



# Nigerian Chemical & Engineering Industry

## MAGAZINE

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Engr. Oke, FNSChE

Process Safety In  
Sugar Industry

Engineers & Economic  
Development



Dr. Udoh, FNSChE

# AGRO PROCESSING

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Enrich Nigeria



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## NSChE VISION



“To be the Center of excellence for the Chemical Engineering Profession in Africa and the Prime Mover of Industrialization in Nigeria”.



## NSChE MISSION



“To organize the Nigerian Society of Chemical Engineers into a virile professional body capable of promoting the relevance and versatility of the profession, achieving better training and updating of Chemical Engineers through its activities. Fostering of relationships with the academia, research institutes, industries, other professional bodies and government will be the basis for stimulating accelerated industrialization of the country and improving the quality of life of the Nigerian people”.

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FROM THE

# Editorial SUITE

This edition of our magazine is another delivery of value to our teeming readers. Relax as you read and you will pick the values from the materials. The first deliverable is the versatility of chemical engineers depicted in the specialized groups created by the Nigerian Society of Chemical Engineer. We have Petroleum Upstream Group, Education and Research Group, Solid Mineral Processing Group, etc. The full list is in Executive Secretary's column. The Executive Secretary, on behalf of the Board of Directors, cordially invites fellows and members to make their choices as to which specific groups they can function effectively in their professional pursuits. The next deliverable is 'Process Safety'. Process safety sounds like a new discipline but it is really not new.

NSCHE is simply bringing it to the front burner. This is very important in the contemporary history of the process industry not only in Nigeria but the whole world because of the need to prevent catastrophic incidents. The adage, "Prevention is better than cure" is applicable to process industry as also applicable to other aspects of life activities. The Nigerian Society of Chemical Engineers has been inundated by several catastrophic incidents not only in the oil and gas industry but in other areas. As a concerned professional body, NSChE initiated and formed a body called Process Safety Initiative of Nigeria (PSIN) which has given opportunity for stakeholders to come together with unity of purpose to address issues of process safety.

In this edition, the article on 'Process Safety' presented by Engr. Olubunmi Oke, FNSChE pertains to the sugar industry. Read and search for the value.

Readers will also derive value from the article presented by Dr. Godwin Udoh, FNSChE. The topic is "The Role of Engineers in National Economic Development" This is a concise and lucid presentation pointing to the relevance of engineers in national development. Over the years, policy makers in our country keep bemoaning infrastructure deficit, yet we have teeming Nigerian engineers ever ready to tackle the problem and provide the necessary services. The paradox can be removed through deliberate engagement of competent Nigerian engineers in consultancy and other forms of contract in the development of infrastructure. The Nigerian content law, if well implemented in the oil and gas sector, serves as one of the enablers to promote the use of



**Engr. Donatus Uweh, MNSChE**  
**(Editor-in-Chief)**



indigenous professionals for national development.

Another presentation in this edition is the one by Prof. Oyebanji Oyelaran-Oyeyinka, FAEng, FNSE, FNSChE on the topic, "Prospect and Challenges in in Agro-Processing: Special Agro-Processing Industrial Zones.

Prof. Oyelaran-Oyeyinka, a polyvalent intellectual, a chemical engineer and a development economist, is currently serving as the Senior Special Adviser on Industrialization to the President of African Development Bank (AfDB). His presentation on agro-processing is exceptionally instructive. Leaning on Prof. Oyelaran-Oyeyinka's presentation, we can really ask the question, "Why

should policy makers in Nigeria be exporting jobs when agro-processing can readily serve the country as massive job spinner?" If we take the presentation with the seriousness it deserves, then sooner or later from our hearts and lips, we should begin to say "Gone are the days of exporting raw cocoa from Nigeria and importing cocoa-based finished products for consumption at the expenses of the value of the Naira. Cocoa, in this case, is just an example.

Again, leaning on a deep understanding of the value of agro-processing to Nigeria's economy and indeed of West Africa, the International Affairs Committee (IAC) under the umbrella of the Nigerian Society of Chemical Engineers organized the seminar which took place on June 20, 2022 where Prof. Oyelaran-Oyeyinka made his presentation on agro-processing to a very wide audience of participants. The concept of special agro-processing zones was unveiled as an appropriate template which can be used to implement wide scale agro-processing schemes in Nigeria.

His presentation was not just an advocacy but a realistic and implementable proposition that clearly points to agro-processing as holding a great promise which can bring about Nigeria's economic recovery and speedy transformation into an economic giant within the comity of nations. Read his presentation for all the details.

At this juncture, we express our deep appreciation to all the contributors to the successful publication of this edition.

**Happy reading!**

**Engr. Donatus Uweh, MNSChE**  
**Editor-in-Chief**

# CORDIAL INVITATION TO NSCHE MEMBERS AT HOME AND ABROAD TO JOIN ANY SECTORAL GROUP OF THEIR CHOICE

## 1.0 INTRODUCTION

The Nigerian Society of Chemical Engineers during her 48th NSChE Annual Conference which took place at OOPL Event Centre, Presidential Boulevard, Oke Mosan, Abeokuta, Ogun State between 8th - 10th November, 2018 officially launched the Nine (9) Sectoral Groups which were earlier constituted and approved by Council. The 10th Sectoral Group was later approved by Council in October 2020 and all the Sectoral Groups are currently operating at different levels of vibrancy. Please find below the list of the Ten (10) Sectoral Groups and their respective Co-ordinators.



**Engr. Samuel O. Bosoro**, MNSChE  
(Executive Secretary, NSChE)

## 2.0 THE LIST OF NSCHE SECTORAL GROUPS (SGS) & THEIR RESPECTIVE CO-ORDINATORS

SECTORAL GROUP (SG)	CO-ORDINATOR
a. Education & Research (ER)	Dr. Ibrahim Muritala
b. Solid Minerals Processing (SMP)	Engr. Ben Akaakar
c. Bio/Agro/Food/Pharma (BAFP)	Dr. Felix Ajuebor
d. Chemicals & Chemical Products (CCP)	Engr. Tunde Taiwo
e. Petroleum Upstream (PU)	Engr. Christopher Egwuatu
f. Petroleum Midstream/Downstream (PMD)	Engr. M. T. H. Williams
g. Health/Safety/Environment (HSE)	Engr. Wilson Dadet
h. Management/Consulting/Construction/ Services (MCCS)	Engr. Rotimi Ajayi
i. Computing & Systems Technology (CST)	Dr. Dauda Araromi
j. Energy and Power	Engr. Adekola Badiru

The quest to establish and execute programs which cut across the broad spectrum of Chemical Engineering practice and which meet the needs and expectations of the wide array of members of NSChE has beleaguered the Society over the years.

Sequel to this desire, NSChE Council approved the establishment of 10 Sectoral Groups stated above to cater to the breadth of Chemical Engineering practice in Nigeria. The prime objective is to provide an all inclusive platform for Chemical Engineers to participate in the activities and programmes of the Society. It is expected that no Chemical Engineer will feel alienated as everyone would fit into one Group or the other. It is envisaged that this action would create an enhanced sense of fulfilment among members while participating in the societal activities, make our conferences more attractive and worthwhile and also encourage more Chemical Engineers to join the Society.

## 3. AIMS & OBJECTIVES OF A SECTORAL GROUP

- To serve as rallying points for Chemical Engineers practicing in the sector, for networking, sharing of knowledge and sharing of experience.
- To promote best Chemical Engineering practices and professional

excellence in the sectoral area.

- To promote the relevance and importance of Chemical Engineering in the sectoral area.
- To create and foster a sense of belonging for Chemical Engineers in varied endeavours, within the NSChE family.
- To provide breadth and diversity in programs and activities of NSChE, thereby sustaining the interest, participation and membership of a broad spectrum of Chemical Engineers in the Society.
- To identify relevant issues and trends in the sectoral area and apprise NSChE as appropriate.
- To initiate professional positions on issues of policy and public interest arising in the sectoral area, in consultation with the Policy Advisory Committee of the Society.
- To promote the spirit of Chemical Engineering entrepreneurship in the sectoral area.

#### 4. OPERATING GUIDELINES FOR A SECTORAL GROUP

- i. Council shall designate a coordinator for each SG at the onset, for a tenure of 2 years. Once the SG activities commence, the Coordinator shall be expected to choose an Assistant Coordinator and a Secretary, after due consultation with subscribing members. These officers shall constitute the Working committee of the SG.
- ii. Each SG shall be expected to elect its Coordinator subsequently on expiry of the 2 year term of the appointed Coordinator. Elections shall also be held at the same time for positions of Assistant Coordinator and Secretary.
- iii. Members of the SG Working Committees may be eligible for election to office for three consecutive 2-year terms, after which they shall no longer be eligible.
- iv. The SGs shall be considered special organs of Council. The Coordinators shall therefore automatically become members of Council and shall be expected to attend quarterly Council Meetings, to represent their SGs.
- v. Each Coordinator shall submit a written report to Council in a format to be agreed with the Executive Secretary and approved by the BOD, quarterly.
- vi. SG activities shall be conducted mostly by electronic communication. Physical activities may also take place where there is a high

aggregation of members in a location. Each SG is however expected to hold a session at the Annual Conference of the Society. These activities shall be tailored to deliver on the aims and objectives, as outlined above.

- vii. An SG may request approval and obtain support from the National Secretariat or the BOD for major events which have potentials of providing value for the SG, NSChE and Chemical Engineers.

All NSChE Fellows, Corporate Members, Associates, Affiliates, Graduates etc are cordially invited to join at least one Sectoral Group or maximum two Sectoral Groups of their choice and participate actively in the activities of the Group(s) in order to derive the professional development benefit which these platforms offer.

*For further information, kindly contact the National Secretariat.*

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# PROCESS SAFETY AND PRACTICE IN INDUSTRY: SUGAR INDUSTRY IN NIGERIA AS A CASE STUDY

## 1.0 INTRODUCTION

The success of any production process is hinged on running without accidents or any unwanted stoppage. Any unforeseen circumstance that leads to an accident will affect the revenue of the company or even make it run out of business. The knowledge of process safety and practice, with proper implementation, is very important in order to keep companies, particularly dealing with hazardous substance,

in business. A Sugar Refining Factory or Sugar Refinery is not an exception. It makes use of many substances, processes and equipment which any mal-operation or lack of control can create an unsafe situation. Thus, it is necessary to have a system in place to prevent occurrence of accidents.

Process Safety as described by American Institute of Chemical Engineers (AIChE) is a disciplined framework for managing the integrity of operating systems and processes handling hazardous substances by applying good design principles, engineering and operating practices. It deals with the prevention and control of incidents that have the potential to release hazardous materials or energy. Such incidents can cause toxic effects, fire or explosion and could ultimately result in serious injuries, property damage, lost production and negative environmental impact. While occupational safety and health primarily covers the management of personal safety, process safety focuses on preventing fires, explosions and accidental chemical releases in chemical process facilities or other facilities dealing with hazardous materials such as refineries, and oil and gas production installations (wikipedia).

In sugar industries like other chemical handling facilities, process safety can be considered as the outcome or result of a wide range of technical, management and operational disciplines coming together in an organized way. Process safety involves, for example, the prevention of leaks, spills, equipment malfunction, over-pressures, over-



**Engr. Olubunmi Oke, B.Sc.,**  
M.Sc., MNSE, FNSChE  
Dangote Sugar Refinery Plc, Lagos

temperatures, corrosion, metal fatigue and other similar conditions. Process safety practices and programs focus on design and engineering of facilities, good maintenance practices for equipment, effective alarm systems, effective control points, procedures and training (wikipedia).

## 2.0 BRIEF ON SUGAR PRODUCTION INDUSTRY IN NIGERIA

Sugar production involves two stages: (a) processing of sugarcane or sugar beets into raw sugar and (b) processing of the raw sugar into refined sugar. All sugar factories in Nigeria are designed to produce raw sugar from sugarcane and all are incorporated with sugar refinery which refines the raw sugar. Sugar refining operations which dominate the sugar production processes in Nigeria convert imported raw sugar (from sugar cane) to refined sugar.

Information from National Sugar Development Council (NSDC) website indicates that Nigeria's total annual consumption of sugar from domestically grown raw sugar stood at 38,597 metric tonnes in 2019- 2.75% of total sugar processed in Nigeria, which was 1,401,891 metric tonnes. The balance of 1,363,294 metric tonnes was from imported raw sugar.

*“...Nigeria's total annual consumption of sugar from domestically grown raw sugar stood at 38,597 metric tonnes in 2019- 2.75% of total sugar processed in Nigeria...”*

Table 1 shows the annual sugar production, importation and consumption from 1990 to 2020.

Year	Consumption (Tons)	Production (Tons)	Importation (Tons)	Average Unit Price (\$/MT)	Importation Cost (\$)	Per Capital Consumption (Kg-Raw Value)	Local Production (%)
1990	645,248	41,478	603,770	440	265,658,800	n/a	6.43
1991	773,463	44,893	728,570	290	211,285,300	n/a	5.80
1992	598,986	32,420	566,566	280	158,638,480	n/a	5.41
1993	405,590	28,576	377,014	300	113,104,200	6	7.05
1994	360,060	22,814	337,246	340	114,663,640	6	6.34
1995	358,038	20,000	338,038	410	138,395,580	5	5.39
1996	525,985	12,104	513,882	370	190,136,340	5	2.30
1997	552,573	15,805	535,768	320	171,445,760	6	2.86
1998	773,264	9,850	763,414	310	236,658,340	7	1.27
1999	781,782	10,000	771,782	240	185,227,680	6	1.28
2000	771,890	36,000	135,890	270	198,690,300	7	4.66
2001	1,209,480	0	1,209,480	260	314,464,800	8	n/a
2002	1,009,165	0	1,009,165	260	262,282,900	11	n/a
2003	988,441	0	988,441	260	256,994,660	8	n/a
2004	865,000	0	865,000	265	229,225,000	9	n/a
2005	1,301,494	0	1,301,494	216	281,416,777	9	n/a
2006	1,176,698	50,000	1,126,698	175	197,172,150	9	4.25
2007	1,258,996	55,000	1,203,996	260	313,038,960	9	4.37
2008	1,393,668	35,000	1,358,668	241	327,438,988	11	2.51
2009	1,220,080	39,000	1,220,041	324	395,293,284	9	3.20
2010	985,615	30,000	955,675	505	482,615,875	7	3.04
2011	1,109,410	5,000	1,104,410	595	657,123,950	8	0.45
2012	1,104,980	6,843	1,098,137	411	517,222,527	7	0.62
2013	1,379,349	5,011	1,374,338	377.6	518,950,028.80	8.10	0.36
2014	1,445,816	12,345	1,433,471	441.39	632,719,764.69	8.60	0.85
2015	1,498,212	13,488	1,484,724	372.15	552,540,036.60	8.70	0.90
2016	1,584,724	25,000	1,559,513	330.96	516,156,280.08	9.10	1.58
2017	1,306,913	20,184	1,286,729	357	459,362,253.00	7.60	1.34
2018	1,231,028	14,918	1,216,110	271.37	331,312,430.10	6.80	1.21
2019	1,401,881	38,597	1,363,294	280.42	382,294,903.48	7.60	2.75
2020	1,531,411	***	1,531,471	283	433,406,293.00	7.70	n/a

Table 1: Nigeria's Annual Sugar Production, Importation & Consumption

NB: \*\*\* 2020 Crude sugar and consumption is taken as simple addition of yearly production and importation, although there are ending stocks that are not captured.

Source: National Sugar Development Council Website: <https://nsdcnigeria.org/nigeria-sugar-data>

## 2.1 BRANDS OF SUGAR IN NIGERIA

There are three sugar brands from three major sugar producing companies in Nigeria. These include:

- Dangote Sugar:** Dangote Group operates three plantations: Savannah (32,500 hectares) in Adamawa State, Lau Tau (30,000 hectares) in Taraba State and Tunga (78,000 hectares) in Nasarawa State. Dangote Sugar refinery in Lagos State processes imported raw sugar.
- Golden Sugar:** FMN Group operates one 10,000-hectare plantation in Niger State with one refinery in Lagos State.
- BUA Sugar:** BUA Group owns two plantations, LASUCO in Kwara State and Bassa in Kogi. Both plantations have a total size of 70,000 hectares. The company's two refineries are located in Lagos and Port Harcourt.

The sugar refineries operated by the three major players have a combined installed capacity of 3.63 million metric tonnes and

are estimated to be operating at about 70-75% capacity.

In line with the Federal Government's Backward Integration Program meant to achieve self-sufficiency in sugar, all the sugar producing companies are working to ensure that the Sugar Master Plan is achievable.

Sugar producing companies in Nigeria are the following:

- **Sugar Refinery:**

- \* Dangote Sugar Refinery PLC, Apapa, Lagos State (Dangote Sugar)
- \* BUA Sugar Refinery, Apapa Lagos State (BUA Sugar)
- \* Golden Sugar Company Limited, Apapa, Lagos State (Golden Penny Sugar)
- \* BUA Sugar Refinery, Port Harcourt, River State (BUA Sugar)

## 2.2 SUGAR FACTORIES AND OTHER PLANTATIONS

- Nigerian Sugar Company Limited, Bacita, Kwara State (Josepdam Group)
- Savannah Sugar Company Company Limited, Numan, Adamawa State (Dangote Group)
- Lafiaji Sugar Company Limited, Lafiaji, Kwara State (BUA Group)
- Sunti Golden Sugar Estate Limited, Sunti, Niger State. (FMN Group)
- Nasarawa Sugar Company Limited, Tunga, Nasarawa State (Dangote Group Project)
- Oyo Sugar Processors Limited, Iseyin, Oyo State
- Goronyo Sugar Company, Goronyo, Sokoto State
- Lau/Tau Sugar Project, Taraba State (Dangote Group Project)
- Great Northern Agribusiness Limited, Gagarawa, Jigawa State
- Others new Sugar Company located in Kogi State, Gombe State etc

## 2.3 SUGAR PACKAGING

- DOGAN'S Sugar Company and McNichols Cubing Company

## 2.4 SUGAR ESTATES IN NIGERIA

The following are the pictorial display of sugar industries in Nigeria



*Josepdam Sugar Company Limited, Bacita, Kwara State*



*Savannah Sugar Company, Numan Adamawa State*



*Sunti Golden Sugar Estates, Sunti, Niger State*



*Lafiagi Sugar Company Limited, Lafiagi, Kwara State*

## 2.5 SUGAR REFINERY IN NIGERIA



*Dangote Sugar Refinery Plc, Apapa, Lagos State*



*BUA Sugar Refinery, Apapa, Lagos State*



*Golden Sugar Company Limited, Apapa, Lagos State*



*BUA Sugar Refinery, Port Harcourt, River State*

### 3.0 SUGAR FACTORIES OPERATIONS

The major processing operations in sugar factories include the following as shown in Fig.1:

- Weighing of cane
- Cane Handling: Unloading, Conveying, cleaning, cutting with knives, shredding

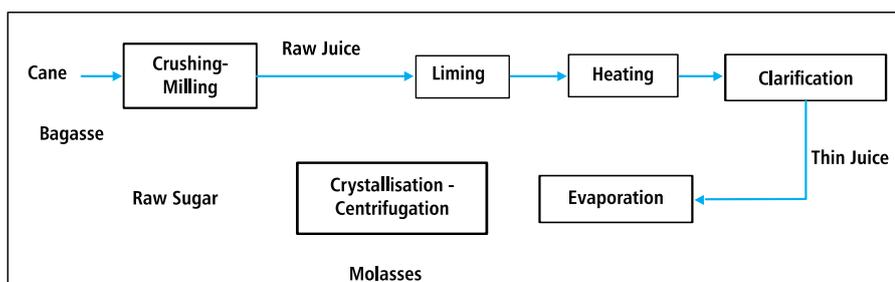


Fig 1: Process flow and operations in sugar factory

- Extraction of Juice (in roller mills) - Juice extraction by crushing the cane between massive rollers or diffusion method, addition of imbibition water
- Purification of Juice: Clarification - removal of both soluble and insoluble impurities, through clarification (or defecation) process, that universally employs lime and heat as the clarifying agents
- Evaporation: Concentration of clear juice in multiple effects evaporators
- Crystallization: Development of sugar grains in single-effect vacuum pans
- Centrifugation: separation of sugar grain in centrifugal machine
- Raw sugar melting or drying
- Sugar recovery

Utility services include water, steam and power generation and compressed air.

### 4.0 SUGAR REFINERY OPERATIONS

The major processing operations associated with refining of sugar include: Raw sugar melting, Clarification of Melt liquor, Filtration, Ion Exchange Resin Decolorisation, Evaporation,

Crystallization, Centrifugation, Drying, Sugar Recovery, Sugar Conditioning, Fortification and Packaging. Utility services applied include water, steam and power, and compressed air. These are shown in Fig. 2.

### 5.0 PROCESS SAFETY: PLANT DESIGN

A safe sugar factory or refinery is one designed to be user-friendly with reliable equipment. In such a factory, appropriate guidelines and safety signs which are easy to understand are provided for safe operations and maintenance activities. In designing and expansion phases of sugar refineries and factories consideration must be given to the principles of designing an inherently safe plant and other ways of making a plant user-friendly as highlighted by Kletz (1991). These principles include Intensification, Substitution, Attenuation, Limitation of Effects of Failures (by equipment design and changing reaction conditions), Simplification, Avoiding Knock-on Effects (by layout and in other ways), Making incorrect Assembly Impossible, Making Status Clear, Tolerance, Ease of Control and Software.

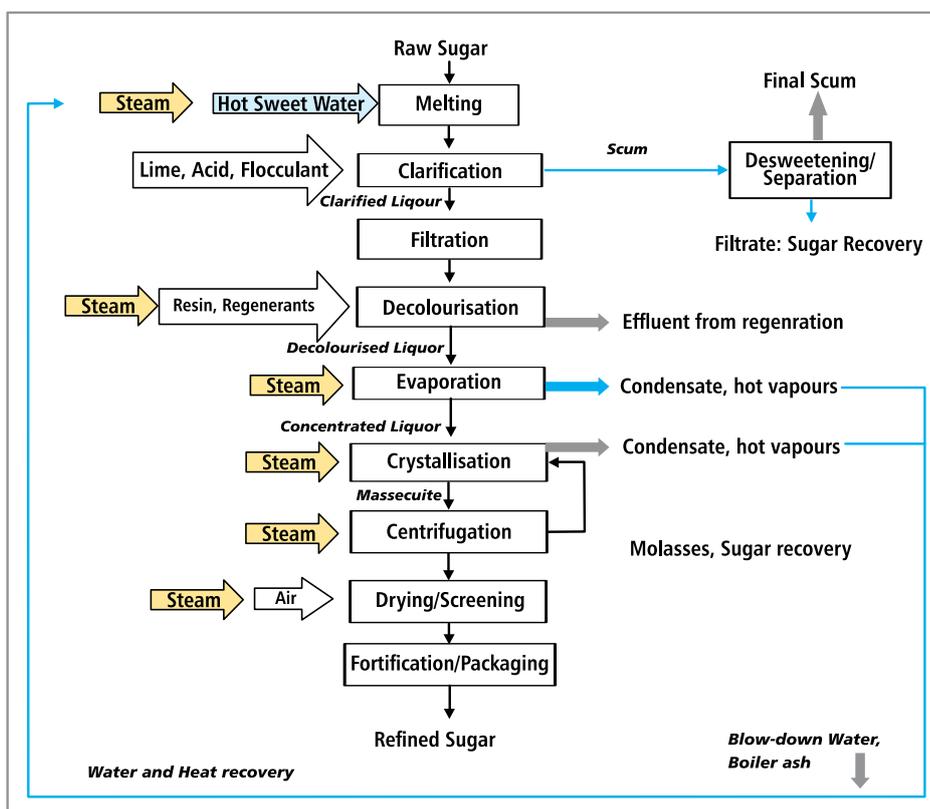


Fig. 2: Process flow and operations in sugar refinery

To run a sugar refinery safely, the designers and operators must recognize the need for safety of operators, technician, equipment and facilities as well as materials (output products and raw materials). Dangote Group for instance, implements “Occupational Health and Safety Management System, OHSMS (ISO 18001:2007)” in its sugar plant which brought about conducting hazard analysis in the refinery and other improvements to safety practice.

#### i. Hazard Analysis:

- During the implementation of the OHSMS, hazard analysis was conducted on all the activities in the refinery, the hazard, sources of hazard, nature of hazard were identified; control measures were assigned to all hazards while all identified hazards were rated based on probability of occurrence and severity to determine the risk rating.
- Risk register is created for this purpose and subject to review.

#### ii. Occupational Health and Safety (OHS) Program

- a. For all hazards with high risk rating, OHS programs are designed to prevent accident.

#### iii. Safety Policy:

The statement to achieve a safe working environment is well communicated and the responsibilities are shared between the management staff and non-management staff.

## 6.0 PROCESS SAFETY: PLANT OPERATIONS

To ensure process safety, the operations of the factory or refinery has to take into consideration the following factors and practices:

- i. Start up and shutdown procedure
- ii. Operation Procedure and Checklist
- iii. Safe Work permit System is in place.
- iv. Preventive/Corrective maintenance plan is in place.
- v. Modification of process line review and approval system is in place
- vi. Materials and spare parts inventory system is in place.
- vii. Team work approach is adopted to ensure safety and product output target.

*“To run a sugar refinery safely, the designers and operators must recognize the need for safety of operators, technician, equipment and facilities as well as materials...”*

- viii. Manpower and Shifting arrangement must be optimal for hitch-free continuous operations to avoid personnel fatigue.
- ix. Manpower training is essential to maintain competence in operations, familiarity with safety signs and compliance.
- x. Equipment monitoring/ checking particularly with the alarm systems to prevent abnormal process conditions such as over-pressure, over-temperature, over-flow, implosion, explosion etc.
- xi. Regular cleaning programs are embarked upon to enhance safety of the facilities.
- xii. 5S and Safe Workplace Systems: This is briefly described as follows:
  - a. Sort- Sort out all unnecessary items, keep only what is necessary
  - b. Set in Order- Arrange in position the necessary items
  - c. Shine- Sweep and shine the items and location
  - d. Standard- Standardize step 1 to 3
  - e. Sustain- Making 5S a habit
  - f. Safe Work Place- Safety awareness of all activities to identify and eliminate hazards for a zero accident and injury- free workplace
- xiii. Safety talk to propagate safety culture is common practice.
- xiv. Compliance Audit: This is briefly described below:
  - a. At planned interval, internal and external audit need to be conducted internally or by regulatory bodies to ensure that the safety procedures are followed. These often bring about suggestions on areas of improvement in the system. The management is to give priority to suggested improvement drives and back it up with required funds.
- xv. Emergency Planning and Response  
Plans must be in place for any emergency so as to reduce the effect of any accident such as call numbers, evacuation procedure, first aid, fire marshal, fire drill, standby ambulance, fire

*“Dangote Sugar Refinery has benefited immensely in her efforts to ensure that the refinery is user-friendly both in design and in operations...”*

station, emergency exit, fire extinguisher, fire hydrant, shower area, assembly point.

#### xvi. Incident Investigation

After all had been done, but the accident happened, all accidents must be investigated and the root cause of accident must be ascertained. Measures to correct the anomaly and prevent future occurrence must be suggested and put in place. Having known by experience that same accident may likely not happen in same position after reasonable solution, the solution in one area need to be applied in other similar cases.

## 7.0 PROCESS SAFETY: EXPERIENCE AND IMPROVEMENT

Owing to experience, over many years of operations and implementation of several standard, Dangote Sugar Refinery has been able to perfect the process of sugar refining in a safe environment, free of accident. There is also continuity in improvement drives through trainings, involvement of people and motivation. The following are noticeable:

- Quality Management Systems, QMS (ISO 9001:2015): improves the documentation in the company
- Food Safety Management System, FSMS (ISO 22000:2005): Bring about production of safe food products
- Occupational Health and Safety Management System, OHSMS (ISO 18001:2007): Improvement in occupational safety practices
- Food Safety Systems Certification, FSSC 22000: Make our food production worldwide recognized
- Administrative Controls/Procedures, Intensify safety procedures, safety talks, work permits, signage etc
- Installation Distributed Control Systems (DCSS) at Clarification station (Software)
- Relocation of empty bags (poly propylene lined with poly ethylene) store from bagging section

(operation area) to store located outside processing area. The store is without wiring or light bulbs that can cause fire (Attenuation).

- The use of non- scattered light shield all over process area (limiting of effect).
- Limiting the amount of empty bags in storage as well as other material in storage (intensification)
- Maintaining off-plant storage location for chemicals and provision of fire break for LPFO tanks ( Avoiding knock-on effects)
- Redesign and rearrangement of dry sugar bucket elevators and screw conveyors to avoid dust escape (limiting of effect)
- Replacement and Installation of modified dust extractor systems ( Attenuation)

## 8.0 PROCESS SAFETY: GAIN

Dangote Sugar Refinery has experienced immense benefits from their application of process safety principles and practices. The refinery is user-friendly in design, operations and implementation of quality standards. These benefits includes but not limited to the following:

- Confidence of the customers in products based on the quality of systems and products
- Building the confidence of staff and contractors to work without fear through safety talk and training
- Improvement in sugar yield from 95% to 96.5% which translate to more gain
- Assurance of security of life and properties by running the refinery without accident

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# MORPOL Engineering Services Limited



MORPOL Engineering Services Limited is a maintenance and construction engineering Service Company doing business primarily in the oil & gas, power generation and waste & water treatment industries in Nigeria.



## EXECUTED AND ON-GOING PROJECTS



### Our Services:

- Engineering Procurement
- General Engineering Maintenance/Calibration Services
- Equipment Overhaul
- Tank Refurbishment, Rehabilitation & Construction
- EPC Pipeline Construction
- Plant Refurbishment, Rehabilitation
- Installation of New Equipment and Facilities
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- Project Supervision and Management

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# THE ROLE OF ENGINEERS IN PROMOTING NATIONAL ECONOMIC DEVELOPMENT

## I.0 INTRODUCTION

The United Nations Sustainable Development Goals (SDG) include building resilient infrastructure with sustainable industrialization/innovation. This encompasses promoting inclusive, sustainable economic growth, and productive employment and decent work for citizens of all countries.

On the other hand, National Development is a comprehensive term which covers:

- improvement in living standard of the people
- increase in per capita income, providing social amenities like education, medical care, social services, etc. to the citizens of any country.

The key to achieving all the above set goals lies in the ability of Engineers to act as catalysts, and team up with other professional colleagues in all areas of Economic Development. We shall focus on some of these areas.

Engineering, as a whole, is the creative application of scientific principles to design or develop:

- Structures,
- Machines,
- Apparatus,
- Manufacturing processes, or works, utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design.

It becomes imperative for engineers to embark on Continuing Professional Development (CPD) - the means by which professionals maintain, broaden and deepen their knowledge, skills and competency.

## 2.0 CONTRIBUTIONS TO THE OIL & GAS INDUSTRY

### 2.1 OFFSHORE OIL & GAS PROCESSING ACTIVITIES

Over the years, Nigerian Engineers in various engineering disciplines have contributed significantly in design, construction, operation and maintenance



Engr. Dr. Godwin Udoh, FNSChE

of facilities and systems in the Nigerian oil & gas industry. They have continuously applied their expertise in Chemical, Civil, Mechanical, Pipelines, Information Technology, Health & Safety disciplines, etc.

At different onshore, offshore locations in the Oil & Gas production value chain, our engineers have participated in the following gas processing processes:

1. Condensate and Water Removal, Acid Gas Removal, Dehydration – moisture removal,
2. Mercury Removal, Nitrogen Rejection, NGL Recovery, Separation, Fractionation, and Treatment of Natural Gas Liquids, etc.

### 2.2 SUBSEA DEVELOPMENT CAPABILITIES

In order to achieve a higher output in crude oil production, our Subsea engineers and geologist have been responsible for designing, building, installing and maintaining the underwater components deployed for the oil & gas production. They also provide technical and engineering support and guidance to offshore or on site teams, as well as manage the installation of wellheads, on the seabed and the flow lines joining them to the platform.



Fig.1: Offshore Processing Systems

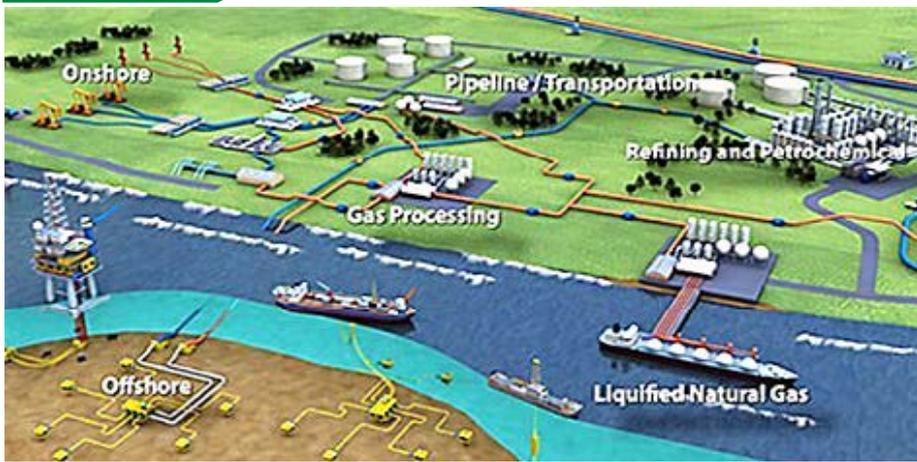


Fig.2: Gas Production/ Processing Field

### 2.3 PIPELINES TRANSPORTATION SYSTEMS

Engineers are required to design for the transportation of fluids from one point to the other through pipelines. This requires the determination of pressure drops in the system, selection of the proper type of pump, compressor, power required, and measurement of flow rates, etc. \* Transportation through pipeline is less damaging to the environment, less susceptible to theft, and more economical, safe, convenient, and reliable than other modes.

### 2.4 THE REFINERY /PETROCHEMICAL INDUSTRIES

The importance of the Refinery/Petrochemical industries in the economic development and growth sustainability of a country cannot be over-emphasized. Refining and processing reduce the environmental impact of oil and gas-derived fuels by removing harmful pollutants and improving their reliability during combustion. Other Products turned out from the Petrochemical industries include: Synthetic detergents, industrial chemicals, fertilizers, etc. These products have relevant application in various sectors of National Economic Development.

Nigerian Engineers play a vital role in the production of key refinery Products such as Liquefied Petroleum Gas (LPG), Naphtha, Kerosene, Diesel oil, Lubricating oil, Fuel oil and Bitumen.



Fig. 3: Oil & Gas SubSea Development



Fig.4: Pipeline Transportation Systems



Fig.5: Petrochemical plant

*“Refining and processing reduce the environmental impact of oil and gas-derived fuels by removing harmful pollutants and improving their reliability during combustion.”*

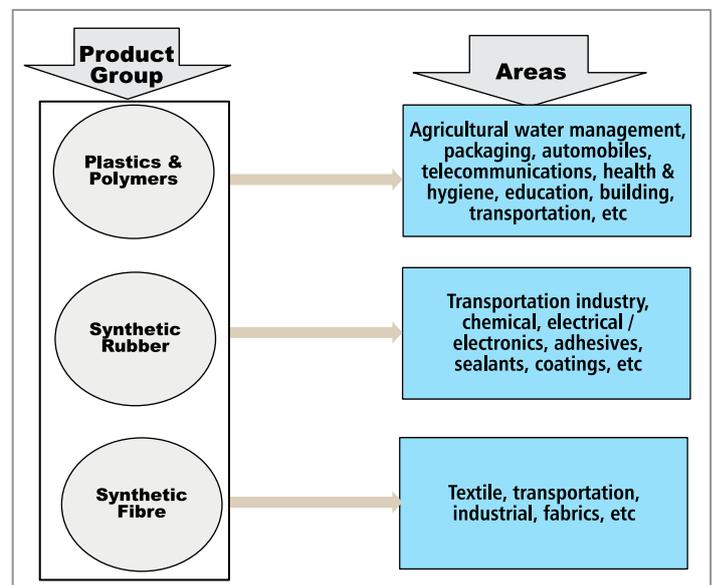


Fig.6: Petrochemical Socio Economic Linkage

### 3.0 CONTRIBUTIONS IN THE AREA OF INTERNATIONAL SHIPPING

International Shipping Enhances Global Manufacturing and Transportation. The Maritime Industry includes all enterprises that engage in the following:

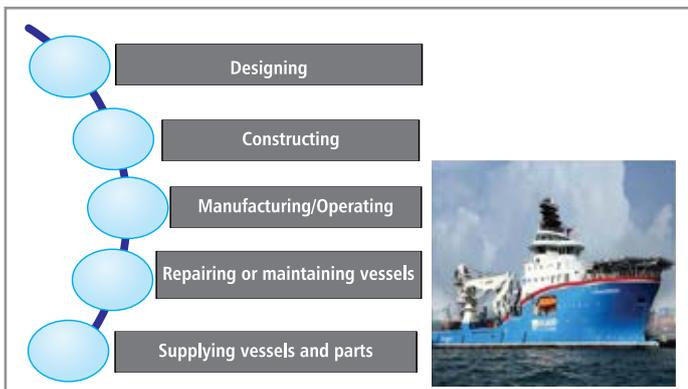


Fig.7.0 The Shipping Business

Over the years Nigerian Naval Architects/ Marine Engineers have been actively involved in ships design and transportation of goods through various types



Fig.8: Sea Port Layout



Fig.9: Crude Oil Tanker

of Sea liners, from one port to the other in different parts of the world.

Shipping allows the movement of liquids, gas and dangerous cargos. For this matter, there are certain regulations to keep the safety of the vessel, the crew, and the cargo. Our Certified Safety Engineers take responsibility for such activities.

Major types of tank ships include the oil tanker, the chemical tanker, and gas carrier. Tankers are cargo ships to transport fluids, such as crude oil, petroleum products, liquefied petroleum gas (LPG), liquefied natural gas (LNG), and chemicals, etc. The tanker sector comprises one third of the world tonnage

### 4.0 ENGINEERS PARTICIPATION IN FREE TRADE ZONES DEVELOPMENT

Free Trade Zone could be any airport, seaport, or any other selected area for zero-duty import of raw materials, spare parts, components, sub-assemblies, semi-finished or finished goods.

Characteristics of Free Trade Zones:

- \* Processing of raw and intermediate materials into finished products, thereby increasing local value added; generate more employment, industrial development and productive investment.
  - \* Exemption from all Federal, State, LG taxes, levies and rates
  - \* 75% Import Duty rebate on products of special nature where there is no local capacity
  - \* Up to 100% foreign ownership of businesses in the Zones.–generally available to all foreign investors
  - \* Quick turnaround for various approvals –e.g. consideration/notification of approval of licensing applications within 5 working days; building permits to be approved within 4 working days, etc.
  - \* Capability to attract Foreign Direct Investments(FDI)
- Free Trade Zone (FTZ) can be designed to encompass the following entities, among others:
- \* Agro-Allied industries
  - \* Petrochemical industries
  - \* Power Generation facilities

*Continued on page 20*

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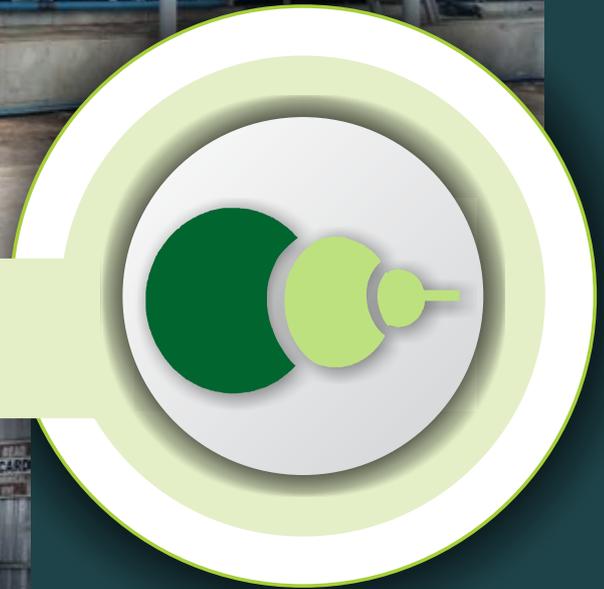
...nigerian coy, global spirit...

## What WE DO

- Oilfield TREATMENT CHEMICALS
- COMMODITY CHEMICALS
- Lab SERVICES
- DELIVERY TANKS & OILFIELD FACILITY UPGRADES
- Blending/Production OF OILFIELD & PROCESS CHEMICALS



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Rumuodara Port Harcourt 500001  
Rivers State, Nigeria.

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AN ISO 9001:2015, OHSAS, 18001:2007 & ISO 14001:2015 REGISTERED COMPANY





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**6 Ijora Causeway, Ijora Lagos State, Nigeria.**  
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- \* Liquefied Natural Gas(LNG) Export terminal  
These industries are capable of energizing National Economic development.

## 5.0 CONTRIBUTIONS IN THE AREA OF INFRASTRUCTURAL DEVELOPMENT

### 5.1 POWER GENERATION/ TRANSMISSION INFRASTRUCTURE

In the area of Power Generation & Distribution, Nigerian engineers are making great impact in ensuring that the existing facilities are monitored to ensure they operate as designed. Renewable (Green) Energy facilities are prioritized, in view of their environmental friendliness. These facilities include:

- \* Solar panels
- \* Wind farms
- \* Bio-mass- Bio-diesel from soybeans, animal fats, vegetable oils, etc
- \* Hydropower from flowing water
- \* Geo-thermal – from heat

### 5.2 CONSTRUCTION OF ROADS & BRIDGES

It is a known fact that countries with the best roads make mobility and distribution of goods and services faster and easier. This goes a long way to improve the bottom line of companies and improves the country's Gross Domestic Product.

The Nigerian Government is continuously



Fig.10:- Road Construction

*“Engineers, in collaboration with colleagues in various other disciplines have the responsibility to contribute significantly..”*

rehabilitating various roads across the 36 states of the country, with visible participation of our engineers

## 6.0 CONTRIBUTIONS IN NANO TECHNOLOGY APPLICATIONS

This is an area where Nigerian Engineers are making gradual impact, especially in research and subsequent applications.

Nanotechnology describes phenomena that take place at dimensions in the nanometer scale and are utilized in the design, characterization, production and application of materials, structures, devices and systems. Nano particles are applied in Bio-Engineering, Electronics, Textiles, Cosmetics, Waste water Treatment, Healthcare, Agriculture, Energy, etc.

Nano Technology supports continuous researches on new methods of manufacturing sustainable chemical products for industrial applications

## 7.0 CONCLUSION

Engineers, in collaboration with colleagues in various other disciplines have the responsibility to contribute significantly towards National Economic Development. This will entail an all-round and balanced development of different aspects and facets of the National life and support improvements in the standard of living of the people. Our expertise will be widely utilized in areas such as Agriculture, Mining, Manufacturing, etc. .

# PROSPECTS & CHALLENGES IN AGRO-PROCESSING: SPECIAL AGRO-INDUSTRIAL PROCESSING ZONES



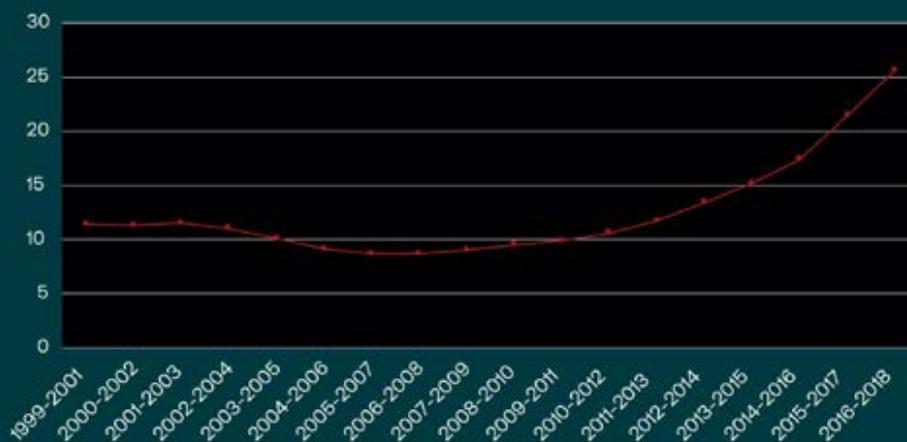
*Prof. Oyebanji Oyelaran-Oyeyinka,  
Senior Special Adviser on Industrialization to the President of  
African Development Bank*

**SEMINAR**  
THE NIGERIAN SOCIETY OF CHEMICAL ENGINEERING  
20TH JUNE 2022

A look at...

## SOCIO-ECONOMIC CHALLENGES

**MILLIONS ARE UNDERNOURISHED IN NIGERIA**  
(3 year moving average)



## AFRICA'S YOUTH BULGE > HIGH DEMAND FOR JOBS

Africa's median age is 20 years

41% of the population is under 15

60% of the population is under 25

Population growth rate of 2.7%, as the fastest growing continent.



# Challenge of unsustainable rural-urban migration

**01** Roots of Unsustainable Urbanization: SECURITY & JOBS

**02** In 60 if Nigeria's population grows at the same rate as now, Lagos will become the world's largest metropolis, home to **85 or 100 million** by 2100, will be more people than California or Britain. Nigeria will be 3rd largest after India & China.

**03** SECONDARY TOWNS: 75% cent of the Nigeria's population live in peri-urban/rural settlements of fewer than 100,000-500,000 people. Double or even triple in population over the next 15 to 25 years



## AGRO-INDUSTRIAL PROSPECTS & CHALLENGES

Agribusiness is a huge Industry but Africa faces Challenges:

- Low-Scale of Production compared with comparators
- Low Yield and Low Productivity across Agro-Processing Value Chains
- Low Agro-Industrial Value Addition

## GLOBAL IMPORTANCE OF AGRO-INDUSTRIAL PROCESSING



THE GLOBAL FOOD INDUSTRY IS...



4.7x bigger than the Automobile industry: **US\$1.3 trillion**



7x bigger than the IT industry: **US\$0.9 trillion**

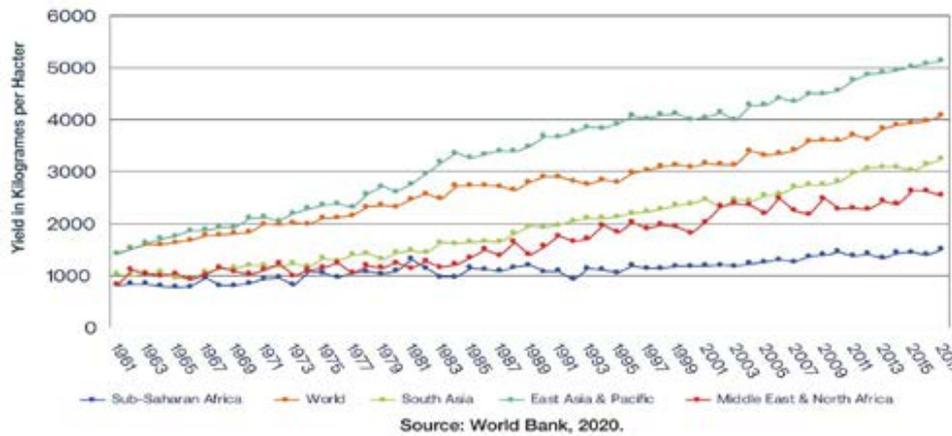


8.4x larger than the iron & steel industry: **US\$0.8 trillion**

Globally, the agri-food industry is the largest subsector of the manufacturing industries

- ✓ It represents 10% to 30% of this sector
- ✓ US\$ 8 trillion output
- ✓ 40 million employees in 2018

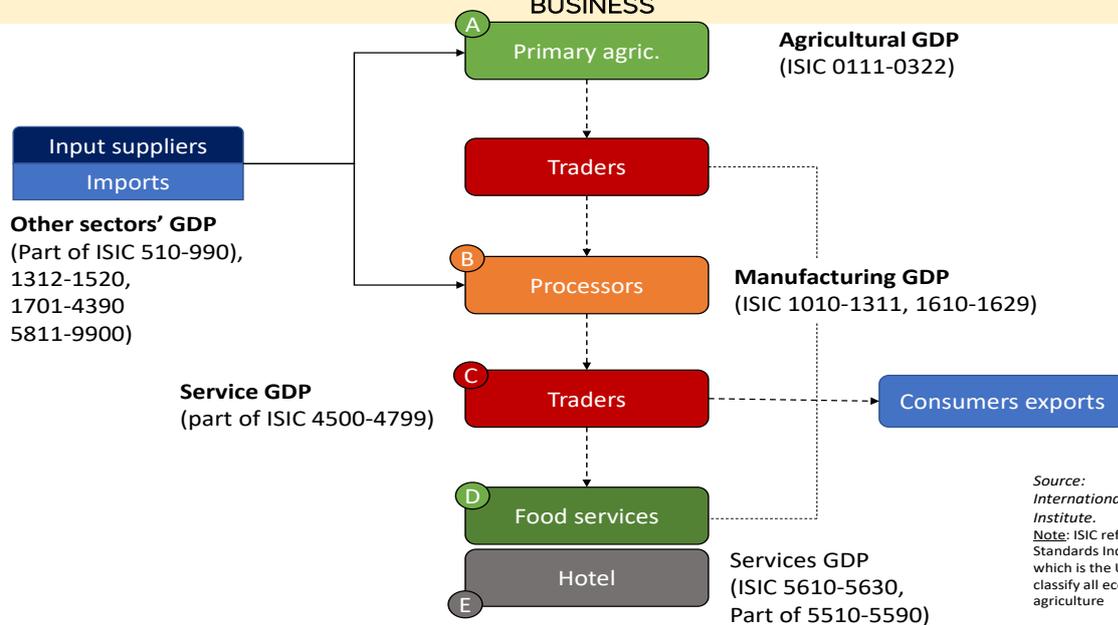
# CEREAL YIELDS BY REGION (1961 – 2017)



**SAPZ will raise productivity across value chains.**



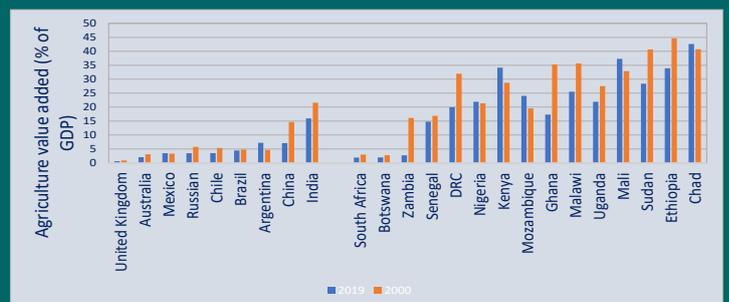
AGRIBUSINESS INCLUDES PRIMARY AGRICULTURE AND NONFARM FOOD AND NONFOOD AGRICULTURAL BUSINESS



## PRODUCTIVITY IN MANUFACTURING IS POSITIVELY RELATED TO GROWTH OF NON-MANUFACTURING e.g Agriculture

Figure 7: Agriculture value added (% of GDP) - 2000/2019

- Trend in Agriculture Value Added as a share of GDP in Sub-Saharan Africa compared to that of the rest of the world in 2000 and
- Agriculture Value Added (as % of GDP) is higher among Sub-Saharan African countries than the rest of the world.



High agriculture value added in SSA countries shows a LACK OF DIVERSIFICATION INTO HIGH VALUE HIGH PRODUCTIVITY PRODUCTS.

This means Africa continues its reliance on non-processed agriculture.

IN SUB-SAHARA AFRICA...

The values in 2000 range from 2.79% (Botswana) to 44.67% (Ethiopia)

FOR THE DEVELOPED COUNTRIES...

The values in 2000 range from 0.86% (United Kingdom) and 21.61% (India) in 2000

# THE MANUFACTURING SECTOR IS THE FOUNDATION OF INDUSTRIAL AGRICULTURE

- Industrial agriculture is heavily dependent on the use of machines and chemicals (pesticides, antibiotics, and others) to maximize the yield per acre.
- Industrial agriculture has been a main source of technology-driven productivity growth and organizational innovation for the most “industrialized” countries.

Yield numbers testify to the efficiency and productivity gains...

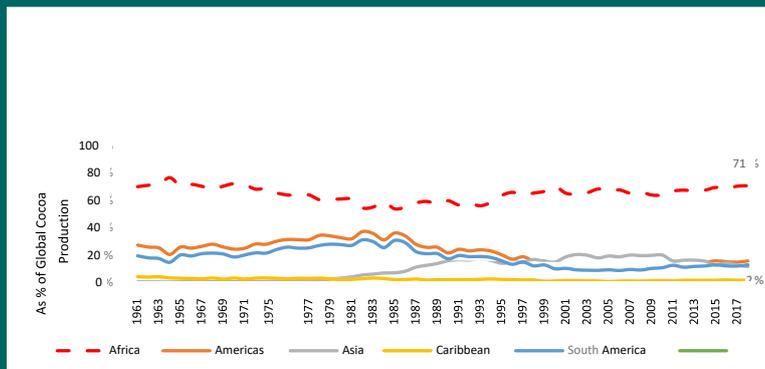
In 2019, the Netherlands exported **€94.5 billion** worth of agricultural goods  
Global Agri-foods in \$8 trillion: 8 times bigger than Global ICT

The global average yield of potatoes is about **9 tonnes per acre**  
Dutch fields regularly produce more than **20 tonnes per acre** due to industrial technologies



- The situation of **low productivity** applies across the full value chain both **ON-FARM** level (low crop yield) and OFF-FARM: Manufacturing processing & Services levels.
- It constitutes a barrier to structural transformation which requires that rising productivity frees up labour to move out of agriculture into manufacturing.
  - In other words, the level of value addition and crop processing of agricultural commodities is low
  - Post-harvest losses in sub-Saharan Africa average 30% of total production, meaning that the region **loses over US\$4 billion** each year.

## COCOA PRODUCTION IN THE WORLD, 1961 - 2019



Africa accounts for 70% world production of cocoa beans

- 80% of Africa's cocoa production is already sold even before it is harvested.
- Africa accounts for about **21%** of world's cocoa grinding but at most **1%** of the global chocolate market.

- Raw cocoa export = exporting jobs from Africa.
- In 2018 the chocolate industry employed about 70,000 people in the EU and USA.
- The global chocolate industry market in 2019 was valued at US\$ 106.6 billion; & \$147 billion by 2025.
- Africa's share of Cocoa beans export = \$6 billion
  - Africa only earns 3 – 6% of the chocolate industry's retail market value even though it is the main producer of cocoa.



# Cocoa production in **NIGERIA** is **250,000** to **400,000 tons** per year.

Nigeria exports about **85% of total cocoa production as raw beans. Only 15% is processed** into butter, liquor, powder and cake.

## INDONESIA processes 80% OF COCOA FOR EXPORT

- In 2019, processed cocoa products contributed over **\$1.01 billion** in export value.
- **Products:** cocoa liquor, cocoa cake, cocoa butter, and cocoa powder, with the main export going to countries such as the United States, the Netherlands, India, Estonia, Germany, and China.
- **Nigeria export 80% Raw Beans at value of \$240 million.**

## GLOBALLY, COCOA IS A \$100 BILLION ANNUAL MARKET

- Ghana and Cote d'Ivoire produce 70% of global cocoa beans: their share of market is less than 10%. **The bulk of the value goes to value adding chocolate producers.**

**OIL PALM: NIGERIA AND MALAYSIA same levels in the 1950s.** Malaysia developed a strategic industrial masterplan in 1956. Systematic investment in breeding and tissue culture developments 2020: Malaysia has **six million hectares of plantation while Nigeria has 10% of that at 600,000 hectares**

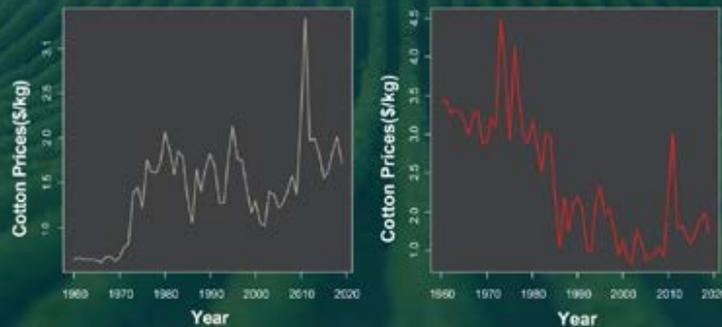
**Malaysia and Indonesia supply OVER 80% of the global palm oil.** Malaysia earned US\$16 billion from oil palm in 2018.

# Export of Raw Materials benefits mainly the Processors: **COTTON**



## NOMINAL AND REAL PRICES OF COTTON IN US\$ (1960-2020)

Nominal Prices Cotton US\$(1960)



Data Source: <https://datacatalog.worldbank.org> (Pink Sheet Accessed on 04-05-2020)

The **REAL PRICE** of cotton has **TRENDED DOWNWARDS** since 1960. Same with other Commodities.

- Countries exporting the same quantities of cotton annually since 1960 receive **less export revenue today** than they did in **1960**.

Introducing...

# SPECIAL AGRO-INDUSTRIAL PROCESSING ZONES

# SAPZ KEY GOALS AND OUTCOMES

## KEY GOALS

### ENHANCE PRODUCTIVITY

Increase yields through the use of modern technologies (improved seed, fertilizers, mechanization, digitization, irrigation)

### REDUCE POST-HARVEST LOSS

Link farmers to markets, develop primary processing facilities

### REDUCE COST OF OPERATIONS

Share facilities and economies of agglomeration

### INCREASE VALUE ADDITION

Use modern processing to increase value to all value chain actors especially farmers and consumers



Agriculture Value Chain Development

## KEY OUTCOMES

1. Reduce food imports
2. Assure food security/nutrition, at low and stable prices
3. Boost Revenue from Agricultural exports
4. Create wealth for rural farming communities
5. Create new sustainable jobs, especially for the youth
6. Enhance 'hope', reduce restlessness and crime
7. Boost rural livelihoods and rural-urban drift
8. Revival of stranded public and Private sector funded Assets



## STRUCTURE: SPECIAL AGRO-INDUSTRIAL PROCESSING ZONES

01

SAPZs are designed to concentrate agro-processing activities within areas of high agricultural potential.

02

They enable agricultural producers, processors, aggregators and distributors to operate in one vicinity reducing transaction costs and sharing business development services for increased productivity and competitiveness.

## STRUCTURE: SPECIAL AGRO-INDUSTRIAL PROCESSING ZONES (2)





## ENABLERS OF SAPZs

### ENABLER I: ENERGY & INFRASTRUCTURE

- SAPZs will provide facilities, & services delivery not available outside of zones
- Zones to provide a productive business environment by responding to the nationwide binding constraints, such as inflexible and constraining regulatory regimes, and inadequate trade logistics in a limited area;
- Zones to provide power, water, rails, telecommunications and roads;
- Raise levels of Investment in the above



### ENABLER II: ECOLOGY - LAND & LOCALITY

- This refers to the Location and Locality of the SAPZs
- SAPZ promotes economic benefits that accrue when firms cluster their activities together. These include reduced costs from:
  - a) cheaper inputs and raw materials due to proximity;
  - b) firms enjoy greater benefits from specialization of labor;
  - c) Shared Information and reduced transaction & search costs
  - d) Firms realize gains from increasing returns to scale (or economies of scale)



## ENABLER II: ECOLOGY: LAND & LOCALITY (continued)

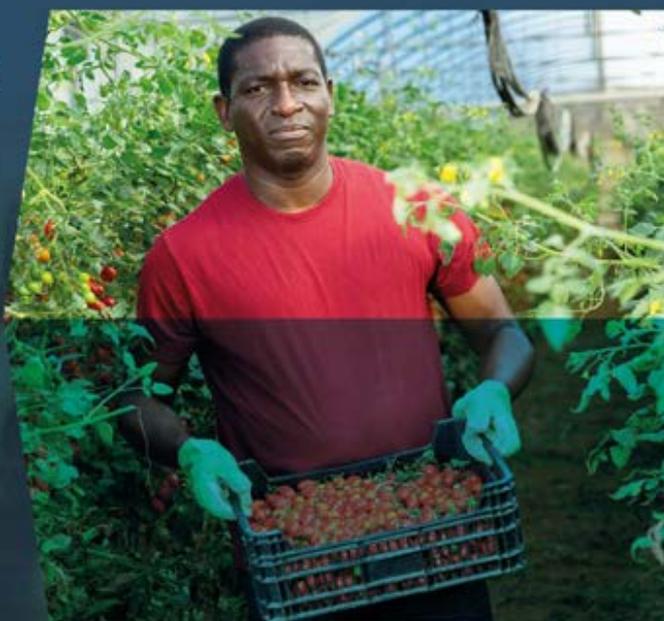
### WHY SAPZs IN PERI-URBAN AREAS?

- D SAPZs will be deliberately located in Secondary Towns promote rural development;
- D Secondary Cities are the economic backbone of the world's largest cities; contribute a huge per cent of the world's GDP
- D Secondary cities are 2<sup>nd</sup> cities and towns coming behind the “primate” cities which often are capital cities.
- D They are not fully integrated into national systems: they experience huge infrastructure deficits, weak human capacity, high levels of under- and unemployment,
- D SAPZs will revitalize their economies to promote balanced development;
- D SAPZs as an Industrial Policy tool induce industrial development of these secondary towns and ;  
Reduces “Migration of Despair” from Rural to Urban (the poor ends up in Slums)

### ENABLER III: ENTERPRISE CLUSTER FORMATION

SAPZs will consist of business and economic actors:

- D Leading Actors : Anchor investors;
- D A strong skills base or potential skill base that can be developed;
- D Large firms that sub-contract to SMEs;
- D Access to finance, critical component.
- D Agglomeration of Farmers linked to Zone Hubs
- D One-Stop Centre to reduce bureaucracy



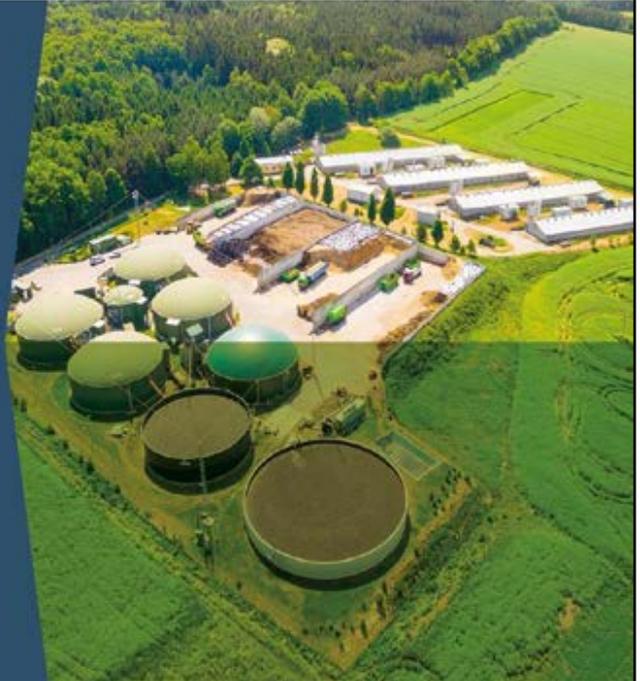
### ENABLER IV: ENABLING INSTITUTIONS

- D SAPZs supported by sound (predictable and transparent) legal and regulatory framework: for clarity of roles and responsibilities, protection and certainty to the developers and investors
- D A sound framework ensures that zones attract the right investments, implemented with high standards and avoid unpredictable risks, such as political setbacks or interference and land speculation
- D High-level leadership and inter-agency coordination



## ENABLER IV: ENABLING INSTITUTIONS (continued)

- D** Strong and long-term government commitment from the top leadership to ensure policy continuity & provision of various public goods
- D** Platform for dialogue and cooperation mechanism among the central, provincial and local governments;
- D** Cooperation across government agencies as a zone program involves many government stakeholders in charge of such factors as land, transport, utilities, customs, taxation, finance, immigration and skills



## ENABLER V: ENGAGEMENT: PARTNERSHIP & COLLABORATION

- D** SAPZs will rely on public-private collaboration; namely, outsourcing, public-private partnerships (PPPs) to ensure success
- D** Engage PPPs as an innovative mechanism for funding projects in SAPZs to optimize costs, create jobs, improve delivery and increase the quality of performance
- D** SAPZs to leverage Learning and Horizontal Linkages. A Network of Africa's SCPZs can be established to enable better learning and exchange of best practices facilitated by this Partnership



# EXAMPLES OF COUNTRIES WITH SUCCESSFUL INDUSTRIAL PARK EXPERIENCE

## CASE 1: INDUSTRIAL PARKS IN KOREAN ECONOMY

STATUS OF INDUSTRIAL PARKS (2012)



구분	Number of Parks	Area (1000 m <sup>2</sup> )	Companies	Workers (1000 People)	Production (bil. \$)	Export (bil. \$)
National Industrial Park	41	792,287	46,352	1,072	6,796	267.4
Local Industrial Park	497	493,984	23,082	664	3,087	151.0
Urban High Tech Park	11	2,271	152	1	1.6	0.01
Agricultural Industrial Park	444	70,963	6,208	139	489	11.6
Total	993	1,359,505	75,794	1,878	10,374	430.1

Total number of industrial parks (2020): 993  
 65% of manufacturing production, 76% of exports, 44% of manufacturing employment

## CASE 2: INDUSTRIAL ZONES IN THE VIETNAMESE ECONOMY



- Industrial zones in Vietnam fueled by Foreign investment.
- December 2019, there were 376 industrial zones, with 249 already in operation. The occupancy rate reached 73%.
- By 2018, industrial and economic zones attracted 7,500 domestic projects worth US\$41.75 billion and around 8,000 foreign projects with a total capital over US\$145 Billion.
- In 2019, Vietnam generated export earnings of at least US\$ 3 billion from each of the following commodities – cashew nuts, rice, cassava, fish, coffee, tea, black pepper, and rubber – resulting in total agricultural export revenue of US\$ 40 billion.
- Vietnam’s key attraction to foreign investors is qualified low cost of labor.
- Strong Political and Bureaucratic Support & Ease of Doing Business.

## CASE 3: SPECIAL ECONOMIC ZONE IN GABON



# Nkok SEZ achieved significant impact in just 8 years!

SIGNIFICANT IMPACT ON THE ECONOMY... AND POSITIONING OF GABON AS A PROCESSING POWERHOUSE



## SAPZ PROGRAMME IN NIGERIA



### MAJOR CLUSTERS FOR PRIORITY VALUE CHAINS: PHASE 1



# MAJOR CLUSTERS FOR PRIORITY VALUE CHAINS: PHASE 2



The solution:

## WHAT WILL SAPZ DO?

### 1 Agro-Processing will Resolve the Perennial Foreign Exchange and Volatility Challenges

- The twin approach of growth strategies rely on imports substitution and exports of goods and services.
- As imports, grow however, so must the rate of export revenue in order to sustain economic growth.
- Promoting relative balance of payments stability in order to:



- Secure the value of the domestic currency
- Secure reliable foreign currency inflows, a country needs faster export revenue growth.

A key challenge is our concentration on exports of oil and primary goods with relatively low-value added while importing high value-added goods including capital and intermediate goods.

### 2 Resolve the Rural Poverty and Insecurity Problems



- SAPZ will resolve one of the most important sources of poverty especially among rural farm workers: low agricultural productivity.
- To demonstrate the vast differences in productivity, note the following: [The OECD projects maize yields in 2029 will range between 2.7 t/ha in Sub-Saharan Africa and almost 12 t/ha in the United-States, the largest maize producer and exporter in the world. Similarly, average rice yield in Australia is expected to reach 12.4 t/ha in 2029.](#)
- We must use of agronomic inputs (fertilizer, pesticide, irrigation) and the implementation of good cultivation practices on the most suitable lands.
- **Mass Unemployment/Poverty:** There is a link between unemployment, poverty and crime, especially among young people.
  - It is clear that government will be unable to provide employment for all, but it should ensure that individuals live in an environment that is conducive and supportive of their livelihood and personal development.

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## It will bridge infrastructure deficit and foster manufacturing



- Earlier estimate of Nigeria's infrastructure deficit at \$100 billion annually is three times the total 2021 federal budget, projected at \$34.51 billion.
- **Industrial development depends on hard, soft and advanced infrastructure.** Electric power, water/sanitation, roads, railways, ports and airports propel all modern production structures such as factories and agricultural value chains.
- Consider how global productive agricultural economies work: they are heavy users of chemicals, fertilizers, pesticides and agricultural machinery. The world's most productive service economies rely on top-tier computer technology, transport equipment and, in some instances, mechanized warehouses.



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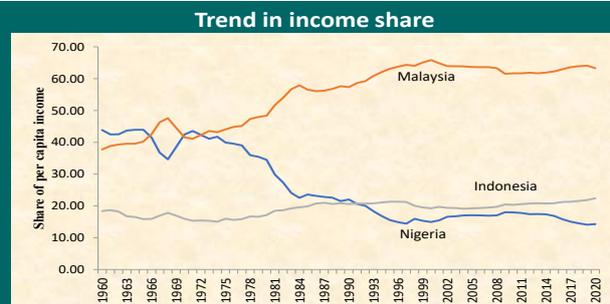
## Break the Dependence on oil and raw material exports



- "Nigeria will continue to remain at the bottom of global wealth table measured by GDP as long as it is a raw materials and oil exporter."
- In National Accounts, GDP measures value-added **not materials buried under the ground like oil, nickel or copper.** **Africa hardly adds value to its vast raw materials assets.** In Nigeria, cocoa production fluctuates between 250,000 to 400,000 tons per year. Nigeria exports about 85% of total cocoa production as *raw beans* and only process and mostly export the remaining 15% into butter, liquor, powder and cake.

• **Contrast:** Indonesia's cocoa industry processes nearly 80% of the output for exports. In 2019, processed cocoa products contributed over **\$1.01 billion** in export value.

→ Ghana and Cote d'Ivoire produce 70% of global cocoa beans but their share of this market is less than 10%. The bulk of the value goes to value adding chocolate producers.



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## Institutions and Leadership



- One of Nigeria's historical challenges is seen in the emergence of institutions that oppose industrialization. An **enclave economy such as oil tends to breed rent-seeking behavior promoting widespread corruption.**
- Rent seeking as different from profit seeking expends huge resources to gain a larger share of existing wealth rather than create new wealth.. **In effect, Nigerian elite by their behavior have sabotaged every industrial initiative ranging from iron and steel, petrochemicals/refineries, aluminum, fertilizer projects to name a few.**
- In our society with fragmented and diverse ethnic groups, what benefits the powerful in politics and bureaucratic groups disadvantages the economic performance of the country. The patronage system operates in a way by which rulers and their political organizations profit through giving rewards to key constituents who keep them in power.
- Powerful bureaucrats also benefit not by supporting production but rather by taking control of resources and allocating such in ways that promote cronies and political allies.

## 6

## Embark on Urgent Economic Diversification through faster modernization of agriculture



- Countries like South Korea, Malaysia and Indonesia paid attention to what one might call *Lead Sector Sequencing* started with **modernizing subsistence agriculture**. Nigeria should reset and pursue an active industrial strategy taking agri-business as its base while continuing to promote other industrial sectors, and the services sector that have driven most African economies.
- While the country is challenged with poor power supply, use the strategy of *localization of industrial zones* such as the AfDB's **Special Agro-Industrial Processing Zones (SAPZs)**. Economic history has shown that without diversification into industrial manufacturing including modernized agribusiness and services, and away from simple resource extraction, **the long-term development prospects of countries are always bleak**.
- A strong link exists between the poor state of export diversification and the dismal nature of employment creation. Creating meaningful and stable employment usually requires relatively high and stable growth. SAPZs have the potential to create massive jobs for youth.

### Steps to this approach are:

- Leaders must foster peace and maintain harmony among its diverse multi-ethnic states to ensure stability in the rural and urban areas;
- Use the SAPZ to modernize the rural areas & modernize agriculture where the country has comparative advantage;
- Design industrial productive economy to stem rural-urban migration;
- Ramp up govt support for infrastructure to connects all parts of country targeting productive capacities and human capital buildup;
- Facilitate industrialization by deliberate industrial technology coordination: from light to heavy industries, from labor- to capital-intensive production



### Nigeria is at an inflection point of history.

Nigeria is crying for leadership that is accountable and is incorruptible. Leaders that will husband our assets to achieve tangible outcome by putting forth and aggressively implementing a Bold and Compelling industrial Agenda for our country.

We need transformational leadership that puts the broader collective interest over and above self and sectional -interest. A transformational leader, who desires to serve, cannot possibly serve God and mammon at the same time. The pursuit of self-aggrandizement is antithetical to the pursuit of the greater good.

We need leadership that will weave our diversity into national cohesion; we need leaders who will lead a renaissance for Industrial transformation.



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