collaborators do not respect contract agreements (Langan and Price, 2020) or the deal will be bounded with defective consensus (Obasse and Onuoha, 2020).
14. Government at different levels should be giving equal priority to areas with equal potentials during resource allocation. Invention, support or project on agro-processing shall never be allocated to a place with inadequate raw materials or other indispensable resources. Raw materials availability, human resources and production capacity among the key ingredients in establishing a sustainable agro-processing business.
15. Government at different levels should do all the possible and reduce rural-urban migration.

Resources that will improve the economy and living conditions in rural areas should be provided. This will make the rural populace focus more on farming and agro-processing.

16. Federal and State governments must increase budgetary allocation for agriculture. Efficiency and sustainability will never be achieved in local food production and processing with the present meagre allocation to the agricultural sector. The allocation should be increased to 25 % as recommended by FAO.
17. A strong connection needs to be established between agro-processing industries and other stakeholders in the supply chain, including research and tertiary institutions.
18. It is also important to combat on-farm and off-farm postharvest losses and wastes. Postharvest losses can be curbed by improving agro-processing in the areas with abundant raw materials and also during seasonal glut.

Conclusion

The potentials of the local agro-processing industry will be realised when a favourable condition is created for large-scale food production and processing. Smallholder farmers and small-scale agro-processors must have adequate access to loans and credit, must be adequately trained to have the right knowledge and skills in their areas of practice and be ready to accept and implement new ideas. Government should develop and sincerely implement policies that will encourage local agro-processing taking into account the peculiarity of indigenous technologies. Government and local investors should focus on finding solutions to local problems from within by improving our local technologies through partnerships with research and educational institutions. Basic infrastructures must be provided in the rural areas for them to serve as a hub for large-scale food production and processing. Policies that will encourage the establishment of small and medium agro-processing companies should be endorsed. Products from small and medium agro-processing companies requires strict quality standards for them to positively compete with imported brands.

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