FMARD
FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

PPP TRANSACTION FOR 33 SILO COMPLEXES IN NIGERIA

BUSINESS CASE

February 2016

LION'S HEAD global partners

MYSILO® TAHIL DEPOLAMA SİSTEMLERİ

YOEB CONSULTANTS LIMITED

CPCS

Benchmac & Ince

Triple 'E' Systems

Name:	Lion's Head Global Partners LLP	Primary Contact:	Bim Hundal
Address:	29-35 Old Queen Street	Telephone:	+44 207 340 0400
	London, SW1H 9JA	Email:	bim.hundal@lhgp.com

NB Front Image – Ikenne, Ogun State Grain Silo Complex, courtesy Alvan Blanch.

1. Glossary of Acronyms

A/P	Accounts Payable
ATA	Agricultural Transformation Agenda
BSADP	Borno State Agriculture Development Programme
D/E	Debt to Equity Ratio
DSCR	Debt Service Coverage Ratio
EIRR	Economic Internal Rate of Return
FEC	Federal Executive Committee
FGN	Federal Government of Nigeria
FMARD	Federal Ministry of Agriculture and Rural Development
FMCG	Fast-Moving Consumer Goods
FMOF	Federal Ministry of Finance
GDP	Gross Domestic Product
GES	Growth Enhancement Scheme
GMP	Guaranteed Minimum Price
IRR	Internal Rate of Return
Kg	Kilogram
MT	Metric Tonne
NGN	Nigerian Naira
NIRSAL	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending
NPV	Net Present Value
pa	Per Annum
pcm	Per Calendar Month
PPP	Public Private Partnership
PSC	Public Sector Comparator
RfP	Request for Proposals
SCF	Standard Conversion Factor
SDR	Social Discount Rate
SGRD	Strategic Grain Reserve Department in FMARD
STPR	Social Time Preference Rate
USD	US Dollar
VFM	Value for Money
WACC	Weighted Average Cost of Capital

2. Executive Summary

The findings from the Business Case can be summarised as follows:

2.1 Grain Market

- There is an active 25m MT+ per annum grain market in Nigeria.
- This market – in terms of supply and demand - is expected to grow by 2.5-3% per annum.
- Market activity is distributed across the country, but climatic and population density factors create higher demand at specific silo complexes.
- The market is dominated by small scale farmers and traders but there are a growing number of commercial grain producers and industrial offtakers.
- Grain storage facilities:
    - Have the potential to have a substantial impact in terms of reducing waste and making more efficient supply chains at scale;
    - Are in high demand by farmers and offtakers.
- This demand for storage, handling and processing services is sufficiently robust to support operations without government guaranteed utilisation.

2.2 The Financial Valuation

- The valuation model used Discounted Cash flow and Multiples analyses to assess the value of the silo complexes.
- The Net Present Value of commercial operation of the silo complexes is **NGN 25.8bn**.
- On a risk adjusted basis, the private sector will create **NGN 4.34bn** additional financial value.
- The estimated present value of the cost of operating the silo as a grain reserve is **NGN 207bn**.

2.3 Risk Analysis

- Key risks relating to the silo complex are operational risks and access to capital.
- The private sector is best placed to manage these risks.
- The government is able to partially mitigate these risks by:
    - Contractually bearing some of the demand risk;
    - Creating a transparent and predictable policy environment for public private partnerships and investment;
    - Leveraging concessional/public sector capital to unlock trade finance.

2.4 Economic Analysis

- Commercialising the silo complex operations through private sector engagement unlocks **NGN 99.3bn** economic value.
- On a risk adjusted basis, the private sector will create **NGN 51.5bn** additional economic value versus a public sector operator.

2.5 Proposed PPP Models

- PPP models allow the government to define how risks and returns are allocated in engagement with private sector partners
- In this case a **concession model is the optimal approach**.

2.6 Implementation Timeline

- Given the Presidential Pre-approval of concessioning the silo complexes, and the FMARD eagerness to execute the transaction swiftly, we propose the following timeline for transaction implementation:

Deliverable	Activity	Time to Complete	Est. Date
Market outreach	Regional Stakeholder Meetings	4-6 weeks	15th Mar - 4th Apr
	Bidder Conference	6-8 weeks	18th April
	Report	8 weeks	25th April
RfP Documentation	Submitted for Approval	8 weeks	25th April
RfP Process	Proposal Launch	9-12 weeks	2nd May
	Submission Deadline	17-22 weeks	27th June
	Proposal Evaluation	1-2 weeks thereafter	4th July
	Approved Bidders Named	2 weeks thereafter	11th July

3. Introduction

3.1 The Transaction Context

The Federal Government of Nigeria (FGN) through the Federal Ministry of Agriculture and Rural Development (FMARD) in collaboration with the Federal Ministry of Finance (FMOF) and in accordance with the National Policy on Public-Private Partnership (PPP) is in the process of exploring options for partnering with the private sector for the management and operations of 33 grain silo complexes in Nigeria.

This decision is in line with the FGN reform agenda and its strategic vision of firmly establishing PPPs as a viable option for the operations and management of Silo infrastructure for storage of grains in Nigeria. In this connection, the FMARD is taking steps to concession Silos built across the country by the FGN.

3.2 The Assets involved in the Transaction

These silo complexes are distributed over 33 sites across Nigeria. The silos are in various states of operational viability. The complexes have been planned and constructed to store grains purchased by SGRD on behalf of the FGN and distribute grains according to government policy.

3.2.1 Operational Silo Complexes

The first category of thirteen silo complexes were constructed and commissioned from 1988 to 2006. These complexes have therefore been operational for a significant period of time. As a result, some rehabilitation work may be required to reach maximum operational capacity. However, they are fundamentally ready for immediate inclusion in the transaction, provided that existing commitments made by the FGN to third parties for management and operation of the sites are no longer binding.[1]

Silo Location	State	Year	Size (MT)	Condition (1-100)	Grain Stored (MT) (Est. at YE 2014)
Akure	Ondo	1991	25,000	85%	97.37
Ezillo	Ebonyi	2012	25,000	87%	N/A
Gombe	Gombe	1988	25,000	89%	10,057.00
Ibadan	Oyo	2006	25,000	87%	841.70
Ilorin	Kwara	2006	25,000	64%	1,855.88
Irrua	Edo	1994	25,000	75%	N/A
Jahun	Jigawa	1998	25,000	91%	3,920.98
Jos	Plateau	2006	25,000	93%	9,989.76
Kaduna	Kaduna	2011	25,000	59%	7,379.00
Lafiagi	Kwara	1988	11,000	82%	N/A
Makurdi	Benue	1991	25,000	98%	1,402.00
Minna	Niger	1991	25,000	96%	11,345.40
Ogoja	Cross-River	1991	25,000	92%	N/A

[1] FMARD has allowed a private partner (Grand Cereals) to rent 4 of the 10 storage bins at the Jos Silo Complex for NGN 6,000,000 p.a.

In 2009, the FGN began a process to construct a further 20 silo complexes distributed widely across the country. Construction contracts were tendered and work began with contracts legally dictated to run from 2009-2010, but have been extended to the point of completion of each complex.

3.2.2 Constructed Silo Complexes

The second category of silo complexes are those six complexes where the construction contracts have been completed. These silo complexes can become operational immediately, but as with the first category, may require additional investment to provide the full complement of equipment. Four of the silo complexes are untested and therefore uncommissioned and do not contain grains. Two of the silo complexes have been tested and therefore did contain grains when the locations were visited by the due diligence teams. As with the operational silo complexes above, these are ready for inclusion in a transaction. The silo complexes in this category are:

Silo Location	State	Year	Size (MT)	Condition (1-100)	Grain Stored (MT) (Est. at YE 2014)
Bulasa	Kebbi	2014	100,000	92%	Unused
Dutsin-Ma	Katsina	2014	25,000	87%	Unused
Ikenne	Ogun	N/A	25,000	92%	Unused
Ilesha	Osun	2012	25,000	95%	Unused
Kwali	FCT	2012	100,000	82%	1,778.32
Sokoto	Sokoto	2013	25,000	94	10,738.5

3.2.3 Silo Complexes Under Construction

The third category of silo complexes analysed are those under construction with theoretically ongoing contracts for their completion. There are eleven silo complexes in this category in varying states of readiness, but all require installation of equipment necessary for storing grain at the complex. The complexes at Okigwe, Gusau, Gaya and Ado-Ekiti are closest to completion; lower condition assessments at e.g. Lokoja reflect more substantial issues, but in all cases there is scope to quickly complete the complex. On that basis, we recommend including these complexes in the transaction but note that the return expectations will be lower due to the higher upfront investment requirement.

Silo Location	State	Year	Size (MT)	Condition (1-100)	Grain Stored (MT) (Est. at YE 2014)
Ado-Ekiti	Ekiti	N/A	100,000	79%	N/A
Bauchi	Bauchi	N/A	25,000	64%	N/A
Gaya	Kano	N/A	25,000	82%	N/A
Gusau	Zamfara	N/A	100,000	91%	N/A
Igbariam	Anambra	N/A	25,000	0%	N/A
Jalingo	Taraba	N/A	25,000	13%	N/A
Lafia	Nasawara	N/A	25,000	13%	N/A
Lokoja	Kogi	N/A	25,000	17%	N/A
Okigwe	Imo	N/A	100,000	91%	N/A
Uyo	Akwa-Ibom	N/A	25,000	33%	N/A
Yola	Adamawa	N/A	25,000	87%	N/A

3.2.4 Excluded Silo Complexes

The final category are silo complexes that have been excluded from the transaction and this analysis on the basis of discussions with the client. There are three silo complexes in this category. Two are excluded on the basis of security concerns. Both are in the North Eastern geopolitical zone and close

to conflict areas; at Maiduguri, in Borno State, the silo complex has been reportedly requisitioned by the government as a temporary military base. One silo complex at Yenagoa in Bayelsa Sate is excluded on the basis that no construction has been undertaken. The silo materials have been delivered to the complex location but the site selected for the complex is not suitable for the foundations to be laid.

Silo Location	State	Year	Size (MT)	Condition (1-100)	Grain Stored (MT)
Yenagoa	Bayelsa	N/A	25,000	Site selected	N/A
Damaturu	Yobe	N/A	25,000	N/A	N/A
Maiduguri	Borno	N/A	100,000	Requisitioned by FGN	N/A

3.3 Utilization of the Silo Complexes

The storage capacity of the silo complexes is used for government-owned grain; the exception is that 10,000 MT capacity is allocated to Grand Cereals at the Jos Silo Complex in Plateau State.

The FGN's participation in Nigerian grain markets has been linked to:

- Guaranteed Minimum Price (GMP) policy, whereby the government acts as the buyer of last resort and purchases a limited volume of grains annually through Licensed Buying Agents, solicited on the basis of a public tender with a fixed purchase price;
- The Strategic Grain Reserve Policy which sets a target of storing the equivalent of 5% of locally produced grains, but which is not implemented at that level; and
- Distribution of grains from the Strategic Grain Reserve locally and internationally to reduce food insecurity in times of extreme scarcity.

Procurement and distribution of grain under these policies is essentially conducted at the discretion of the Federal Executive Committee (FEC). The SGRD implements decisions made at the FEC level by:

- Calculating the GMP according to an agreed formula
- Publicising the GMP and issuing a public request for proposals to supply grains at that price
- Evaluating proposals and selecting grain suppliers
- Purchasing a FEC-determined volume of grains at the GMP
- Storing these grains in government-owned storage facilities including:
    - operational grain silo complexes; and
    - 48x 2,000 MT capacity warehouse complexes located in:

State	Location	State	Location
Kaduna	Zaria	Kwara	Oro
	Saminaka		Pategi
	Makarfi	Ebonyi	Adifun Echara Ikwo
Kebbi	Argungu		Akaeze
Kano	Dawanau	Lagos	Ikoridu Fish Farm
Katsina	Daura	Ebugu	Ore Agundi
	Dutsin-Ma		Eha Amufu
Zamfara	Talata Mafara		Ikolo Ogbede
	Bukkuym	Cross Rivers	Orlu/Okuku, Yala
	Gummi		Ikom
	Tsafe	Delta	Ibusa
	Wanke		Agbarho
	Mada		Oleh
	Dansadau	Ondo	Igbara-Oke
	Kawuwar Daji		Ikare

State	Location	State	Location
	Moriki	Ekiti	Ifaki Orin Rd
	Shinkafi		Igbemo
Bauchi	Ningi		Ose-Ekiti
	BSADP Facilities	Ogun	Ajegundi Farm Settlement
Adamawa	Ganye		Epe Farm Settlement
	Fufore	Oyo	Irepodun
Benue	Wanune		Iresa-Apa
	Ogobia		Otamapo
Gombe	Tudun Hatsi		Saki, Saki West

Additional grain marketing activities that extend beyond the Silo Complexes have been implemented, including piloting a private sector-operated warehouse receipt system at six of the government-owned grain warehouses. State Governments are active in terms of managing publicly-owned grain storage facilities and purchasing and distributing grains. However, there is little reliable data on the extent of these operations. Interviews with stakeholders indicated that the current condition of state-owned grain storage facilities was low; so are state-level grain purchases. Published details on state grain storage and purchasing activities include:

- 8,398 MT grain storage capacity in Sokoto State;
- 4 silos in Angwan Maigizo, Jama'a, Saminaka & Birnin Gwari, Kaduna State, are abandoned;
- Purchases of excess grains from farmers in Katsina state to the value of NGN320m in 2013

3.4 The Transaction Process

To date, the transaction advisor has focused on running two work streams in parallel:

- Preparing the transaction analysis and structure;
- Initiating procurement for potential bidders.

In terms of deliverables, the transaction provider has:

- Prepared an inception report with initial market review and transaction execution plan;
- Conducted technical, environmental and legal due diligence on the silo complexes;
- Issued a request for expressions of interest and selected a shortlist of potential bidders.

The remaining stages in the transaction process are:

- Stakeholder engagement of Business Case transaction structure in geopolitical regions;
- Preparation of transaction documentation and finalise data room;
- Issue Requests for Proposals and review submissions;
- Select and negotiate with preferred bidders for each silo complex.

3.5 This Report

This report summarises the transaction advisors' approach and finding in respect of:

- Qualitative description of grain markets in Nigeria;
- Financial analysis of the silo complexes;
- Economic analysis of the silo complexes;
- Key risk areas and sensitivity of conclusions to these risks;
- Relative analysis of the transaction structuring options.

4. The Nigerian Grain Market

4.1 Purpose of the Section

This section describes the key characteristics of the Nigerian grain market in terms of:

- the current Nigerian economy and contribution of agriculture;
- the structure of the grain value chain;
- types and locations of grain producers;
- types and locations of grain consumers;
- types of grain storage technologies, their utilisation and demand.

4.2 Grain Market Description

4.2.1 Economic and policy context of agriculture in Nigeria

Nigeria is the largest market in sub-Saharan Africa – both in terms of economic output and demand. However, historically extremely strong and consistent GDP growth is now under pressure. From the rebasing in 2014 that retroactively analysed 2010 onwards, total GDP annual growth has been between 4.2% and 6.2% per annum. In the previous decade, growth was much higher, typically falling from 6%-8%. The lower growth was to a large extent driven by lower economic output in the oil sector, which represents 10% of total GDP. The fall in driven initially by lower oil production from 2011 due to vandalism, theft and reduced investment, and latterly due to the oil price.

As a consequence, diversification of the economy is critical if Nigeria is to sustain a strong balance of payment position. The FGN has demonstrated effectiveness and capability in implementing reforms, as reflected, for example, in the macroeconomic consolidation, consolidation of the banking sector after the 2009 crisis, and substantial progress in implementing reforms in the power and agricultural sectors.

The competitiveness of the agriculture value chains and diversification of the productive base of the economy away from oil is a key pillar of the FMARD's policy objectives, historically through the Agricultural Transformation Agenda (ATA). The ATA is the policy channel that represents the Government's focus on value addition to targeted commodities for enhanced food security, employment creation and sourcing of raw materials for industries and generally for agriculture to serve as engine for a broad-based economic development in Nigeria. FMARD's strategy is designed to focus on self-sufficiency via import substitution, lowering of food costs, increasing real wages and driving down inflation, engendering a rapid transition to an export-oriented agricultural economy. It is also aiming to diversify the economy thereby increasing foreign exchange reserves, stabilizing the exchange rate and significantly increase the level of foreign direct investment (FDI).

The agricultural sector is considered an engine of growth capable of generating broad-based development outcomes needed for rapid economic transformation. The sector has been central to Nigeria's poverty reduction and employment generation efforts, and retained this importance in recent times as a key contributor to non-oil growth and important in overall economic growth as well.

Self-sufficiency and import substitution are explicit policy goals of agricultural development strategies in Nigeria, resulting from the growing and substantial food import bills (USD 2 billion) and policy responses (export bans) from a number of exporting countries witnessed during the recent

global financial and food price crisis. The agriculture sector has been growing over the last decade, but not fast enough to meet the food security, employment and poverty challenges. Indeed, in recent years, food imports have been growing at a faster pace than the population growth (about 11% against, 2.8%) , and though the country has met the MDG1 on hunger, still 8.5% of total population were living below the minimum level of dietary energy consumption in 2011. Low productivity of major staple crops – measured as average yield per hectare - is a result of very low use of improved inputs, limited access to extension services by farmers and limited investment by the private sector confine the sector well below its potential for growth. Power and road infrastructure, low-cost and long term financing, access to competitive inputs and supplies, as well as inconsistent policy environment are consistently identified by the private sector as major challenges to their engagement in the sector. The FMARD is focused on a targeted set of initiatives supporting priority food staples and traditional export crops, and intends to develop these for growth and employment creation, with the expectation that the rest of the sector will subsequently follow.

Staple crop production is the key driver in the agriculture sector, accounting 90% of its contribution to GDP; the balance comes from livestock, fisheries and timber. Production is monitored across a range of different crops, with highlighted GDP contribution described in the graph below:

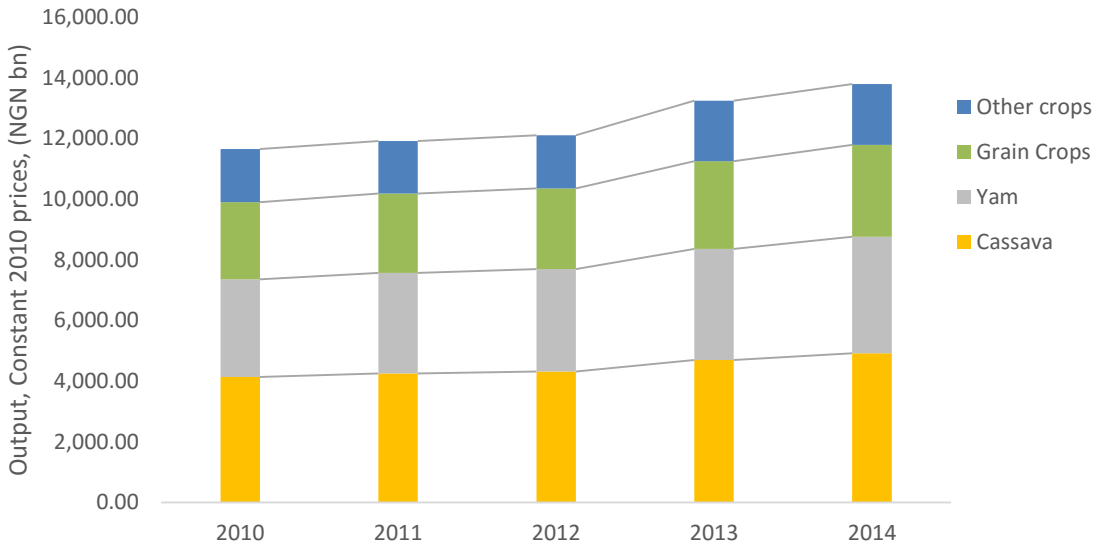


Figure 1: GDP Contribution by Crop Production, CBN 2015

The major grain crops that contribute to the total crop production are maize, sorghum, millet and rice. From 2010 to 2014, these crops accounted for 22% of total crop production. Relative to cassava and yam, grain crops have much larger potential for rapid improvements in yield and market efficiency/competitiveness.

The objectives of the FMARD in terms of economic development and investment can and are being actively pursued for grain crops. This transaction, aiming to increase storage utilisation and the efficiency of grain trading and post-harvest services, is one of a number of strategies that the FMARD is implementing. Parallel strategies include:

- The Staple Crop Processing Zone (SCPZ) policy to catalyse private sector investment and value addition to staple crop supply chains in 15 locations across the country through financial incentives and targeted infrastructure upgrades;

- The Growth Enhancement Support scheme (GES) to increase the availability, quality and affordability of inputs for farmers, principally fertilizer, and achieve fourfold yield increases;
- Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) which has created a platform to intermediate between farmers/companies and banks lending to the agribusiness sector as well providing credit guarantees.

4.2.2 Grain Market Structure

The grain crop supply chain in Nigeria is highly fragmented, but can be simplified to the following structure:

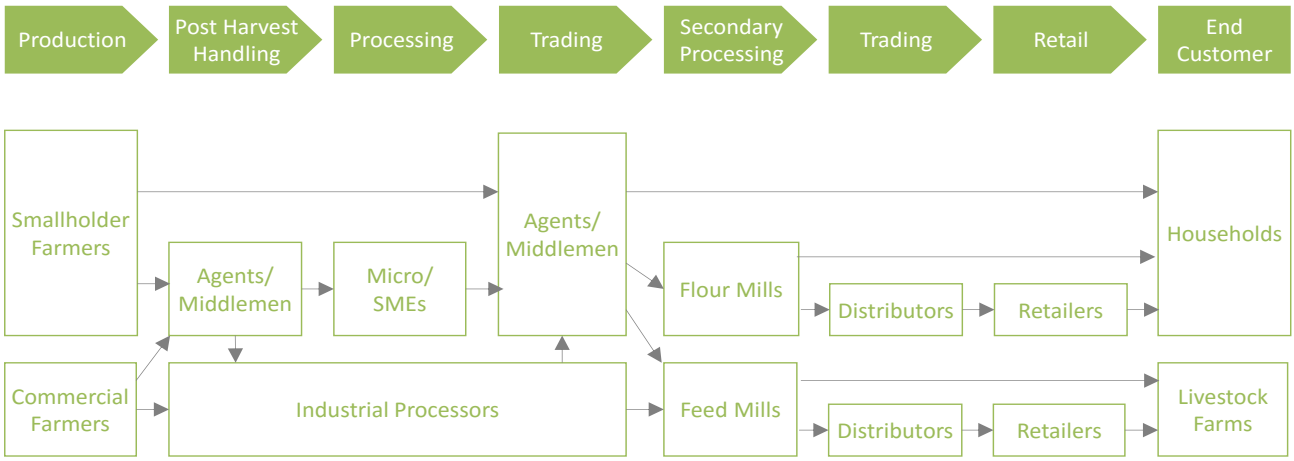


Figure 2: Grain Value Chain in Nigeria

As depicted above, there are two fundamental types of grain producer: smallholder farmers, typically with plot sizes below 5 ha, and a small but growing class of commercial farmers with plot sizes ranging from 50ha to thousands of hectares.

Likewise, there are two main types of demand for grain crops in Nigeria: households and livestock farms. By far the largest of these is for household consumption – either the grain itself or in the form of processed consumer goods (bread, beer, malt drinks etc). This household demand represents approximately 80-85% of the total grain consumption in the country, or approximately 25m MT.

The remaining 15-20% of consumption is driven by demand for animal feed – representing 5m MT of maize, soya, rice and sorghum. The livestock sector in Nigeria comprises poultry, fish and cattle operations. Poultry farms represent 85% of the total feed grain market, but there has been a large growth in commercial fish farming and specialist aquaculture feed supply chains.

Between this supply and demand sits a network of middlemen/trader/agents and processors. Wholesale traders are typically located in key market hubs. These market-based wholesale traders then have a web of buyers/commodity assemblers who purchase from local markets or directly from farmers. These wholesalers then sell directly to millers, processors and distributors with a margin, or to wholesale counterparts in other regions (or countries) when there is an opportunity for arbitraging price differences.

Markets are distributed throughout the country, either around large urban centres or in strategic locations in areas with high levels of grain production or logistical advantages (e.g. border towns, key transport networks). In the course of the feasibility analysis, the transaction advisors gathered grain trading data on a number of these hubs, namely:

- Aba
- Bodija
- Dandume
- Dawanau
- Dodoru
- Giwa
- Gombe
- Gujungu
- Kaura Namuda
- Mile 12
- Maiduguri
- Saminaka

The scale of operations of traders varies widely. A small number of traders interviewed as part of the Business Case preparation had been able to turnover 15-20,000MT in a given year, but acknowledge that in achieving these volumes they became the largest suppliers in the market. The evidence is that the majority of traders operate at a much smaller scale – with mean trading volumes are in the order of 10-100MT per week/500-5000MT per year.

Industrial processing facilities – milling and handling grains – are also distributed throughout the country, with notable hubs around Aba, Sokoto, Kaduna, Kano, Ibadan, Jos and Lagos.

Within the context of this value chain, there are two scenarios for how a silo complex operator will play a role:

1) As a trader in the market, purchasing and selling grains; and
2) As a service provider to other market participants, charging for handling, processing and storage of grain crops.

For the trading role, the typical strategy would entail purchasing grains from smallholder and commercial farmers as well as other traders, and selling back to traders or directly to processors, millers and other distributors.

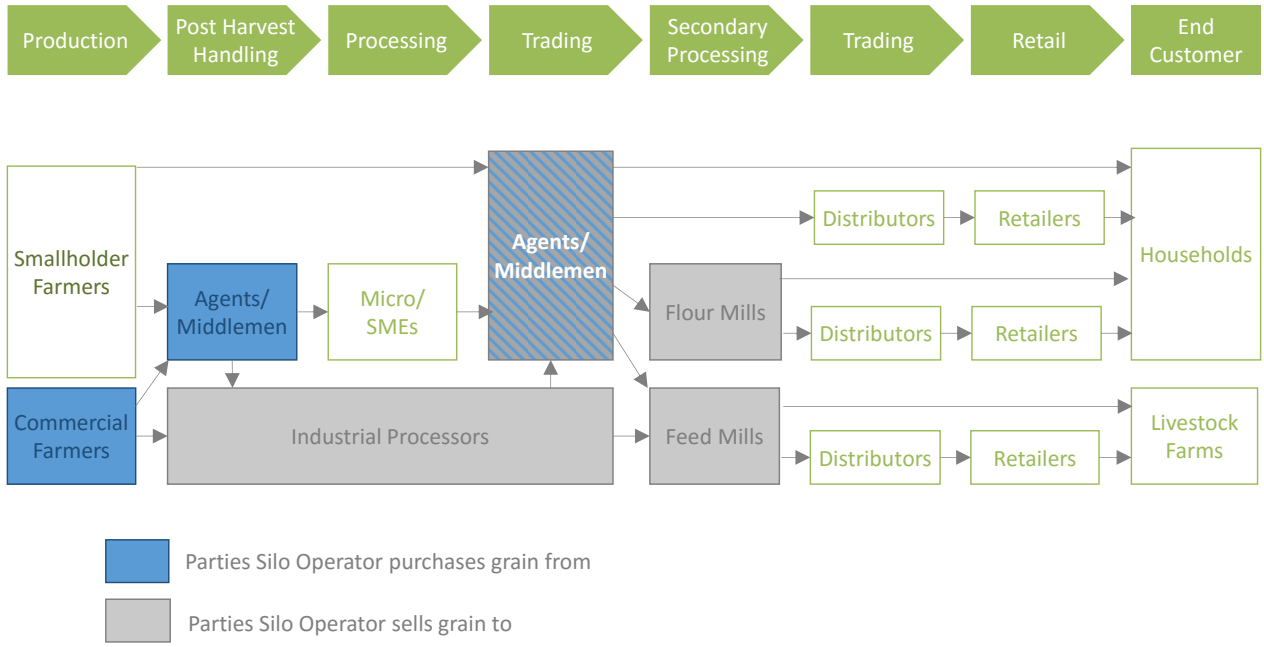


Figure 3: Grain Trading Value Chain Stakeholders

As a service provider, the silo operator could allow smallholder and commercial farmers, as well as traders and processors to use the handling and storage facilities in the silo complex for a fee. For this business line, the trader has lower market risk, but also therefore lower margins. In this feasibility study, this operating model is described as “Post-Harvest Handling and Storage Services.” The key

stakeholder for a silo complex offering these services would include grain producers, intermediaries and offtakers seeking to improve the consistency of the supply chain and reduce post-harvest losses.

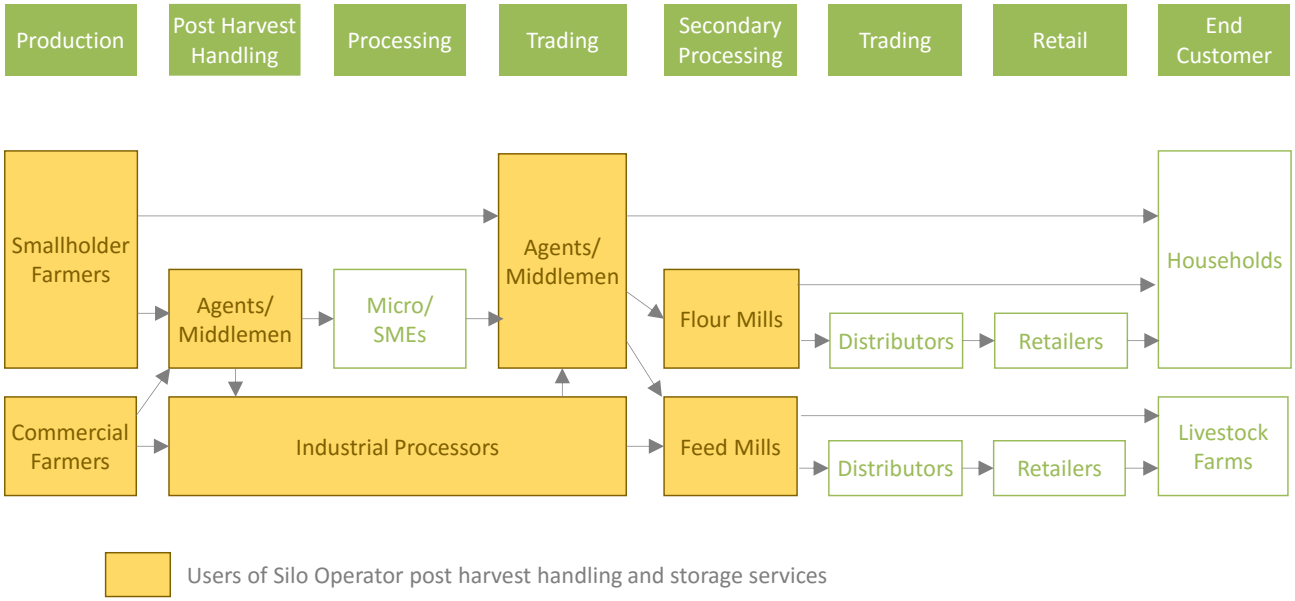


Figure 4: Post Harvest Handling and Storage Stakeholders

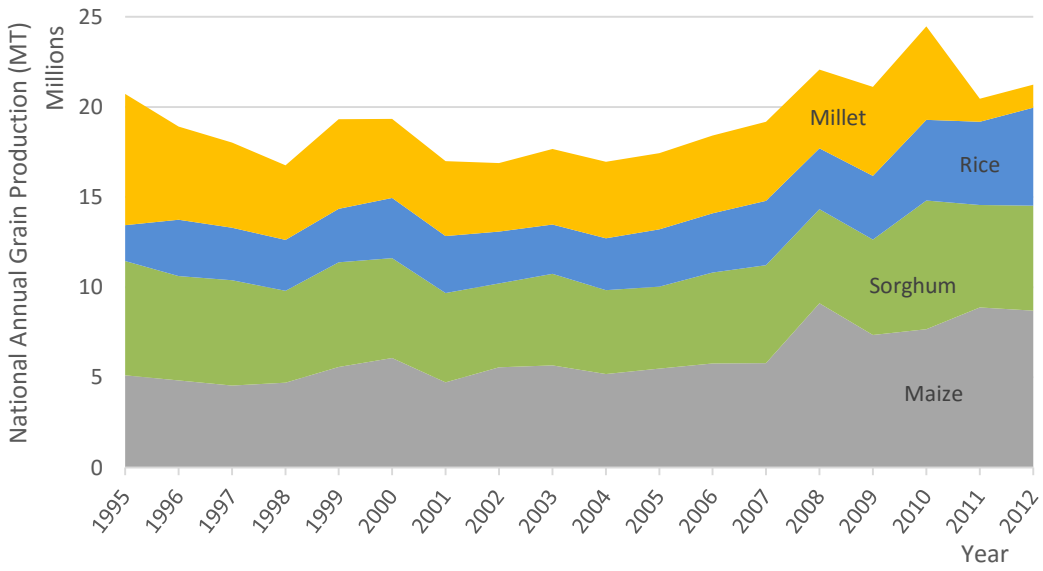
4.2.3 Grain Crop Production

In line with FGN treatment of grain crop production, this analysis focuses on four principal grain crops: maize, sorghum, millet and rice.

National Grain Production

Estimates for total annual grain production in Nigeria fall in the range of 20-25m MT per annum over the last five years. This grain production is divided across four major grain crops: maize, sorghum, millet and rice, though there is a small production volume of wheat, barley and other grains.

The average grain production mix over a three year period was around 38% maize, 28% sorghum, 22% rice and 12% millet. Over the last 20 years, production has incrementally increased, with particular growth in maize and rice production.



Projected growth

Estimates for total grain production vary – with international figures tending to fall slightly below local historic and projected values. OECD/FAO Agricultural Outlook 2015-2024 puts rice and coarse grain production at 20m MT in 2012 versus FMARD records at 21.8m MT.

Taking FMARD and OECD/FAO estimates together, there is a clear forecast for growth in local grain production over the next decade, averaging 2.7% compounded annual growth across all grain types and ultimately reaching 28-30MT total production by 2024.

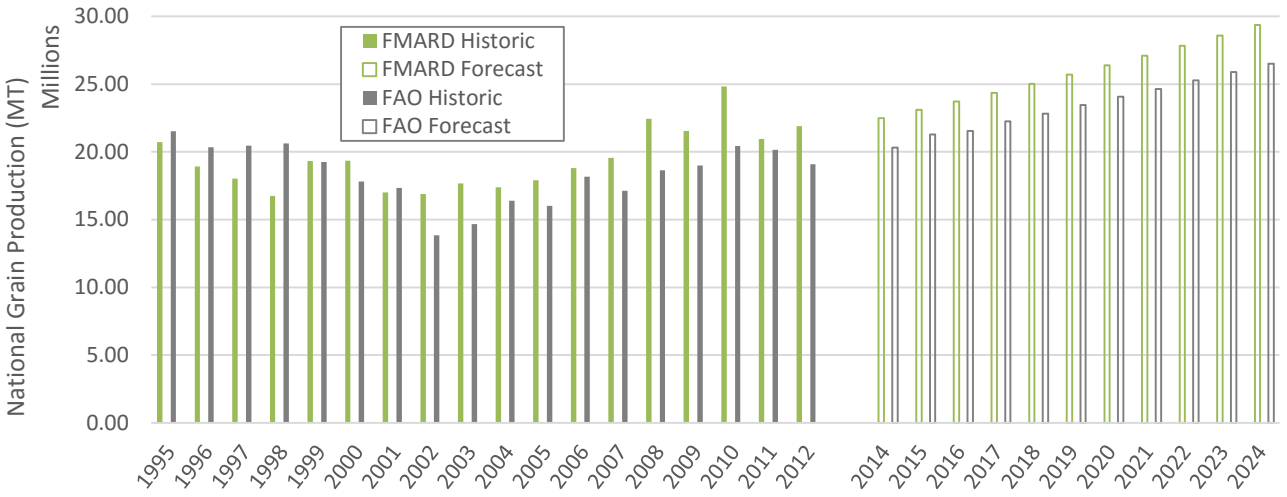


Figure 5: Historic and Forecast Grain Production, FMARD/NBS and OECD/FAO, 2014

Types of Grain Crop Producer

As noted above, grain production in Nigeria is dominated by smallholder farmers. These farmers grow different types and volumes of grains according to the suitability of the climate, perceived local and national demand, and the availability of inputs.

Grain crop farmers are distributed evenly across the country, though key grain producing states in Kaduna, Katsina and Kano have a much higher population active in grain agriculture, while farmers in Enugu, Ebonyi, Abia and Akwa-Ibom are more focused on tuber production. Estimated numbers of total farmers range from 30m smallholders principally focused on agriculture to over 100m people deriving at least part of their livelihood from agriculture.

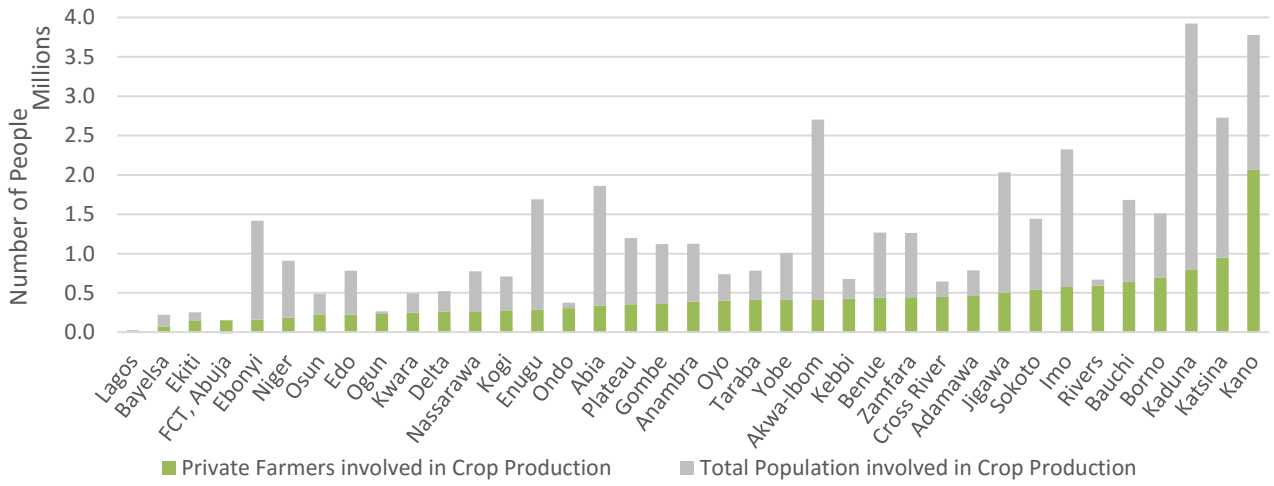


Figure 6: Distribution of Grain Farmers and Population involved in Grain Farming Nationally, FMARD 2013

Geography of Grain Crop Production

Nigeria's rural areas can be subdivded into a number of different climate/ecological classifications, but there are essentially three belts running East-West across the country. In the North, there is a band of short grass savannah running from Sokoto to Maiduguri. In the central belt, there is a range of woodland and tall grass savannah, and along the southern cost is a belt of more humid rainforest and mangrove swamp area.

As a consequence, grain crops that thrive in drier, savannah areas are typically produced in the North of the country. For sorghum and millet, the geographic distribution of production is as follows:

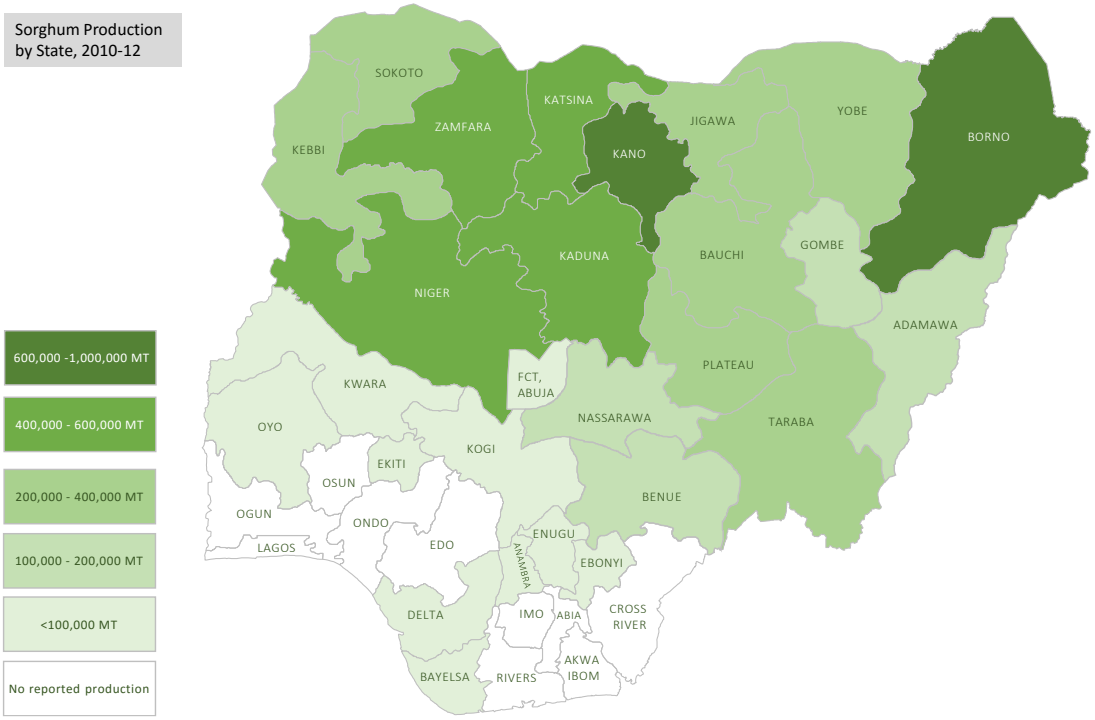


Figure 7: Average Annual Sorghum Production by State, 2010-2012

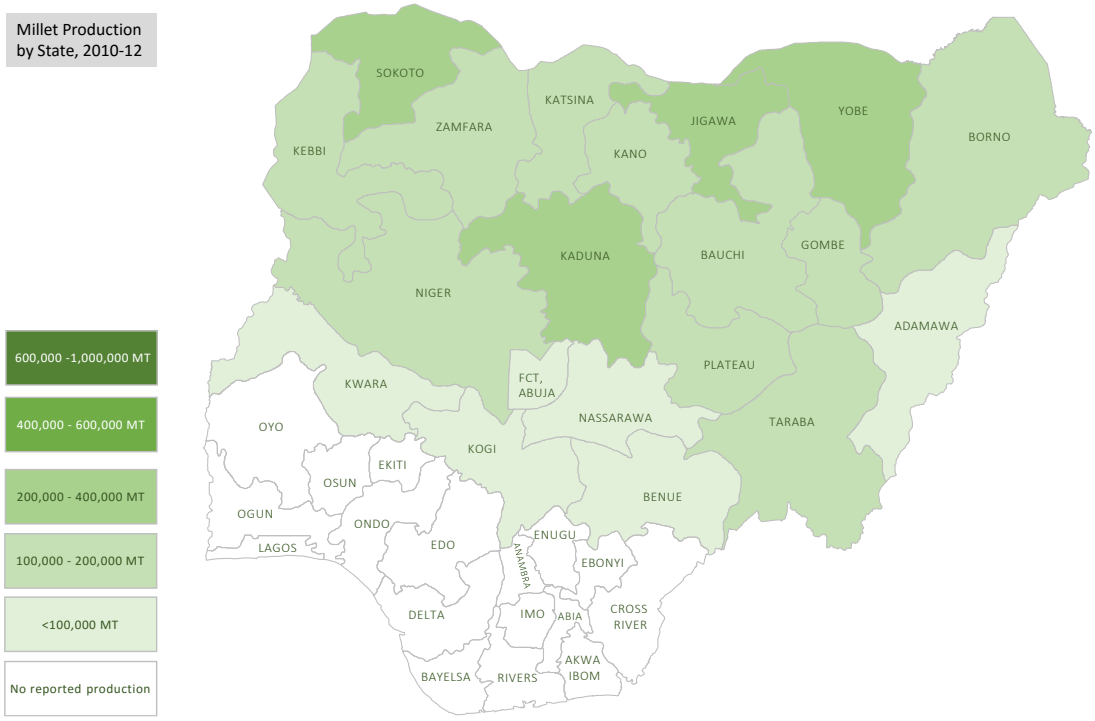


Figure 8: Average Annual Millet Production by State, 2010-2012

By way of contract, maize and rice are viable crops in areas with higher rainfall and humidity. SInce these crops can be reduced in a wider range of environments, they are produced as staples across the country, with production most densely focused in the central belt of states.

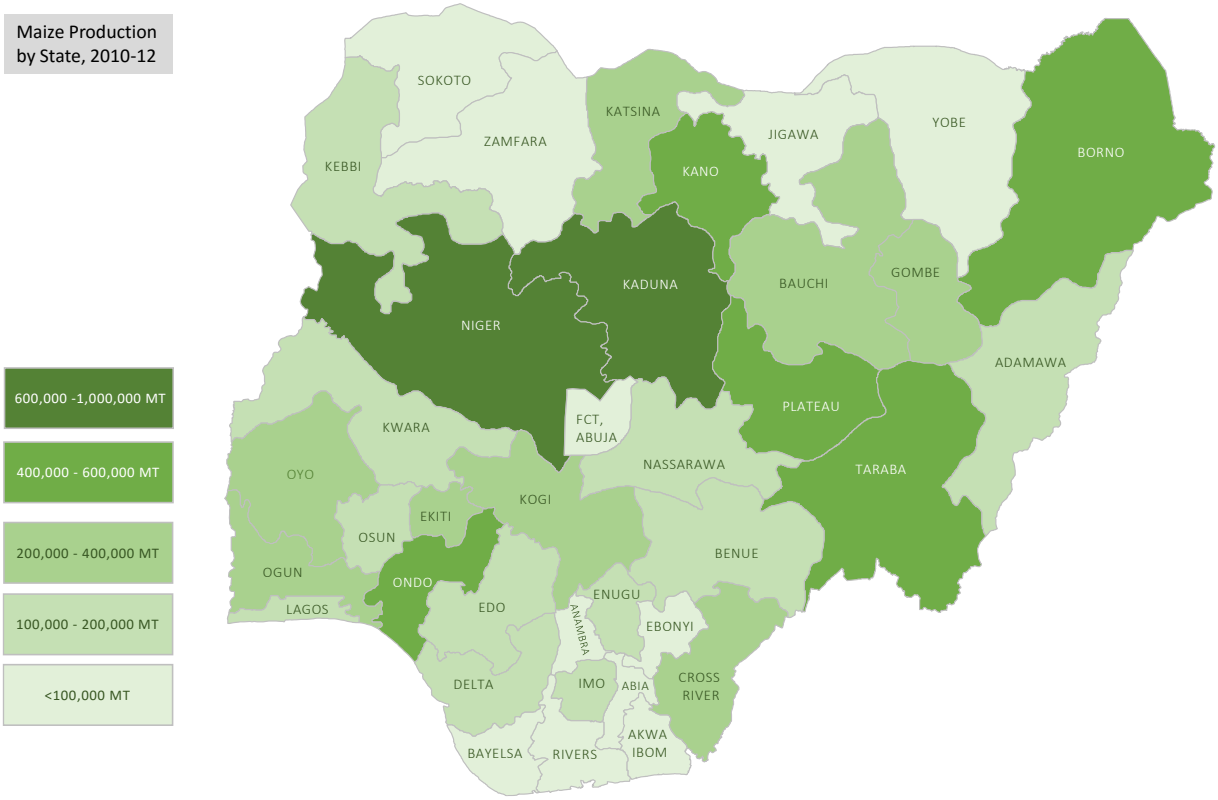


Figure 9: Average Annual Maize Production by State, 2010-2012

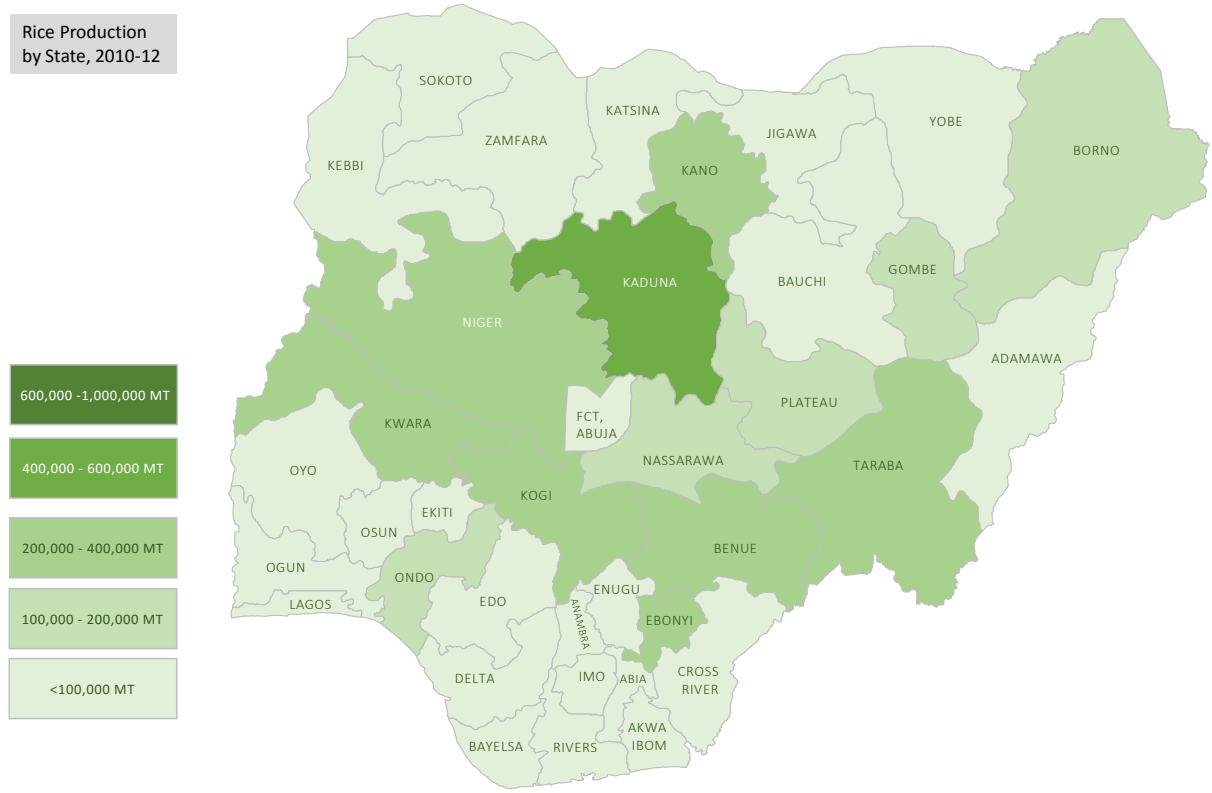


Figure 10: Average Annual Rice Production by State, 2010-2012

There are also a small but growing number of commercial farmers focused on grain production. As of the National Agriculture Sample Survey carried out in 2011, 400 corporate farms were surveyed and of these, there were 171 farms focused on crop production. Of these corporate farms, there was a marked preference for grain production (61% of production by volume versus national averages (22% of GDP value).

As the commercial agriculture market continues to develop in the country, these businesses should become key relationships for the silo operators.

Prominent commercial farms focused on grain crops include:

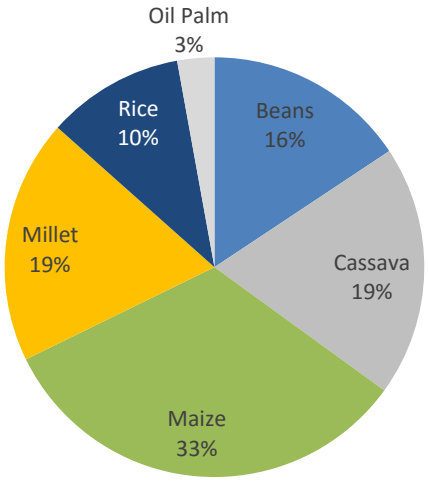


Figure 11: Corporate Farm Crop Output, NASS 2012

Company	Location	State
Olam Nigeria	Pategi	Kwara
	Doma	Nasawara
	Yola	Adamawa
	Makurdi	Benue
Deansmanger Project	Wuya	Niger
	Bida	
Isyaku Rabiu & Sons Ltd	Sharada	Kano
Tara-Agro Industries Ltd	Wukari	Taraba
Labana Global Ventures	Birnin Kebbi	Kebbi
Ada Rice Production Ltd	Adani	Enugu
Bayelsa Farm Ltd	Yenagoa	Bayelsa
Ebony Agro Industries	Ikwo	Ebonyi
Stine Industries	Amichi	Anambra
Shonga Farms	Shonga	Kwara
Ofada Veetee Rice	Itori	Ogun
Gawal Farms	Birnin Kebbi	Kebbi
Kojoli Farms	Jada	Adamawa
Nikoy Lyd	Kaduna	Kaduna
Nalmaco	Zaria	Kaduna

In tandem with the silo concession transaction, FMARD is looking to improve agricultural commodity markets through the Nigerian Commodity Exchange. Market trading infrastructure and particularly commodity exchange development is a major source of operational revenue for some silo complexes. The most relevant example for Nigeria is the grain storage market in South Africa, where silo operators are licensed participants in the market acting as both principals and service providers.

4.2.1 Grain Crop Demand

Grain demand in Nigeria is principally driven by household consumption. In the North, the savannah production area, staple food crops are millet, sorghum and acha. In the more tropical South, maize, rice and gari are staple ingredients.

Total grain demand today is estimated to be 23.3m MT per annum by the FAO/OECD. This demand is expected to grow at a compounded annual growth rate of 2.7%:

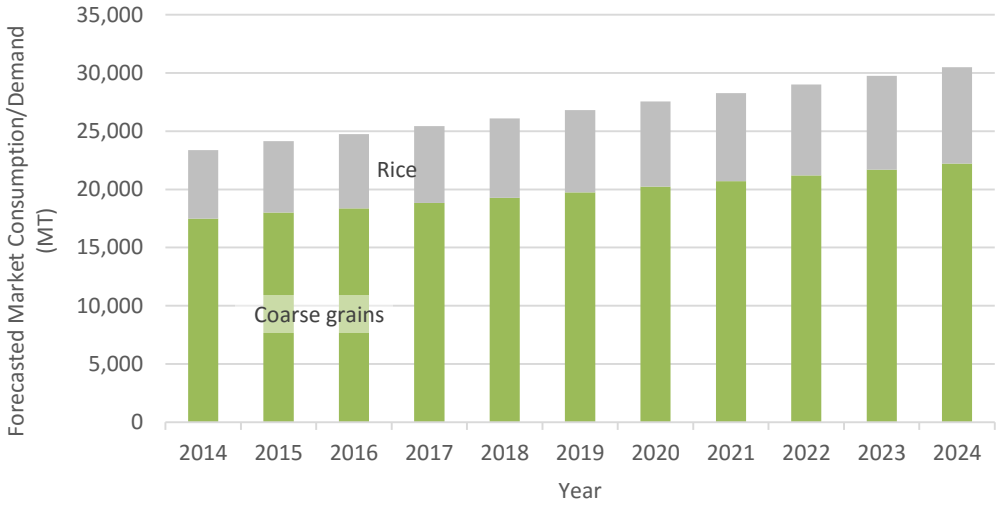


Figure 12: Demand Growth Forecasts, OECD/FAO Agricultural Outlook 2015-2024

As economic development increases household income and wealth, this drives up demand for consumer goods – rice, maize, wheat, protein and grain-based beverages. The Fast Moving Consumer Good (FMCG) sector – food and beyond - grew by 15.6% per annum from 2001-2010 and is expected to grow by 8.7% from 2010-2020, amounting to $125bn value. Processed food – and particularly grain-related products such as beer, malt drinks, pasta, and bread highlighted in green below– represent a key part of this market growth story.

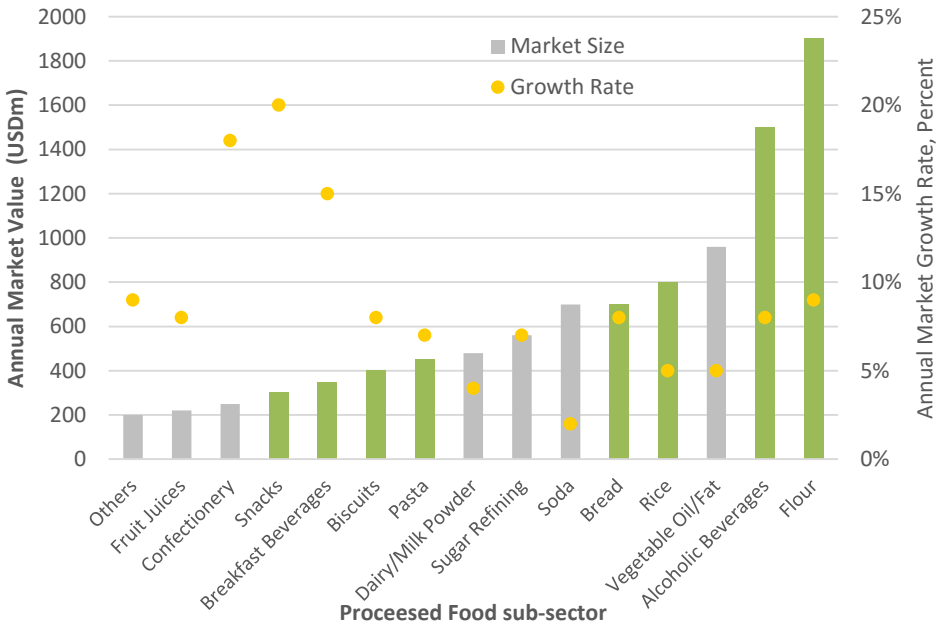


Figure 13: Market Sizing and Projected Growth to 2017; USDA 2012

As demand for processed foodstuffs increases so too will demand along the supply chain for inputs – maize, sorghum, millet and rice - and therefore the demand for grain storage.

At both the household direct consumption and processed food levels, demand is driven by population density and movement of goods into and within the country. The total population of Nigeria is approximately 180m (173.6 in 2013) and is growing at a rate of 2.8% per annum. The population is

distributed across all regions of the country. Particularly high density areas are in the urban centers of Lagos, Kano, Abuja a, Ibadan, Kaduna and Port Harcourt.

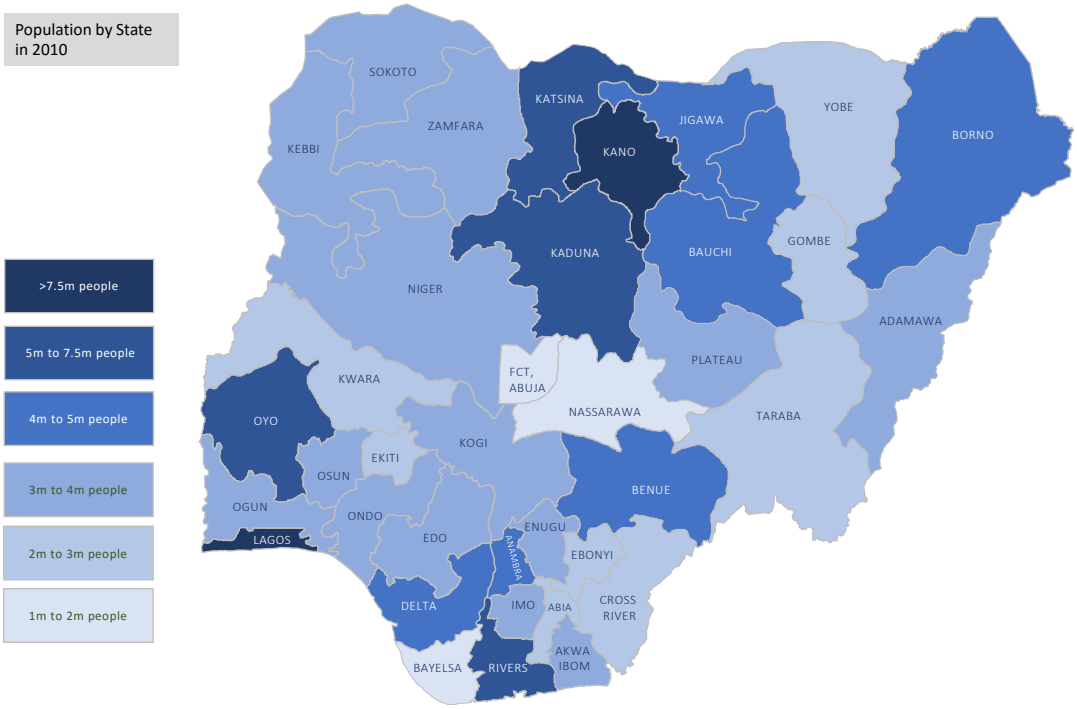


Figure 14: Population Distribution by State, NBS 2010

At the farmer level, this demand translates into consuming grains produced within the household. Typically this level of consumption. While there is limited data on regional/crop specific rations between consumption and sale of crops, the anecdotal feedback is that anywhere between 30% and 50% of key grain crops can be consumed locally. Data from two maize producing regions suggests that these figures are within reasonable limits:

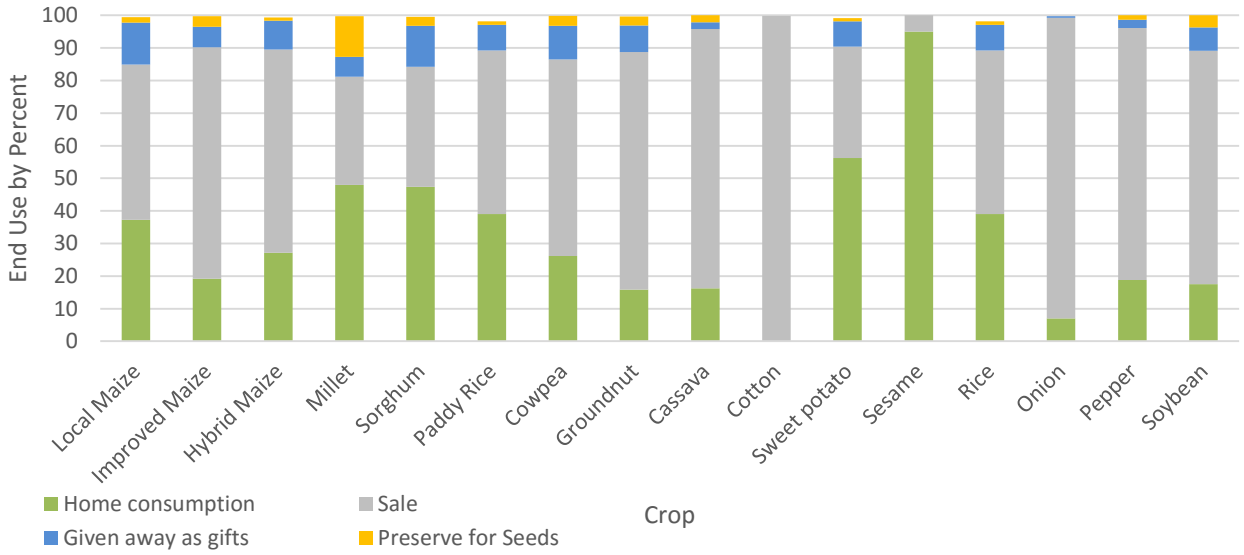


Figure 15: Disposal of Harvest produce, dry savanna populations (IITA/CIMMYT, 2010)

This on-farm consumption dampens household level demand in production states – but is independent of urbanisation and processing demand trends. .

In terms of crop processing, there is a substantial and growing market in Nigeria – with FMARD policies actively promoting secondary, value add agriculture investment and the domestic demand growth (as a result of economic development and population growth) supporting the growth of existing FMCG players.

There is limited information about total processing capacity in Nigeria, but data collected from the major commercial players in terms of throughput gives some indication of the scale and ratios of annual throughput by commercial offtakers. Importantly: 1) this understates the total capacity since it is driven by publicly available information; 2) this does not account for household level processing activities.

Grain Use	Monthly Capacity	Annual Capacity	Ratios
Flour Mills	540,000MT	6,400,000 MT	58%
Breweries	500,000MT	6,000,000 MT	45%
Feed Mills	50,000 MT	480,000 MT	4%
Agro-processing Facilities	35,000 MT	420,000 MT	3%
Total	**1,113,000 MT**	**13,356,000 MT**	

The locations of identified grain processing facilities and the relevant silos for each location is described overleaf.

Companies/Affiliates	Facility Type	Grains	Locations	State	Nearby Silos
Diageo Plc. Guinness Breweries Plc	Brewery	Maize, Sorghum, Barley	Ikeja Ogba Benin City Aba	Lagos Rivers Edo Abia	Ibadan, Ikenne, Irrua, Okigwe, Uyo
Jos Int'l Breweries Plc. Pioneer Milling Co Ltd.	Brewery	Sorghum, Barley	Jos	Plateau	Jos
Sona Breweries	Brewery	Sorghum, Barley	Sango Otta	Ogun	Ilesa, Ado-Ekiti, Ilorin
Champion Breweries	Brewery	Sorghum, Barley	Uyo	Akwa Ibom	Uyo
Premier Breweries Plc	Brewery	Sorghum, Barley	Onitsha	Anambra	Okigwe, Ezillo
Nigerian Breweries Sona Systems Life Breweries Consolidated Breweries	Brewery / Malting Plant	Maize, Sorghum, Barley	Aba Kaduna Ameke Ibadan Iganmu Ota Onitsha Makurdi Imagbon Awa Omamma	Abia Kaduna Enugu Oyo Lagos Ogun Anambra Benue Ogun Imo	Uyo, Kaduna, Okigwe, Ibadan, Makurdi, Ezillo, Ikenne, Ibadan
SAB Miller Intafact Beverages Pabod Breweries International Breweries:	Brewery / Malting Plant	Malted Barley, hops	Onitsha Pabod Ilesa	Onitsha, Rivers Osun	Igbariam, Okigwe, Uyo, Ilesa
Nigerian Breweries Derivatives Industries Ltd Lifecare Industries Ltd Taibod Ventures Ltd	Brewery / Malting Plant	Sorghum	Ibadan/ Sango	Ogun	Ibadan
Nestle	Milling / Malting Plant	All	Agbara Sagamu	Ogun Ogun	Ibadan, Ikenne
Mondelez International Cadbury / Kraft Food	Factory	Sorghum	Ikeja	Lagos	Ibadan, Ikenne
Karma Foods Ltd.	Factory	Soybean	Abuja	FCT Abuja	Kwali

Companies/Affiliates	Facility Type	Grains	Locations	State	Nearby Silos
UAC Livestock Feed Ltd Grand Cereals	Agro-processing Mill	All	Ikeja Aba Benin Kaduna Onitsha Jos	Lagos Aba Edo Kaduna Anambra Plateau	Ibadan, Uyo, Irrua, Kaduna Okigwe, Jos
Amo Byng Nig	Agro-processing Mill	All	Awe Aba Jos	Oyo Abia Plateau	Ibadan, Uyo, Jos, Ilesa
Tiger Brands Dangote Flour Mills Plc.	Agro-processing Mill	All	Apapa Kano Calabar	Lagos Kano Cross River	Ibadan, Ikenne, Gaya, Uyo, Ilorin, Gaya, Uyo, Ilorin
Flour Mills Nigeria Plc. Premier Feed Mills Co Ltd	Agro-processing Mill	All	Apapa Kaboji	Lagos Niger	Ibadan, Ikenne, Minna
Honeywell Flour Mill Plc.	Agro-processing Mill	All	Sango Otta Ikeja	Ogun Lagos	Ibadan, Ikenne
Olam International Limited Crown Flour Mills	Agro-processing Mill	Rice, Maize	Ikeja Kano	Lagos Kano	Ibadan, Ikenne, Irrua, Okigwe
The Chagoury Group: Ideal Flour Milling Group Port Harcourt Flour Mills Nigerian Eagle Flour Mills Niger Delta Flour Mills	Agro-processing Mill	Maize, Sorghum	Kudenda Port Harcourt Ibadan Umunya	Kaduna Rivers Oyo Enugu	Kaduna, Uyo, Ibadan, Ezillo
Salco Ltd	Agro-processing Mill	All	Jos Kano Abuja Ikeja	Plateau Kano FCT Lagos	Jos, Ibadan, Ikenne, Gaya, Kwali
Tara Agro Industries Ltd Ebony Agro Industries Ltd	Agro-processing Mill	Rice	Ikwo Uzo Uwani	Ebonyi Enugu	Ezillo, Okigwe, Ogoja
Stallion Foods	Agro-processing Mill	Rice	Ikeja Kano	Lagos Kano	Ibadan, Ikenne, Gaya
US Lynx Nigeria	Agro-processing Mill	All	Kuie	FCT, Abuja	Kwali
Novum Agric Industries	Agro-processing Mill	All	Karu	Nasarawa	Lafia

Companies/Affiliates	Facility Type	Grains	Locations	State	Nearby Silos
Durante Fish Industries	Agro-processing Mill	Aquaculture Feed	Ibadan	Oyo	Ibadan
Integrated Grain Processors	Agro-processing Mill	Rice / Rice Bran	Udi	Enugu	Ezillo
Umza Farms	Agro-processing Mill	Rice	Sarauniya	Kano	Gaya
Atafi Rice	Agro-processing Mill	Rice	Hadeja	Jigawa	Jahun
Ashi Feeds	Agro-processing Mill	Rice	Anyin	Benue	Lokoja
Mikap Nigeria	Agro-processing Mill	Rice	Markurdi	Benue	Makurdi
Gauri Rice Mill	Agro-processing Mill	Rice	Bauchi	Bauchi	Bauchi Silo
Clysters	Agro-processing Mill	Rice	Sabo-Gida	Nasarawa	Lafia,, Kwali, Makurdi, Lokoja
Omor	Agro-processing Mill	Rice		Anambra	Okigwe , Ezillo
Zuru Rice	Agroprocessing Mill	Rice	Dakingari	Kebbi	
Kare Hi-Tech	Agro-processing Mill	Rice	Talata Mafara	Zamfara	Gusau
Alhaji Aliu	Agro-processing Mill	All	Kano	Kano	Gaya
Oni-MP farms Cross River	Agro-processing Mill	Rice	Bansara	Cross River	Ogoja
Al-Uma	Agro-processing Mill	Rice	Jalingo	Taraba	Yola
Convenient Home Foods	Agro-processing Mill	Wheat, Maize	Kano	Kano	Gaya
AACE Foods	Agro-processing Mill	Soybeans, maize	Sango Otta	Ogun	Ibadan
Peemos	Agro-processing Mill	All	Sapele	Delta	Irrua
UNIDO/Ebonyi State	Agro-processing Mill	Rice	Abakaliki	Ebonyi	Ezillo
Jimsina Farms Int'l Ltd	Farm/ Processing	Soy, Maize, sorghum	Ikeja	Lagos	Ibadan, Ikenne
Obasanjo Farms	Farm/ Processing	Maize, sorghum, rice	Ota	Ogun	Ota: Ibadan
Maizube Farms Limited	Farm / Processing	Maize, rice	Minna	Niger	Minna Silo
Anadariya Farms	Farm / Processing	All	Bebeji	Kano	Gaya, Jahun
LoryB	Farm / Processing	All	Ijebu-Ode	Ogun	Ikenne
Ruwan Kanya	Farm / Processing	All	Kano	Kano	Gaya
Dabol	Farm / Processing	All	Zaria	Kaduna	Kaduna

4.2.2 Grain Storage

Farmers, traders and offtakers use a large number of distinct grain storage technologies with some degree of variation regionally in terms of customary practice.

Types of Storage Technology

Nigerian grain storage strategies can be divided into five basic types:

Classification	Description	Utilization
Other / simple storage	This typically includes storage in homes and simple shelters on farms, as well as basic crib/platform arrangements. The most prevalent storage strategy in the north is in 100KG sacks, while farmers and traders in the South may store grains loose on the ground.	Farmers
Rhombus / Rhumbu / Oba	Traditional structures elevated on stones and constructed of mud and grass (Rhumbu) or woven grasses/palm fronds (Oba) which are predominantly used for storing maize, sorghum and millet	Farmers
Air tight storage containers	Steel drums, plastic containers and storage bags (e.g. PICS bags) that can be hermetically sealed to protect against funghi and pests.	Farmers, Traders
Warehouses	Standalone buildings with capacity for loose or bagged storage typically between 500 and 2000 MT in capacity, used to store a variety of crops.	Traders, Industry
Silo facilities	Modern steel or other metal storage facilities dedicated to grain. Small scale silos can hold 10+ MT of grain, while larger facilities are in the order of 1,000-5,000 MT bins.	Industry

The Agricultural Sector Census in 2012 collected data on usage/access to each of these types of storage by farmers in each state. The resulting distribution of technologies on a national basis is displayed below:

Use of Storage Technology

The use of modern silo storage is minimal. In part, this reflects the cost and scale of silo storage facilities. Farmers and traders do not see value in and may not be able to access the large capital expenditure required to install grain silos, nor do they handle sufficient volumes of grain to justify large storage facilities. For farmers, the main focus is on informal storage technologies and warehousing – the latter of which reflects the dominant storage technology in use in market towns.

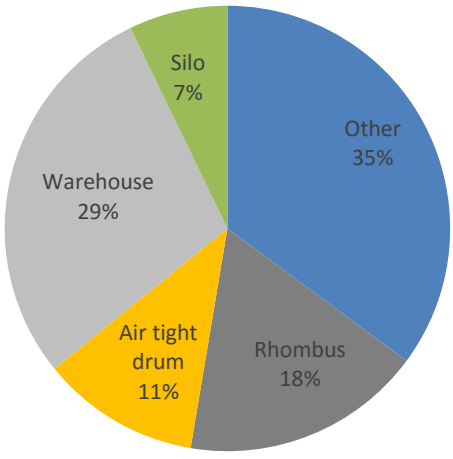


Figure 16: Distribution of Storage Technologies Nationally; NBS, 2012

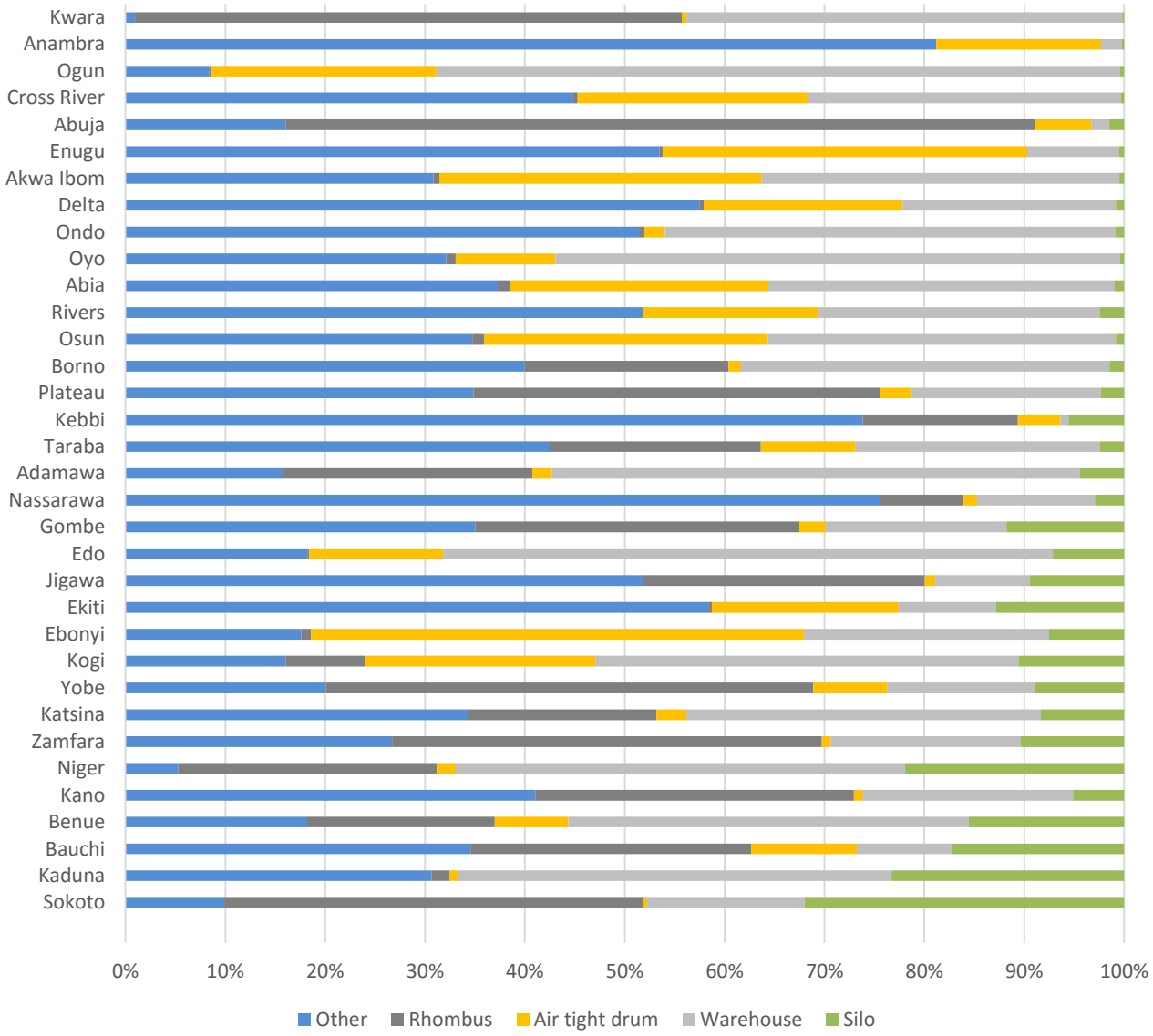


Figure 17: Proportion of Storage Technology - State-Level Farmer Responses; NBS 2012

From the state-level data, there are clear trends in terms of where farmers are able to access modern storage facilities. Farmers in the grain dominated Northern belt – notably Sokoto, Kaduna, Bauchi, Kano, Zamfara, Katsinao and Yobe - have higher access to modern storage facilities – but also have a higher proportion of rhumbu users. The latter is explained by the traditional role this technology plays – tradition that is widespread and well established in these regions. Silo technologies also seem to be central states including Benue, Kogi and Niger, driven by the high levels of rice and maize production in these regions.

The large commercial stakeholders operating at scale have the balance sheet capacity and grain throughput to explore grain silo storage alongside other bulk grain storage strategies.

Notable scaled storage facilities directly linked to breweries, millers and processors include:

Company	Location	State	Capacity
Amo Byng	Awe	Oyo	70,000 MT
	Aba	Abia	
	Jos	Plateau	
Flour Mills of Nigeria Ltd	Apapa	Lagos	191,000 MT

Company	Location	State	Capacity
Honeywell Flour Mills	Tin Can	Lagos	73,500 MT
UAC/Grand Cereals	Jos	Platuea	16,000 MT
Olam International (Crown Flour Mills)	Lagos	Lagos	48,000 MT
	Warri	Delta	20,000 MT
	Doma	Nasawara	TBD
BUA Group	Tin Can	Lagos	45,000 MT
	Beachland	Lagos	4,000 MT
	Kano	Kano	10,000 MT
	Port Harcourt	Rivers	46,500 MT
Chagoury Group	Tin Can	Lagos	28,000 MT
Lifecare Industries	Sango	Ogun	12,300 MT

These storage facilities are for the most part linked to the flour industry – and therefore wheat importation and coastal storage/production units. Additional storage facilities are operational, particularly at the large brewing and malt processing plants named above

There are no transparent national data resources for the level and utilisation of storage facilities. Anecdotally, farmers typically store grain for very little time – selling quickly after harvest between November and January. Traders and other intermediaries are the main storage stakeholders – using warehouses and small scale bagged/air-tight storage technologies to preserve grains during the marketing cycle.

Given the paucity of consistent data, it is possible and necessary to learn something from top down analyses. USDA estimates on current stock levels suggest that the total public and private storage of grains are extremely low across all major grain commodities. Given the USDA's focus on trading and macro-level markets, the focus is on crops with substantial production/consumption volume and of relevance to US producer, namely wheat, maize, sorghum and rice. The total estimated stocks held in a given annual period for these crops is as follows:

Est Stocks	2014		2015		2016	
	MT	*% of total*	MT	*% of total*	MT	*% of total*
Wheat	200,000	*4.15%*	200,000	*3.98%*	200,000	*3.77%*
Maize	246,000	*3.02%*	350,000	*4.40%*	100,000	*1.24%*
Sorghum	208,000	*3.06%*	220,000	*3.18%*	220,000	*3.45%*
Rice	657,000	*9.87%*	607,000	*7.78%*	600,000	*9.09%*

Impact of Storage Scarcity

It is hard to quantify the size of the deficit of bulk storage options in the Nigerian grain supply chain, the potential impact of this supply deficit appears to be dramatic. The percent of wheat, maize and sorghum stored relative to turnover/production is well below 5% - and is not increasing year on year. This level of storage – just 1-2 weeks' worth of supply – leaves the country extremely exposed to market shocks in the event of scarcity.

USDA estimates that upwards of 30% of grain is wasted through post-harvest losses. Likewise, the FAO estimates that as much as 3m metric tonnes – 10% of total supply across all grains – is lost after harvest. Millet was particularly affected in 2011 – with losses equating to 36% of production and imports, versus an average loss ratio of 11% before that. Soyabeans, sorghum and maize also all suffer 10-15% losses relative to local production

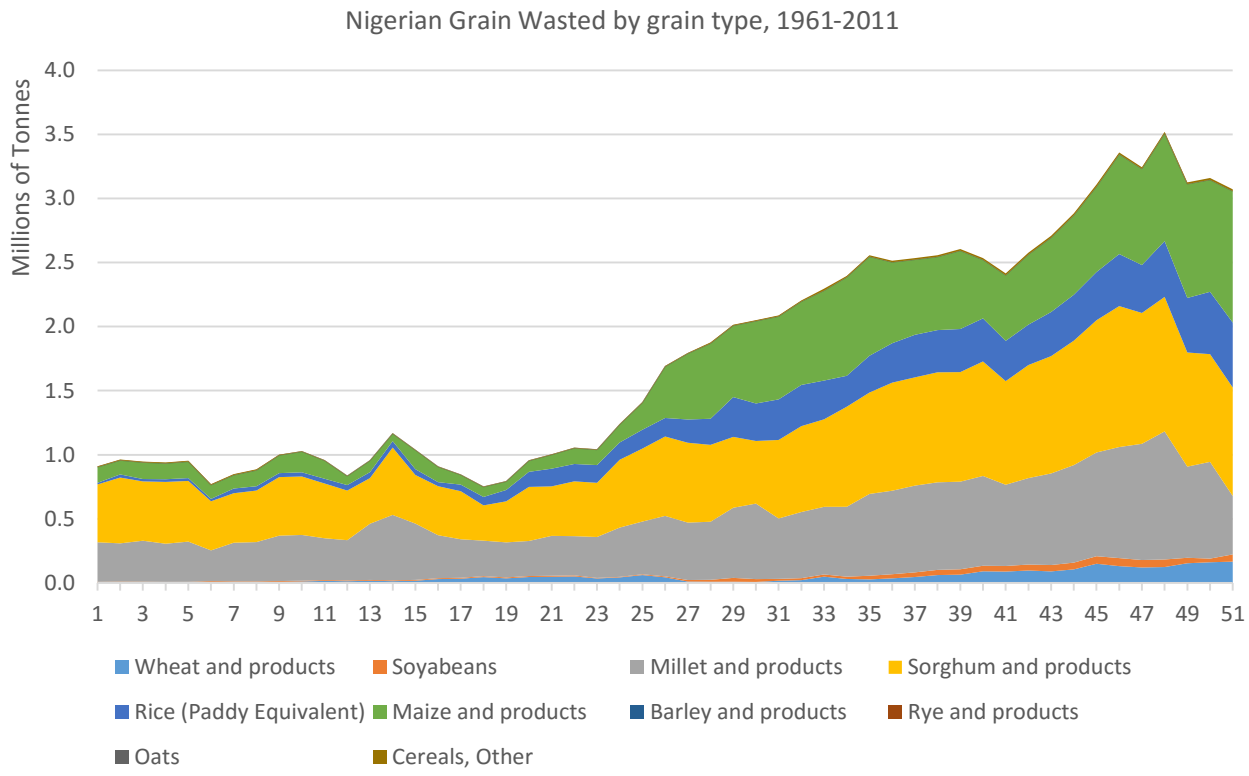


Figure 18: Estimated Annual Grain Waste, MT (FAOStat, 2015)

Reports vary widely in terms of quantitative assessments of the causes/value chain stages resulting in such high levels of post-harvest losses. The key stages for losses are during harvest, during transportation to markets, and during storage – both on-farm and further down the value chain.

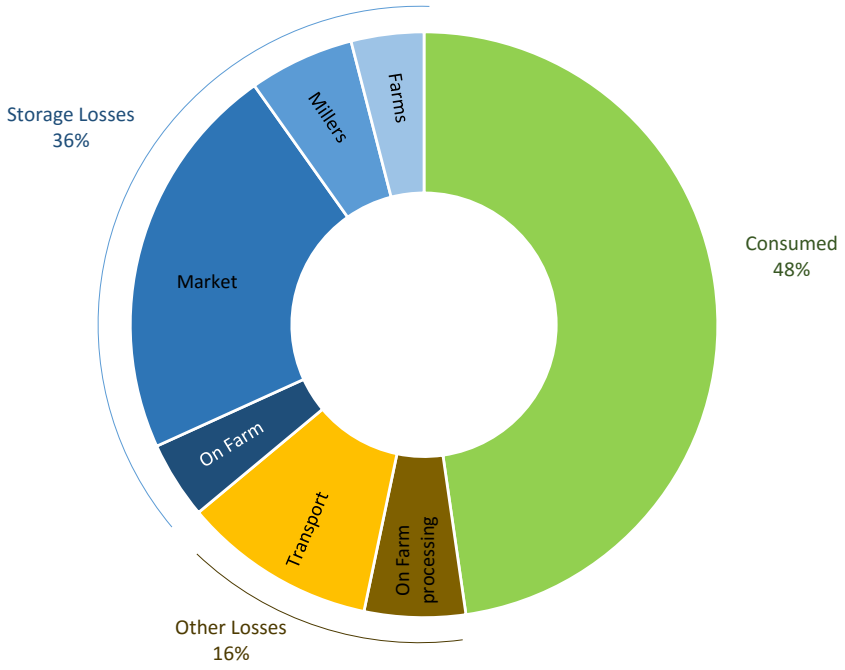


Figure 19: Post-Harvest Maize Losses in Kaduna and Ondo States; Ostermann (2013)

A study of maize value chain in Kaduna and Ondo States (Ostermann, 2013) found that the largest contributor to grain losses is in market-oriented storage. 52% of maize produced was wasted – and 36% of these losses were due to rodent, insect and moisture damage from poor storage. The major

point in the supply chain that suffered from storage issues was at market (22%); feed millers also suffer losses in storage (5.8%) – higher than the 4.27% losses in on-farm storage before the maize goes to market. The high levels of losses at market storage facilities may be due to a combination of number of factors:

- Grains spend a long period of time in poor quality storage at markets;
- Markets concentrate different agricultural outputs and therefore attract pests and act as hubs for grain-related diseases;
- Market storage facilities are limited due to a supply deficit and underinvestment in modern storage options.

The implication is that all stakeholders involved in grain marketing – farmers, traders and buyers – would benefit from improved bulk storage options in order to reduce losses. For farmers, increasing the quality and volume of supply chains and improving the transparency of grain markets should help support higher revenues through increase grain sale volumes. This is part of the key motivation behind the program that SGRD is executing concurrently to the silo concessioning: the Warehouse Receipts initiative utilizing SGRD 2000MT warehouse facilities. For traders, improved, industrial scale storage facilities should decrease the market grain losses and increase revenues – on the basis that demand for grain remains high, driven by increasing investment in agricultural processing and wider growth in demand for fast moving consumer goods. For the ultimate offtakers of grain products, increased storage allows for better price stability and security of supply – and theoretically the potential for lower cost inputs for their products.

While the quantum of the deficit is unknown, it is clear that farmers recognise the issue. Through the National Agriculture Sample Survey, responses relating to the key barriers with respect to marketing grains after production. Lack of adequate storage was compared to pests, theft, market access and other issues. Across almost all states, farmers named lack of modern storage facilities as the main issue facing them today.

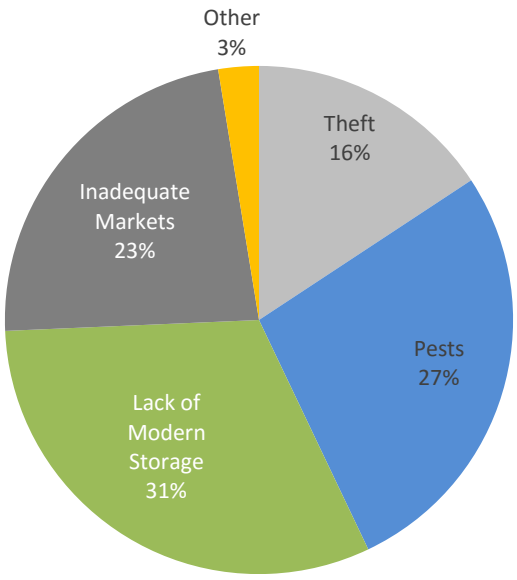


Figure 20: Market Issues cited by farmers, National, NASS 2012

5. Financial Parameters and Assumptions

5.1 Purpose of the Section

This section lays out the calculations and assumptions that were used in the modelling of the potential financial performance of the silo complexes. There are two main types of input:

- Approximations based on historic/observed data; and
- Calculations to differentiate between different operating models/locations.

The key components to model are the general market inputs, the revenue potential, capital and operating costs required to achieve this revenue. The aim is to identify whether or not there is a financial case for private sector investment and engagement with the silo complexes. The case comprises two factors:

1) Is there a commercially viable option for operating the silo complexes; and
2) Is the private sector better able to execute this strategy and unlock additional value?

The core assumptions applied in the financial valuation included:

Financial Parameters	Assumption
Inflation	10%
Cost of Debt	22.5%
Cost of Equity	30%
Debt/Equity Ratio	70/30
Tax Rate	30%
WACC	20.0%
Trade Finance	75% of Inventory
Interest on deposits	0%
Interest on overdraft	15%
Operating Model	
Trading	80%
PH Services	20%
FMARD Grain Reserve	0%
Operating Income	
Capacity utilisation	30-80%
Grain throughput	Silo Specific
Trading grain turnover	2x Capacity
Local grain prices	Silo Specific
Trading margin	10%
PH handling turnover	Silo Specific
PH handling prices	NGN 3,650-4,850 per MT
Agroprocessing Revenue	88,000 per MT
Operating Costs	
Grain Handling Costs	NGN 2800 per MT
Agroprocessing Costs	Input price plus 15% direct costs
Indirect Costs	NGN 9,000,000 – 60,000,000 MT pa
Capital Expenditure	
CAPEX	Silo Specific (see Appendices)

5.2 Financial Inputs

The financial model uses a very small number of macroeconomic financial inputs to incorporate inflation and the cost of capital. In summary these are:

Input	Assumption
Inflation	10%
Cost of Debt	22.5%
Cost of Equity	30%
Debt/Equity Ratio	70/30
Tax Rate	30%
WACC	20.0%
Cash Balances:	
Interest on deposits	0%
Interest on overdraft	15%

The sections below outlines the rationale underpinning each assumed rate.

5.2.1 Inflation

Inflation in Nigeria has been very stable in recent years, after a period of substantial volatility in the 1990s and early 2000s; this is particularly true over the last 3 years, averaging 9.63% to December 2015. Inflation in the food sector has tended to outpace the national average – averaging 10.13% over the same period. We use an inflation rate of 10% for the financial analysis.

5.2.1 Cost of Debt

The Central Bank of Nigeria monitors two commercial interest rates: the prime rate and the maximum rate in a given period. These represent the annual interest rates for term loans offered across the spectrum of Nigerian financial institutions. Debt providers – private and public – tend to use these data points as benchmarks.

The prime rate records the interest rate charged to the most creditworthy borrowers. Over the last five years, this rate has averaged 16.5% In part this is driven by the fact that companies with high creditworthiness are much more valued – and as such they can negotiate terms more favourable than might be expected. For Nigeria, these companies include the large conglomerates including key companies related to grain markets, namely Flour Mills of Nigeria, Dangote, BUA, and Honeywell. While the prime rate is a helpful benchmark, it should also be noted that these companies can access debt at or below the prime rate.

The maximum rate theoretically reports the average high water mark for interest rates in a given period- i.e. the rate of interest charged to the least creditworthy borrowers in the commercial space. Over the last five years, the maximum lending rate has averaged 24.4%.

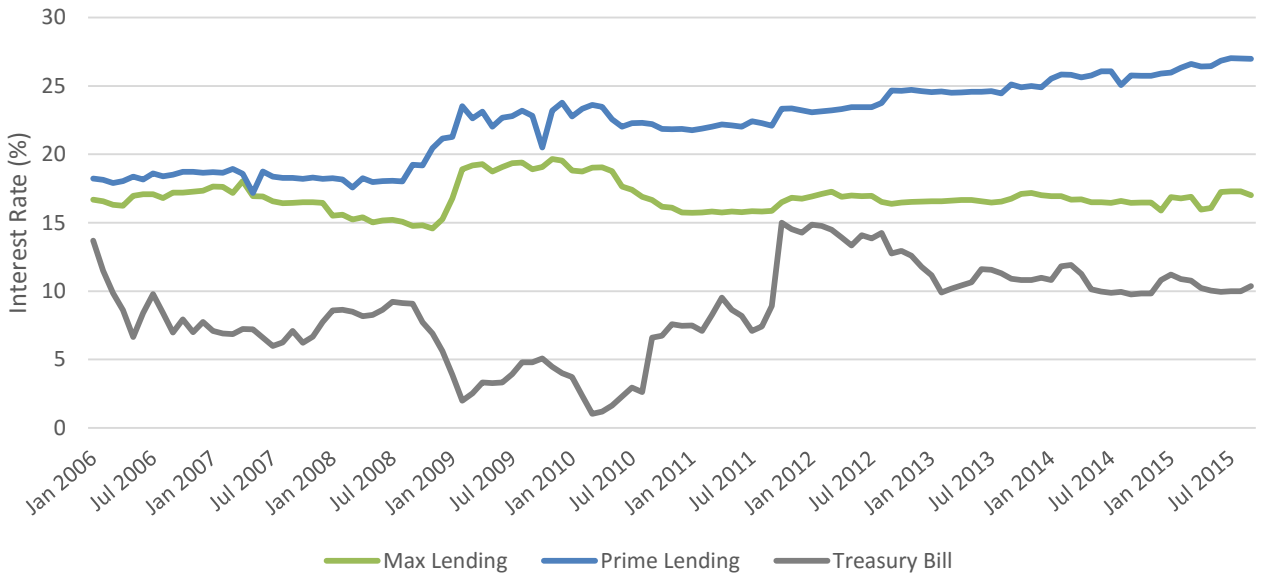


Figure 21: Interest Rate Benchmarks 2006-2015, CBN

The cost of long term debt and the trade finance facility may fall below this level if the silo complex operator is able to leverage concessional sources of capital. The principal channels for accessing this capital are as follows:

- Real Sector Finance Fund (RSFF): providing credit to companies in the manufacturing and agriculture value chain for CAPEX and working capital with an interest rate of 9% per annum;
- Commercial Agriculture Credit Scheme (CACS): providing credit to large and medium scale agribusinesses at an interest rate of no more than 9% through participating banks, with an explicit focus on grain crops such as maize, rice, millet and sorghum and on storage facilities.

5.2.2 Cost of Equity

Pricing equity investment for emerging markets is more of an art than a science. This is particularly true for higher risk sectors, principally agriculture. For large listed corporate equity investors (e.g. Flour Mills of Nigeria, Olam) returns are perceived to be less risky – so expected returns also tend to be lower. In Nigeria, listed companies related to the grain sector tend to have costs of equity between 15% and 20%.

These equity costs do not apply for private investments and or project finance. Private equity investors will be seeking returns upwards of 22% at a portfolio level and often in the 30%+ range on a project or company specific basis. On this basis we used a benchmark cost of NGN denominated equity of 30%.

5.2.1 Tax rates

The corporate tax rate in Nigeria is 30% and this has been used as our assumption. However, it should be noted that there are other applications of tax in the grain value chain and in the agriculture sector.

In terms of grain-specific tax treatment there are a number of duties applied to materials in the agriculture sector and relevant grain handling that have explicit import duty treatment:

Category	Import Duty	VAT	Levy
Dryers for agricultural products	5		
Parts of centrifuges, including centrifugal dryers Of a kind used on agricultural or forestry vehicles and machines	10	5	
Other Weighing machinery, NES	5		
Self-loading or self-unloading trailers and semitrailers for agricultural purposes	35	5	
Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables	0		
Grain oriented steel ingots and flatworked and worked metal	5	5	
Non-electrical works trucks of the type used in factories, dock area, self-propelled	10	5	

Additional tax initiatives relevant to the silos project relate to specific grain imports. Historically, it has not been legal to import various types of grain. For some markets (maize, sorghum) the market has liberalised to allow imports and stabilise prices in periods of local supply deficit. As such, these crops have low import tariffs. Conversely, some crops were promoted through the ATA as priority areas for agricultural and economic development – namely rice and wheat. Import tax rates for these products are therefore much higher to incentivize investment into growing grains locally.

Category	Import Duty	VAT	Levy
Maize (corn), (not in seed)	5%		
Sorghum (excluding seedss)	5%		
Millet (excluding seedss)	5%		
Husked rice imported by pure rice traders	10%		20%
Husked rice imported by rice millers and backward integration program	10%		60%
In packings of more than 5kg or in bulk imported by pure rice traders	10%		20%
In packings of >5kg or in bulk imported by rice millers, backward integration program	10%		60%
Semi-milled or wholly milled rice, polished or glazed, In packings of <5 kg	10%		60%
Other Rice in the husk (paddy or rough) not specified.	10%		60%
Broken rice	10%		60%
Durum wheat (Not in seeds)	5%		15%

Given that the aim is for the grain silos to support local grain production, these tax policies serve as indicators of the import market – they should not have particular bearing on the silo complexes themselves. It may be difficult to restrict private partners, but clearly it would undermine these import substitution policies to have FMARD grain silos being used to store stocks of imported rice and wheat.

One example of how tax policy could affect investors is in terms of the Staple Crop Processing Zone program. SCPZs entail improved infrastructure investment, utility guarantees, and tax incentives to support private sector agriculture development. While we have assumed a 30% tax rate, there is clearly an argument that each of the silo complexes could qualify for tax relief. This is particularly pertinent given that the Olam SCPZ in Nasawara includes grain storage – and would therefore be competing with a prospective silo operator in the same region. This will be reviewed with FMARD as part of the stakeholder outreach and transaction documentation.

5.2.2 Cash Balance Interest Rates

For positive cash balances, we assume no interest returns. In part this is due to the high turnover of cash in a given period as the silo complex operator purchases and disposes of grains partially with its own capital. However, it may be possible to assume up to 10% if the cash is treated as a savings deposit.

For negative cash balances/overdrafts, we assume a 15% interest rate – on the basis that there will be some charge associated, but that the turnover will again reduce the cost of this short term debt versus the long term debt commitment.

5.3 Silo Complex Operating Model

The financial analysis for the viability of the silo complexes is driven by the potential operating model at each complex. The balance of the different operating models (trading, post-harvest services, or strategic grain reserves) will be driven by:

- The strategy and capacity of the silo operator;
- Extrinsic market dynamics such as grain price volatility, handling input costs, transport costs and cost of finance;
- Policy decisions by FMARD about minimum proportions between the three models.

On the basis of FMARD feedback and market outreach, we have used the following scenario for the ratio between the three operating models at each silo complex:

Operating Model	Assumed Ratio
Trading	80%
PH Services	20%
FMARD Grain Reserve	0%

FMARD have suggested that the base level for strategic reserve use be set at zero percent on the basis that:

1) The Ministry's preference is to retain full operation of a number of silo complexes for 100% government use;
2) This analysis, coupled with further input from the FMARD SGRD will be used to determine which silo complexes are not included in the complexes offered for private sector involvement under the PPP transaction;
3) Integrating strategic grain reserves into the PPP structure may be challenging to monitor and effectively price.

These ratios can be adjusted to reflect changes in the policy environment, capacity of the FMARD to finance grain purchases and, if necessary, on the basis of additional private sector feedback.

5.4 Silo Complex Revenues

Revenues are driven by assumptions about:

- the demand for storage in a given complex and resulting utilisation rate
- the use of storage for trading, post-harvest services to farmers or strategic reserve storage;
- purchase and sale prices for traded grains; and
- prices for providing post-harvest services to farmers and traders;

Revenues are then calculated on the basis of the three different operating models available to the silo operator (all of which can run simultaneously).

Operating Model	Revenue Calculation
Trading	(1) capacity utilisation x (2) grain ratios x (3) trading grain turnover x (4) local grain prices x (5) trading margin
PH Services	(1) Capacity utilisation x (2) grain ratios x (6) post-harvest grain handling turnover x (7) post-harvest handling prices
FMARD Grain Reserve	(1) Capacity utilisation x (8) cost of storing grains

The assumptions used for these eight calculation inputs are:

Calculation Input	Source/Assumption			
1) Capacity utilisation	Estimated utilisation each time divided into three categories: low, medium and high demand silo complexes			
(2) Grain ratios	Proportional to average 2010-2012 state production levels			
(3) Trading grain turnover	1.5 x capacity turnover in a given period			
(4) Local grain prices	Average prices at markets local to each complex over from 2012-2014			
(5) Trading margin	Assumed to 7.5% - benchmarked against other traders			
(6) PH handling turnover	Minimum of the storage or processing capacity at each complex			
(7) PH handling prices			Maize, Sorghum, Millet	Rice
	Loading	NGN per MT	400	400
	Weighing	NGN per MT	400	400
	Drying	NGN per MT	1100	1100
	Milling	NGN per MT		1200
	Storage	NGN per MT/month	400	400
	Storage Period	months	3	3
	Fumigation	NGN per MT	150	150
	Fumigation Freq	months	3	3
	Bagging	NGN per MT	400	400
	Total	NGN per MT	3,650	4850
(8) Cost of storing grains	See costs section below			

The sections below outline the rationale underpinning each assumed rate.

5.4.1 Capacity Utilization

Capacity utilisation is modelled by using:

- Projected utilisation for a high demand silo complex benchmarked against experience in Kenya, India;
- Filters to establish three basic categories of silo complex:
    - **High demand:** Silos in states with high levels of grain production and with high populations, which are likely to have the highest and most consistent demand
    - **Medium demand:** Silo complexes in states with high levels of grain production but low populations – i.e. lower local demand and silo complexes in states with low levels of grain production but high populations; and
    - **Low demand areas:** Silo complexes in areas with low production and low population.

Five different data points were used to create an index that approximates the demand for grain in a given state. To assess areas of high local production and local farmer/agent demand for storage, we took three data points:

- The number of crop farmers in the state (FMARD Agricultural Census and Survey, 2013);
- The extent to which farmers identified lack of modern storage facilities as a key issue (NASS, 2012); and
- The level of grain production relative to the storage capacity at each silo complex (FMARD Agricultural Census and Survey, 2014).

To assess local end user demand for storage, two data points were selected to reflect the different types of demand for grain: household consumption and animal feed demand. The data points were:

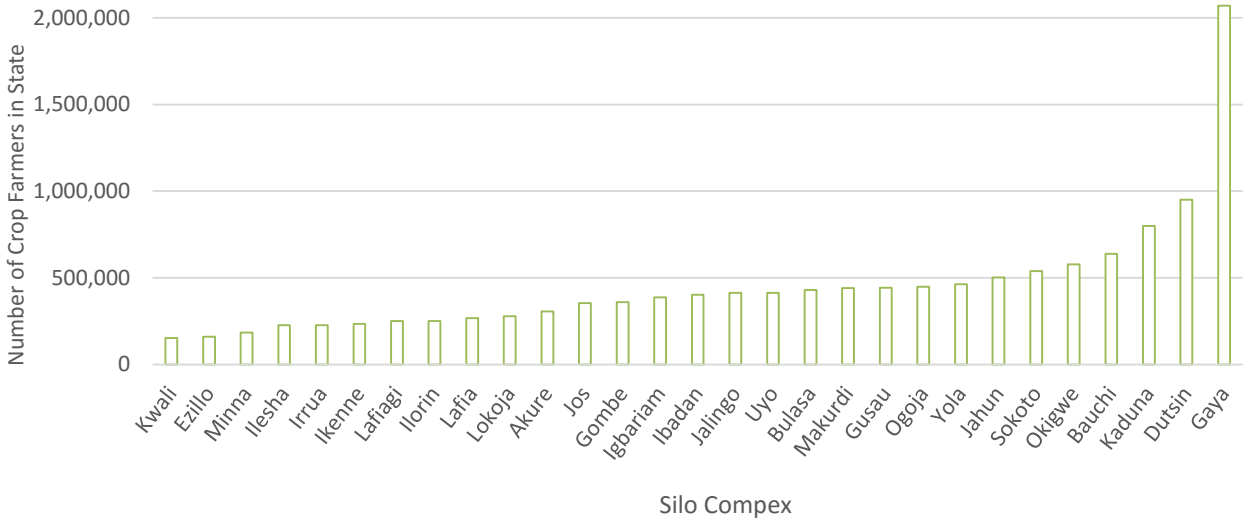
- Local population (National Annual Abstract of Statistics); and
- Local number of fish/poultry farmers (FMARD Agricultural Census and Survey, 2013).

There are some limitations with this approach – in that it potentially underestimates the strategic value of a silo complex from a transport perspective.

However, most market activity is driven by more fundamental drivers. From a supply perspective, the largest markets are in the high grain production areas in the North of the country. From a demand perspective, most processing and downstream marketing activities are close to large population centers.

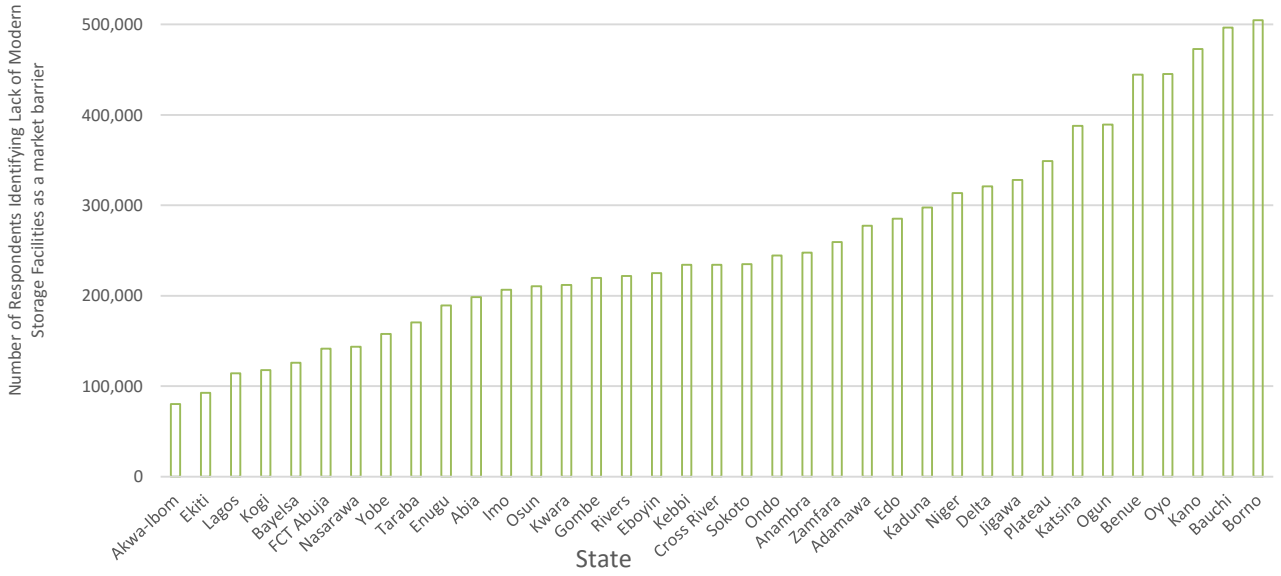
Number of Crop Farmers

In terms of numbers of crop farmers, the census recorded 25m farmers, which is a low estimate but focuses on individuals for whom agriculture is the core economic activity. Given that this figure represents approximately 25% of the total population involved in agriculture, it is a reasonable proxy for local agricultural activity. Kano has the largest number of recorded farmers with over 2m – more than double the next closest state, which is Katsina with just under 1m farmers. On average, 500,000 smallholder farmers are in each state. The distribution across all states is as follows:



Farmer Demand for Storage

Using the NASS data set, we collated the number of farmers identifying modern storage scarcity as a key issue in terms of grain marketing. This issue was consistently identified by an average of 55% of respondents in each state. The absolute number of respondents identifying this issue is below:



This figure was converted into a percent of all farmers identified in the state to get a sense for the relative importance of the issue.

Size of Silo Complex Relative to Farmer Demand

A third level of analysis assessed the local production in a given state relative to the storage capacity at each silo complex. While this analysis is crude, in that it does not consider the strategic location or local demand profile for grain in a given state, it confirms initial market assessment feedback on the silo complexes. For 16 of the silo complexes, the storage capacity represented less than 5% of local production; however, for 10, the silo complexes represented potentially more than 10% of local production – rising to more than half of local annual production in two locations: 56% in the case of Kwali, FCT and 57% in the case of Okigwe, Imo State.

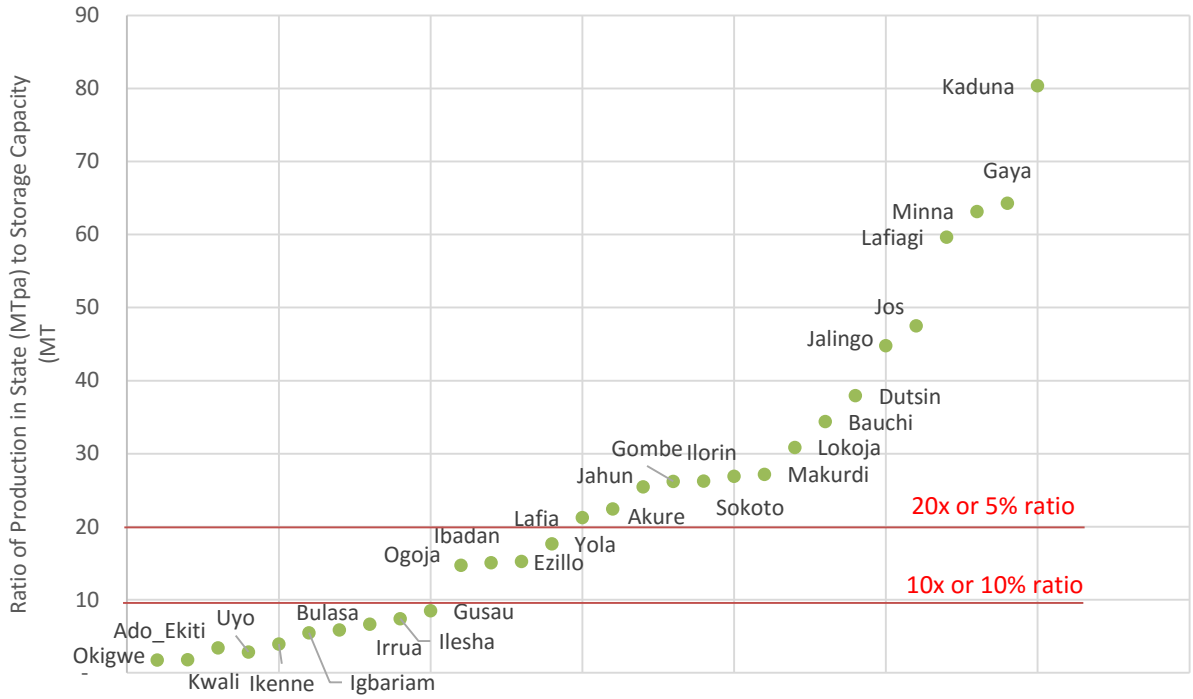


Figure 22: Storage Capacity relative to Average Annual Production, FMARD/LHGP 2015

Consumer Demand

Total population in each state was used as a proxy for household/consumer grain demand in a given region. States with relatively high population. This allowed us to balance supply data with the fact that in many densely populated states along the South cost of the country, grain production and agricultural activity is lower.

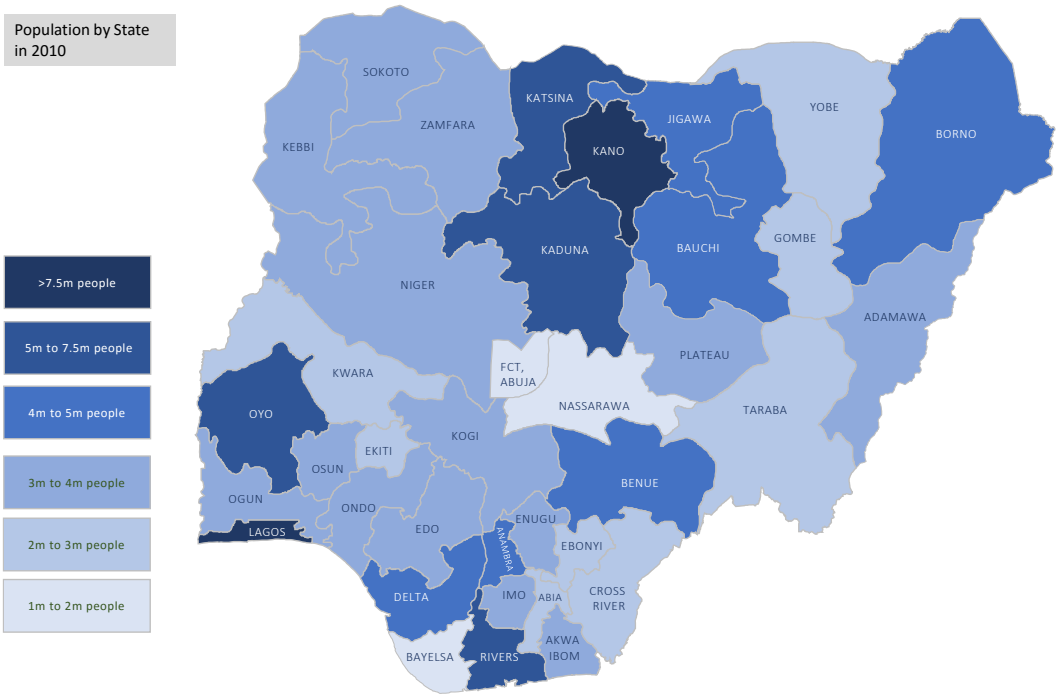


Figure 23: Nigerian Population Distribution by State, FMARD/NBS 2010

Commercial Offtaker Demand

While consumer demand also serves as a proxy for household processing, the data does not capture feed mill activity – a growing part of the grain value chain in Nigeria and key market for silo operators to tap into. As a proxy for the level of livestock activity in a state, we used the number of aquaculture and poultry farmers recorded by the FMARD Agricultural Census. The results were as follows:

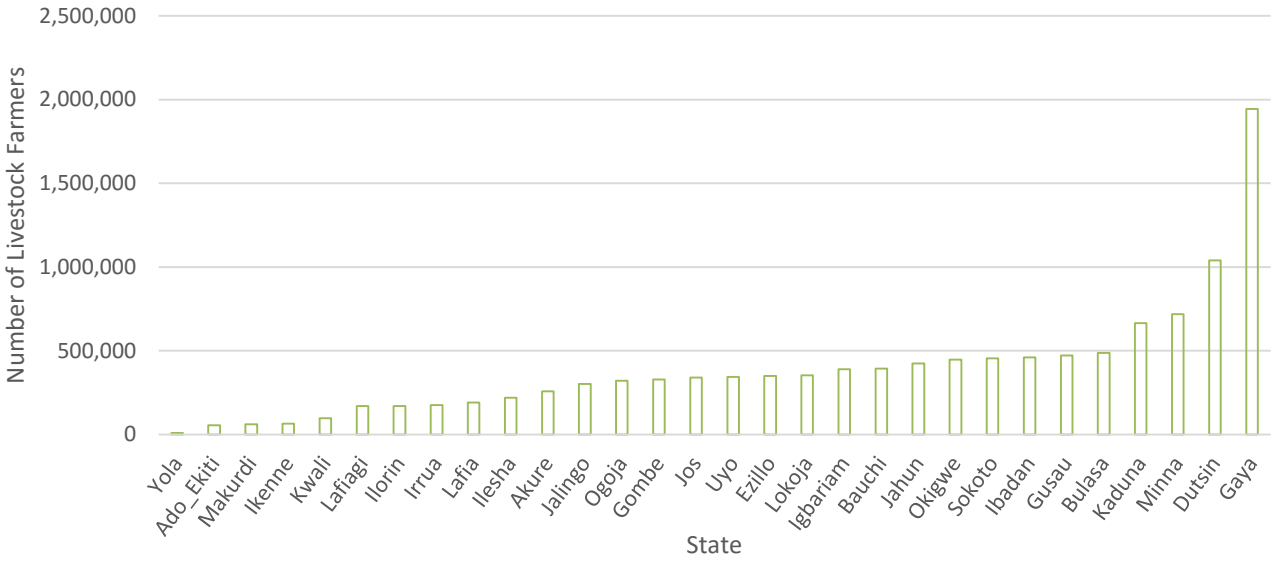


Figure 24: Distribution of People involved in Crop farming in Nigeria, Highlighting Private Farmers, FMARD/NBS 2012

Capacity Utilization Index

Taken together, these data points generate a demand index that divides the silo complexes into three categories: High, Medium and Low demand.

		Storage from Grain Supply			Grain Demand			
		Farmers	Storage	Prod./Storage	Population	Fish/Poultry	Rank	Profile
Ado_Ekiti	Ekiti	30	24	27	24	29	134	Low
Kwali	FCT Abuja	29	1	29	30	26	115	Low
Ilesha	Osun	26	28	22	15	21	112	Low
Irrua	Edo	25	7	23	20	23	98	Low
Lafia	Nassarawa	21	9	16	29	22	97	Low
Uyo	Akwalbom	13	30	28	11	15	97	Low
Ezillo	Ebonyi	28	8	18	28	14	96	Low
Ogoja	CrossRiver	9	25	20	23	18	95	Low
Lafiagi	Kwara	22	17	4	25	24	92	Medium
Ikenne	Ogun	24	2	26	12	27	91	Medium
Ilorin	Kwara	22	17	12	16	24	91	Medium
Yola	Adamawa	8	14	17	22	30	91	Medium
Lokoja	Kogi	20	27	9	16	13	85	Medium
Akure	Ondo	19	13	15	14	20	81	Medium
Bulasa	Kebbi	12	20	24	19	5	80	Medium
Okigwe	Imo	5	26	30	10	9	80	Medium
Jalingo	Taraba	14	12	6	27	19	78	Medium
Gombe	Gombe	17	4	13	26	17	77	Medium
Igbariam	Anambra	16	15	25	8	12	76	Medium
Jos	Plateau	18	6	5	21	16	66	High
Gusau	Zamfara	10	11	21	18	6	66	High
Minna	Niger	27	19	3	9	3	61	High
Makurdi	Benue	11	5	10	7	28	61	High
Sokoto	Sokoto	6	22	11	13	8	60	High
Ibadan	Oyo	15	10	19	4	7	55	High
Jahun	Jigawa	7	16	14	6	10	53	High
Kaduna	Kaduna	3	29	1	2	4	39	High
Dutsin	Katsina	2	23	7	3	2	37	High
Bauchi	Bauchi	4	3	8	5	11	31	High
Gaya	Kano	1	21	2	1	1	26	High

All silo complexes are modelled with a gradual increase in production over four years to reflect the period of investment in site completion/rehabilitation and the incremental building key market stakeholder relationships. The capacity utilisation varies according to the demand profile of the silo complex, as follows:

Demand Scenario	Year 1	Year 2	Year 3	Year 4+
High	50%	60%	70%	80%
Medium	45%	50%	55%	60%
Low	35%	40%	45%	50%

5.4.2 Throughput Ratios by type of Grain

The ratios of different grains used in each silo are driven by historic local production. The goal was to reflect the fact that silos in the Northern Belt would be more heavily skewed to dry grains, especially

sorghum and millet, while central and southern silo complexes may be more heavily skewed to maize and rice. Other grains – barley, wheat – are grown in Nigeria; however, these were excluded from the analysis because their total production levels are low, production is distributed over a number of states, and information on pricing, processing and handling is less available.

Ratios were calculated on the basis of the average annual grain output by state from 2010 to 2012. The percent of grain produced in each state was then rounded according to number of bins in each silo – since a single bin should not hold different types of grain. This gives the number of bins in each silo which might be reasonably allocated to each different grain type:

		Average Annual MT Production (2010-2012)				Estimated Allocation of Silo Bins				
		Maize	Sorghum	Rice	Millet	Total	Maize	Sorghum	Rice	Millet
Ado_Ekiti	Ekiti	251,936	380	87,456		20	15		5	
Akure	Ondo	434,216		126,878		10	8		2	
Bauchi	Bauchi	329,173	311,387	66,393	152,960	10	4	3	1	2
Bulasa	Kebbi	112,147	226,980	97,330	151,420	20	4	8	3	5
Dutsin	Katsina	284,557	446,903	59,530	158,080	10	3	4	1	2
Ezillo	Ebonyi	35,536	650	345,733		10	1		9	
Gaya	Kano	415,390	714,693	313,070	164,317	10	3	4	2	1
Gombe	Gombe	222,080	198,397	102,893	131,790	10	3	3	2	2
Gusau	Zamfara	60,790	540,577	63,380	184,593	20	1	13	2	4
Ibadan	Oyo	285,197	25,702	66,617		10	7	1	2	
Igbariam	Anambra	78,978	7,820	50,033		10	5	1	4	
Ikenne	Ogun	355,356		40,421		20	18		2	
Ilesha	Osun	138,368		46,499		10	7		3	
Ilorin	Kwara	177,542	98,755	359,395	20,537	10	3	2	4	1
Irrua	Edo	103,146		63,659		10	6		4	
Jahun	Jigawa	82,257	249,583	64,183	240,427	10	1	4	1	4
Jalingo	Taraba	452,009	215,798	328,508	123,600	10	4	2	3	1
Jos	Plateau	564,366	357,025	161,841	104,630	10	5	3	1	1
Kaduna	Kaduna	820,413	524,753	460,430	204,470	10	4	3	2	1
Kwali	FCT Abuja	43,013	37,072	74,386	24,247	20	5	4	8	3
Lafia	Nassarawa	172,752	166,077	160,995	31,220	10	3	3	3	1
Lafiagi	Kwara	177,542	98,755	359,395	20,537	12	3	2	7	
Lokoja	Kogi	303,024	86,797	362,283	19,873	10	4	1	4	1
Makurdi	Benue	161,848	158,305	298,119	61,137	10	2	2	5	1
Minna	Niger	625,674	521,239	313,654	119,110	10	4	3	2	1
Ogoja	Cross River	269,055		99,020		10	7		3	
Okigwe	Imo	137,519		36,483		20	16		4	
Sokoto	Sokoto	52,407	255,997	72,277	292,233	10	1	4	1	4
Uyo	Akwa Ibom	69,822		1,379		10	9		1	
Yola	Adamawa	182,043	148,050	95,577	15,687	10	4	3	2	1

5.4.1 Grain Turnover

It is expected that the silo complexes can store and process a larger volume of grains that than the installed storage capacity on the basis that the operator will turnover grains multiple times in a season. We estimated this rate based on:

- Total storage capacity
- Trading turnover
- Monthly Processing Capacity

Total storage capacity for the silo complexes is straightforward – a function of the silo bins multiplied by their size.

The trading turnover represents the volume of grain traded in a given period relative to the total storage capacity for each activity. For trading, we have estimated a turnover of 1.5-2 times capacity in a season – a conservative approach. For post-harvest handling, we estimate that farmers will store crops on hand for an average of three months – so the turnover is four times per season.

Processing capacity describes the capacity limitations of the weighing, drying, and bagging facilities on site – which may be a constraint on the throughput relative to these two activities; the model checks against the turnover estimates and caps when processing throughput is at capacity.

5.4.2 Local grain prices

While there is no centralised, long term database for grain prices in Nigeria, various donor-financed agencies have gathered sporadic information retail and wholesale crop prices. For the purpose of this analysis, we used an average of prices from 2012 to 2014 at 12 market locations. These prices were:

Average Annual Minimum Wholesale Price, 2012-2014 (Fewsnet, 2014)

NGN/MT	Maize	Millet	Rice	Sorghum
Aba	70,445	90,000	60,601	104,055
Bodija	48,417	74,250	165,000	59,667
Dandume	44,063	51,533	111,875	43,433
Dawanau	43,700	43,409	135,502	57,500
Dodoru	48,973	44,600	131,200	57,733
Giwa	48,680	60,000	133,750	50,000
Gombe	50,042	48,750	116,667	50,333
Gujungu	55,933	52,200	119,000	52,983
Kaura Namuda	56,650	50,000	141,500	57,800
Mile 12	61,083	90,000	139,000	78,333
Maiduguri	60,450	64,240	143,966	56,417
Saminaka	40,625	58,067	126,083	48,189
National	**52,422**	**60,587**	**127,012**	**59,704**

For each of the silo complexes, a reference market was selected on the basis of proximity. The data has good coverage of market prices in the North East, North Central and South West, but in some cases no market was identified within an appropriate range. For these silo complexes, a national average market price was used in place of a direct reference price.

Reference Market	Silo Complex
Aba	Okigwe, Uyo
Bodija	Ado_Ekiti Akure, Ibadan, Ilesha, Ilorin
Dandume	Kaduna
Dawanau	Dutsin, Gaya
Dodoru	Lafia, Makurdi, Ogoja
Gombe	Bauchi, Gombe, Jalingo, Yola
Gujungu	Jahun
Kaura Namuda	Gusau
Mile 12	Ikenne
National	Bulasa, Ezillo, Igbariam, Irrua, Kwali, Lafiagi, Lokoja, Minna, Sokoto
Saminaka	Jos

5.4.3 Grain trading margin

Calculating the revenues from grain trading is typically based on margin analysis. Comparable sites in East Africa trade at an average 10% margin over the purchase price.

There are two dynamics to operating a trading business: buying and holding grain on the belief that prices will increase, and trading between markets with different prices. On a time basis, it is noteworthy that Nigerian grain price fluctuations have been extremely volatile within 12 month periods.

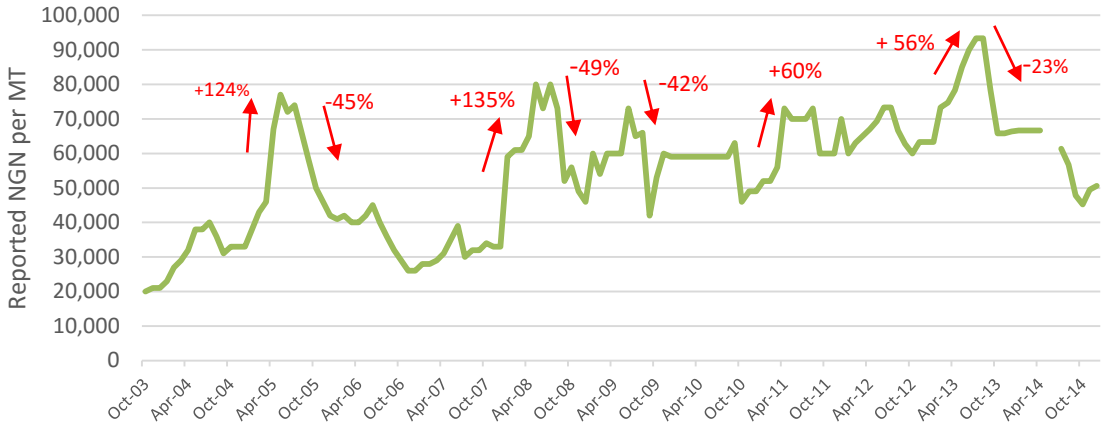


Figure 25: Monthly Maize Prices in Bodija, Ibadan over 11 years; FEWSNET 2014

The graph above shows the price trends for White Maize in Bodija from 2003-2014 (selected at random, which has intra-season swings of up to 135%. The storage and handling costs for a 3 month period is approximately 5-10% of the pricing – so swings of this kind can create extremely profitable periods for traders.

There are also substantial opportunities to arbitrage price differences between different trading locations in Nigeria. The dominant trade for grains is North-South – with the production rich areas feeding the population dense coastal states and other urban areas. Data from the last 2 years suggests that there are very compelling price premia for trade of this kind. Using data for markets in Gombe, Kaduna, Lagos and Ibadan, sorghum and millet both demonstrated protracted periods during which prices were sufficiently high to merit the transportation costs to markets in the south. Maize prices were more stable and offered fewer opportunities to arbitrage price differences.

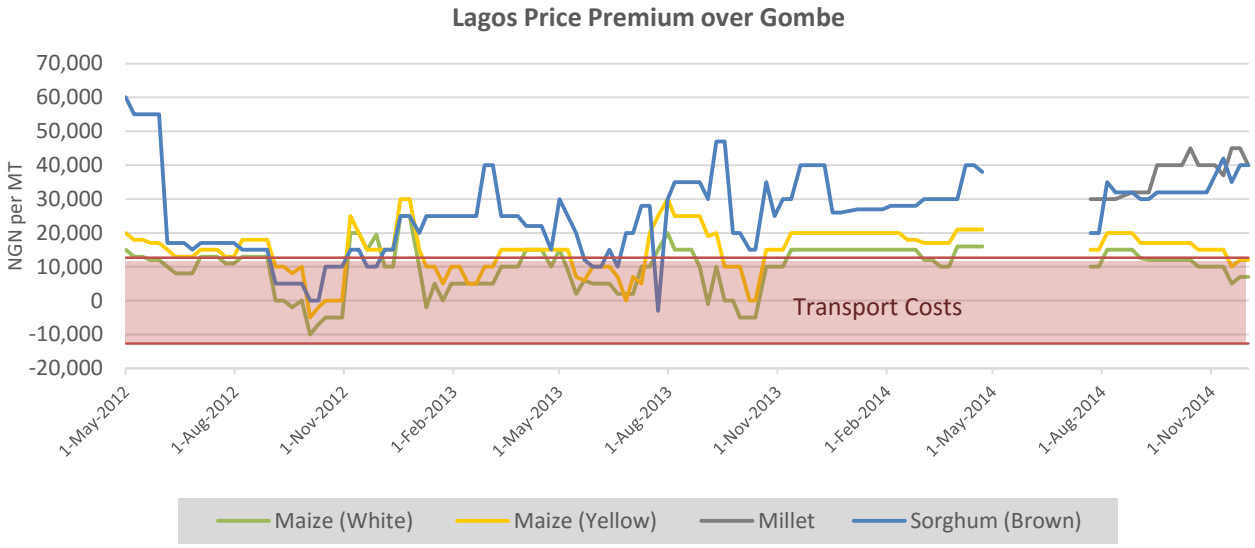
For these trades, the margins after transport (but before in-house storage and handling costs) are well within expected ranges:

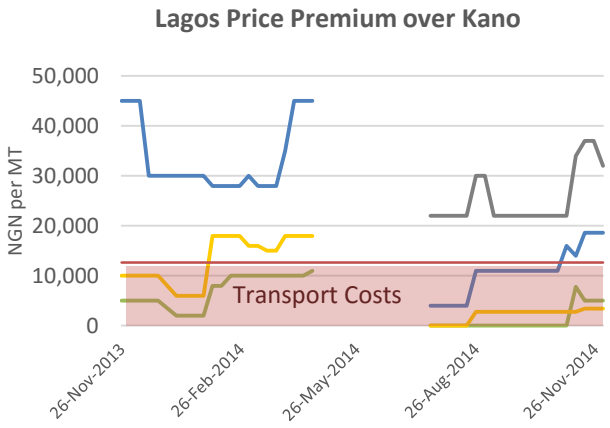
Average intra-market trading margins after transport, 2012-2014				
Markets	White Maize	Yellow Maize	Millet	Sorghum
Lagos/Gombe	4%	8%	27%	17%
Lagos/Kano	N/A	6%	14%	19%
Lagos/Kaduna	9%	4%	21%	35%
Lagos/Ibadan	13%	16%	9%	14%

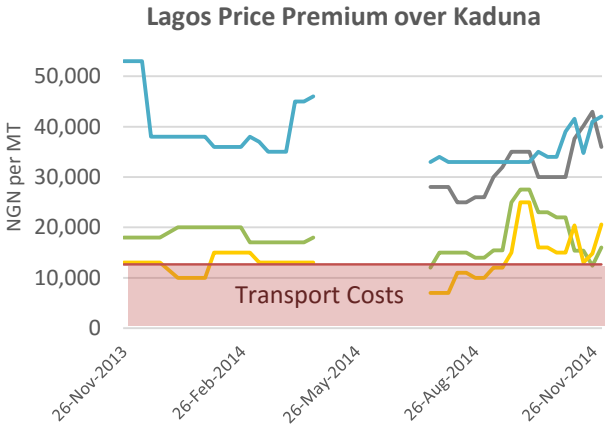
Some traders will be able to capitalise on this swing in order to generate additional value – but they are taking the risk on the general market volatility. Anecdotally, many Nigerians participate in grain market speculation on a small scale – implying that the revenue potential is well recognised.

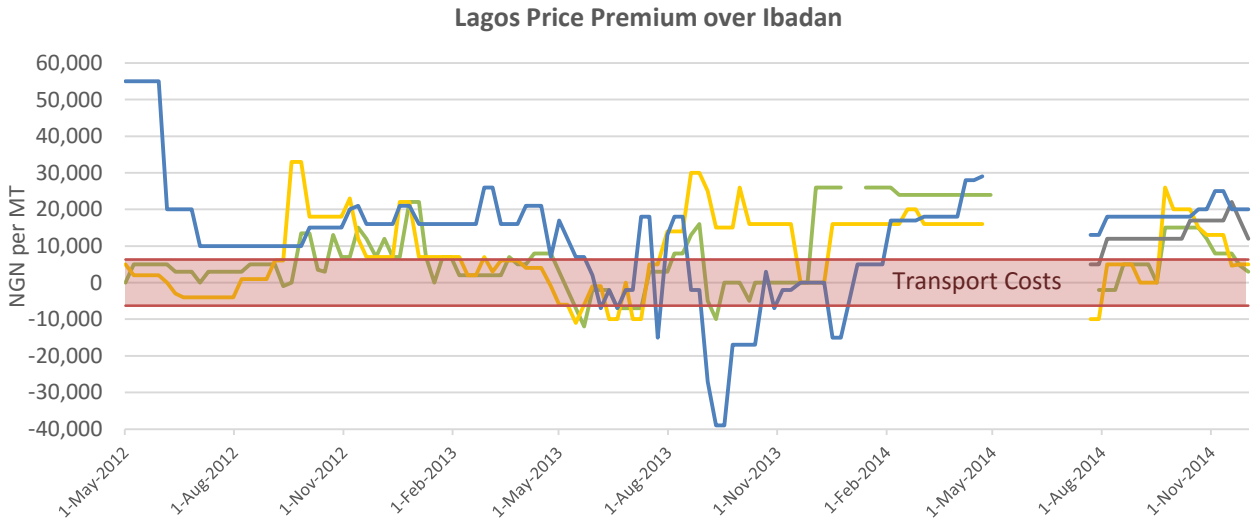
On balance, therefore, we have conservatively assumed a 7.5% margin, in line with East African levels and intra-market margins after in house storage costs - on the basis that many businesses will:

- price to include transport and processing costs;
- price to include compensating for losses;
- seek to smooth out their exposure to volatility through forward sales and absorb losses.









5.4.4 Post-Harvest Handling Prices

For the proportion of grain storage and processing capacity that could be allocated to provide grain handling and storage services to farmers, there are two main pricing calculations. Farmers and traders pay substantial quantities at market for loading, weighing, stitching bags and destoning of crops. We used these pricing levels as benchmarks and added costs for longer term storage and fumigation of crops, priced against references from elsewhere in sub-Saharan Africa.

Maize, sorghum and millet have similar pricing benchmarks. Rice processing includes milling rather than drying, and the data implied slightly lower overall costs as a result. The relative prices and calculations were as follows:

Pricing Post Harvest Services for Maize, Sorghum, Millet

Activity	Unit	Value	Source/Reference
Loading	*NGN per MT*	400	*average from Abuja Commodity Exchange estimates*
Weighing	*NGN per MT*	400	*average from Abuja Commodity Exchange estimates*
Drying	*NGN per MT*	1100	*cross reference to Kenya)*
Storage	*NGN/MT/month*	400	*cross reference to Kenya, FAO MAFAP, USAID price data*
Storage Period	*months*	3	*cross reference to Kenya, Propcom Maikarfi*
Fumigation	*NGN per MT*	150	*cross reference to Kenya*
Fumigation Freq	*months*	3	*cross reference to Kenya*
Bagging	*NGN per MT*	400	*Adamawa Market estimates, cross ref to FAO MAFAP Costs*
Total		**3,650**	

Pricing Post Harvest Services for Rice

Activity	Unit	Value	Source/Reference
Loading	*NGN per MT*	400	*average from Abuja Commodity Exchange estimates*
Weighing	*NGN per MT*	400	*average from Abuja Commodity Exchange estimates*
Drying	*NGN per MT*	1100	*cross reference to Kenya*
Milling	*NGN per MT*	1200	*Propcom Maikarfi Cluster Analysis*
Storage	*NGN/MT/month*	300	*Propcom Maikarfi Cluster Analysis*
Storage Period	*months*	4	*cross reference to Kenya, Propcom Maikarfi*
Fumigation	*NGN per MT*	150	*cross reference to Kenya*
Fumigation Freq	*months*	3	*cross reference to Kenya*
Bagging	*NGN per MT*	400	*Propcom Maikarfi Cluster Analysis*
Total		**4,850**	

5.4.1 Agro-processing Units

Seven of the silo complexes included in the transaction share their facilities with agro-processing units. Of these seven, three must include the agro-processing units in any potential transaction: structures, access and utilities are fully integrated between the two operations.

Revenue calculations for the agro-processing units assume:

Operating Model	Unit	Assumption
Capacity	Mt/hr	0
Utilisation	percent	60%
Hours per shift	hours	8
Shift per day		1
Days pcm	days	22
Months in operation	months	10
Grain conversion rate	percentage	70.00%
Input Costs	NGN	Market Value
Sale price	NGN per MT	88,000

5.5 Silo Complex Costs

The costs associated with the silo complexes fall into two categories: direct costs relating to the handling of grains and therefore driven in part by the turnover of grains in the complex, and fixed costs which relate to the size and scope of the business as a whole.

5.5.1 Operating Costs

Operating costs can be further sub-divided into variable costs which relate directly to the volume of grain being turned over in a given period, and fixed costs, which are associated with the management and operations of each complex independently of the operating model.

For variable costs, we benchmarked specific activities against comparable silo complexes in emerging markets.

1) Direct costs for traded grains are bundled into the trading margin.
2) For post harvest services, the underlying cost base per metric tonne is as follows:

Item	*Unit*	Cost
Electricity and water	*NGN per MT*	600
Direct wages	*NGN per MT*	700
Fuel	*NGN per MT*	1200
Offloading	*NGN per MT*	100
Chemicals, etc	*NGN per MT*	100
Equipment repairs	*NGN per MT*	100
Total Direct Costs	*NGN per MT*	**2,800**

3) For agro-processing services, costs were calculated as a ratio of revenues:

Cost	*Unit*	Cost
Grain Input	*NGN*	Output capacity/conversion factor
Grain conversion	*percentage*	70%
Processing Costs	*percentage*	18% of sales
Indirect costs	*percentage*	5% of sales

Fixed costs are divided into four categories:

- Establishment charges relating to the financial and collateral management of grains, insurance for inventory and security against theft;
- Sales charges associated with outreach to potential silo complex customers, both as users of the post-harvest handling services and offtakers of traded grains;
- Employment costs relating to staffing each silo complex independently of short term staff for grain handling; and
- General costs associated with the administration of each silo complex.

The underlying fixed costs are assumed to vary depending on the size of each storage complex in terms of storage capacity. As such, there are three different fixed costs assumptions: 1) for the 11,000 MT capacity silo at Lafiagi, 2) for the twenty three 25,000 MT capacity silo complexes and 3) for the six 100,000MT capacity silo complexes.

Category		11,000 MT	25,000 MT	100,000 MT
Establishment				
Bank charges and commission	*NGN*	2,125,000	3,187,500	12,750,000
Collateral management fees	*NGN*	3,000,000	4,500,000	18,000,000
Insurance	*NGN*	Variable	Variable	Va
Repairs and maintenance	*NGN*	1,980,693	2,971,040	11,884,158
Security expenses	*NGN*	1,400,000	2,100,000	8,400,000
Sub-Total	***NGN***	**8,505,693**	**12,758,540**	**51,034,158**
Sales / Distribution				
Advertisements and sales promotions	*NGN*	1,112,667	1,669,000	6,676,000
Commission paid	*NGN*	666,667	1,000,000	4,000,000
Travelling and transport	*NGN*	1,666,667	2,500,000	10,000,000
Motor vehicle running expenses	*NGN*	5,693,333	8,540,000	34,160,000
Sub Total	***NGN***	**9,139,333**	**13,709,000**	**54,836,000**
Employment				
Directors' remuneration	*NGN*	6,666,667	10,000,000	40,000,000
Mgmt Salaries	*NGN*	2,040,048	8,428,362	12,147,955
Other Staff costs	*NGN*	1,994,056	5,839,382	8,273,085
Sub total	***NGN***	**10,700,771**	**24,267,744**	**60,421,040**
General				
Audit/Accountancy fees	*NGN*	1,503,333	2,255,000	9,020,000
Cleaning and pest control	*NGN*	1,275,303	1,912,955	7,651,818
Consultancy fees	*NGN*	3,333,333	5,000,000	20,000,000
Legal fees	*NGN*	416,667	625,000	2,500,000
Office expenses	*NGN*	1,504,715	2,257,073	9,028,290
Postage, Printing and stationery	*NGN*	427,427	641,141	2,564,562
Subscriptions	*NGN*	25,500	38,250	153,000
Sub total	***NGN***	**8,486,278**	**12,729,418**	**50,917,670**

Additional information on specific cost items is described below.

5.5.2 Employment Cost Estimates

The total number of employees at each silo complex will be driven by the specific requirements of the operator. However, the existing silo managers were able to provide estimates of the number and qualification/salary level for the numbers of employees that they would expect to see at each size of silo complex. These estimates are described below:

Role	*Seniority*	Salary (NGN)	11,000 Mt	25,000 MT	100,000 MT
Complex Manager	*Grade 12*	1,825,170	1	1	1
Deputy Manager	*Grade 9*	940,102	2	3	4
Site Foreman	*Grade 7*	630,481	2	6	10

Technicians	*Grade 6*	389,543	2	10	15
Additional Labour	*Grade 4*	242,994	5	8	10
Security	*N/A*	300,000	3	7	10

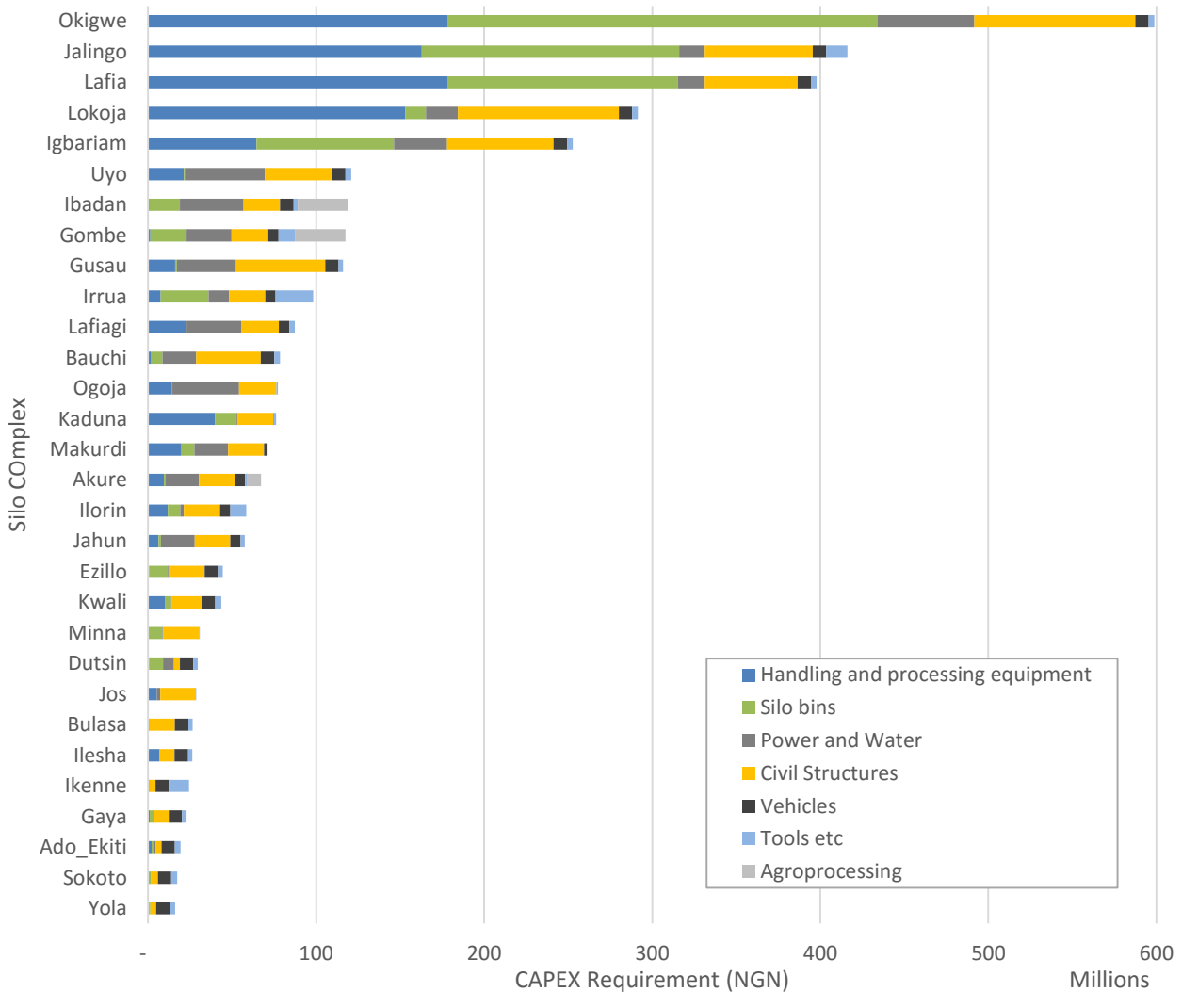
5.5.1 Insurance Cost Estimates

Insurance cost estimates are a factor of the grain inventory expected in a given period. As such, they relate to direct costs, but take the end of year inventory balance rather than throughput in a given period. The insurance rate applied in comparable emerging markets is approximately 0.3% of the value of grain in storage.

5.5.2 Capital Expenditure

All of the silos require some additional capital expenditure to unlock full utilization. For the existing silo complexes, this CAPEX is required to finance rehabilitation to existing structures. For newly completed silo complexes and complexes still under construction, capital is required to provide the final equipment, finish outstanding construction and repair and equipment/structures that have been damaged before the complex has become operational.

The due diligence questionnaire prepared by the Technical Advisor was used to determine the current state of the capital assets at each of the silo complexes. Using the historic bills of quantities and market benchmarks, we then estimated the capital cost for each silo complex as follows:



The total capital expenditure requirement for the silo complexes in terms of rehabilitation and completion is estimated at NGN 3.43bn.

On average, each silo complex requires relatively modest investment in rehabilitation and equipment – in the order of NGN 114m. Five silo complexes had substantial investment requirements at the time of diligence, ranging from NGN 252m in Igbariam to just under NGN 600m in Okigwe. At these complexes, there are two main drivers of higher costs – inadequate/uninstalled handling equipment and the installation of the silo bins themselves.

This value is likely to overstate the total, as work has progressed on a number of complexes (Okigwe, Lafia, Gombe).

6. Project Risks

6.1 Purpose of the Section

This section outlines the key risks associated with the silo complexes, and specifically in terms of private sector engagement. The high level types of risk relating to the silo complexes are:

Country/Sovereign risks:	Legal Risk Monetary Risk Economic Risk Force Majeure Political Risk
Project risks:	Construction/Handover Risk Operating Risk Procurement Risk Financial Risk Social Risk

6.2 Our Approach to Risk Management in PPP Transactions

The general approach to risk management in PPP transactions is to identify and then incorporate risks into a risk-adjusted valuation model.

This model provides an additional layer of analysis in addition to the underlying financial model used for valuation. Where risks have been identified:

- They may already be included in the model through existing assumptions and/or transaction structure; and
- They may require additional adjustment to reflect the different capacities of private versus public partners to manage key risks.

6.3 Types of Risk in PPP Transactions

6.3.1 Country Risk

Legal Risks

Legal risks arise in connection with the lack of precision in and the possibility of changes in the legislation and regulations governing the project.

The broad legal environment for operating the silo complexes is well established. Key regulations relate to:

- Legal status of the silo complexes in terms of:
  - Land rights and access rights granted to FMARD by State Governments;
  - Outstanding construction contracts relating to the silo complex and agro-processing unit purchase and installation;
  - Outstanding lease contracts for storage capacity in the silo complex (for the silo complex at Jos).
- Legal status of the public-private partnership in terms of compliance with:
  - Infrastructure Concession Regulatory Commission (Establishment, Etc.) Act, 2005 ("the ICRC Act");
  - Public Enterprises (Privatisation and Commercialisation) Act, Cap P.18 Laws of the Federation of Nigeria 2004 ("the Privatisation Act"); and
    - Public Procurement Act 2007.
- Legal compliance of the operator with:
  - Labour and employment regulation;
  - Environmental management regulation;

Legal risks are typically managed in three ways, by ensuring that

- the assets are free from legal encumbrance not related to the PPP transaction;
- the PPP transaction within the legal limits of national legislation highlighted above.
- the private operators to meet regulation governing grain storage and handling operations.

The risk of changes in legislation relating to the legal environment can be particularly significant, and can materialize during the construction or the operational phase. With respect to environmental risk management, the aspects of silo operations specific to environment-related regulations have been established in the due diligence process and can be incorporated into and negotiated at the time of signature of the contract. Any increased construction costs caused by changes in environmental legislation during the life of the concession should trigger renegotiation of the contract between the two parties to define the amount of and procedures for indemnification of the operator by the public sector authority.

Monetary Risk

As has been evident in Nigeria over the last 18 months, the country level macro-economic environment creates a risk, for both shareholders and lenders, that the project may be unable to generate sufficient income in strong currencies to return capital to international investors. The main monetary risks that can create this situation include:

- Exchange rate fluctuations.
- Non-convertibility of the local currency into foreign currencies.
- Non-transferability (funds cannot be exported from the host country).

Where the project generates foreign currency income, the foreign exchange and convertibility problems can be easily overcome.

In this instance, investment and operating income will be in Naira. For the most part this creates a natural internal hedge – there is limited exposure. This is particularly the case since in Nigeria, there

is substantial local interest by lenders in the agriculture sector – allowing operators investing equity to borrow capital locally and protect the project from exchange rate fluctuation.

However, for international investors and firms, who make up a large group of potential silo operators, there is a monetary risk incurred when capital is re-domiciled back to the organisation's country of operation. The private sector partner may seek convertibility and transferability guarantees from the government or central bank. Private partners with international currency exposure are also able to reduce their exposure through currency swaps/hedges for currency and insurance against convertibility/transferability contracted with third parties. For these transactions, the responsibility sits with the operator rather than the government.

Economic Risk

Grain storage and processing activities form part of national commodity supply chains. The volume of trade moving through these chains depends to a large extent on macroeconomic factors, namely population, consumption, production, imports, exports, and so forth. Consequently, the macroeconomic situation and its expected evolution have a strong impact on the level of activity in a grain storage facility. The principles of turnover and throughput risk sharing are analyzed in a later section devoted to this topic.

Force Majeure

Force majeure generally covers all events outside the control of the company and events that cannot be reasonably predicted, or against which preventive measures cannot be taken at the time of signature of the contract, and which prevent the operator from meeting its contractual obligations. Apart from this general definition, examples of force majeure are generally stipulated in the contract, including:

- Natural risks, such as climatic phenomena (cyclones and exceptionally heavy rainfall), earthquakes, tidal waves, and volcanic eruptions.
- Industrial risks, fire, or nuclear accident.
- Internal socio-political risks, such as strike, riot, civil war, and guerrilla or terrorist activity.
- Risks of war or armed conflict.

These risks are included under country risks, as it is the national context that determines the probability of their occurrence. It is reasonable that if any such event occurs, it may result in the suspension of reciprocal obligations of the parties involved, with a resultant limitation (although not elimination) of their consequences. The contract can also include procedures for sharing the burden of the consequences of such events between the parties, in particular where the operator is managing a delegated public service.

Political Risk

The operator cannot control the risks inherent in decisions taken by public authorities. The operator naturally seeks protection against harmful decisions through the clauses of the contract by transferring this risk to the government. This is not sufficient, however, since noncompliance with the terms of the contract by the government is just one of the risks facing the operator. In addition, the approval of contracts or the issuance of authorizations from administrative authorities can cause delays and increase costs for the operator. Finally, the risks of expropriation and nationalization are also a danger. The risks of noncompliance, inefficiency or expropriation, and nationalization are grouped under the designation of political risk.

Apart from the detailed analysis of contractual commitments, there is also the problem of the credibility of the applicable legal system. The effectiveness of contractual commitments depends initially on the mechanisms available for settling disputes. Recourse to international arbitration is desirable, involving a neutral jurisdiction applying recognized international rules, such as those of the International Chamber of Commerce. Likewise, the applicable contract law can be that of a mutually acceptable third-party country.

This purely contractual approach, while useful, is frequently inadequate to ensure the acceptable management of the political risk. In practice, the arbitration phase of disputes is rarely reached, but when it is, it reflects the degradation of relations to such an extent that the future of the project is very often threatened.

There are, however, other strategies for protecting against political risk. The inclusion of multilateral organizations, such as the World Bank or the International Finance Corporation (IFC), among the shareholders or lenders represents a form of protection for the operator. The presence of these institutions is not a formal guarantee, but governments generally seek to avoid antagonizing these important multilateral institutions by imposing measures that would upset the equilibrium of a project in which they are involved. Similarly, the financial involvement of sponsors or lenders from the host country can also serve to limit the political risk. For the silo complexes, there has been initial interest from a number of international financial institutions – notably IFC, CDC, and OPIC – as well as local financial institutions with public sector ownership, namely NSIA and AFC.

Actual insurance cover can also be obtained to hedge certain specific risks. Such policies can be obtained from both public insurers such as MIGA (World Bank Group) and private insurance companies.

Quantification of the political risk is always a delicate matter, and there are no reduction or hedging methods that make it possible to eliminate the political risk entirely. In the case of the silo complexes, the perceived political risk can be interpreted according to the following drivers:

6.3.2 Project Risk

Construction Risks

Risks associated with the construction of the project involve unforeseen cost increases or delays in completion. A construction delay also translates into increased costs, principally for the operator, in one of several forms:

- Penalties the operator may have to pay to the government or its customers under its contractual commitments.
- Delays in start-up of the operational phase of the project, causing a loss of earnings.
- Increased interim interest charges (interest due during the construction phase, most often capitalized).

In turn, the principal causes of excess costs or delays are:

- Design errors leading to the underestimation of the cost of equipment or work or the time required to complete the job.
- Inadequate assessment of local conditions (terrain in particular), which can necessitate modification of the original technical solution.

- Poor management of the job site, poor coordination of the parties involved, or the bankruptcy of a supplier or subcontractor.

These project design and management tasks are under the control of the operator, thus the operator should carry these associated project risks. The operator can then conclude a design and build type contract with the construction company so that it can be associated with the project from the design phase on and help shape the project for which it will be responsible. If not involved from the outset, the operator must analyze and accept imposed specifications (for example, basis of design), proposing alternative solutions or refusing certain aspects that it considers unacceptable, but may ultimately have to accept a less than optimal design (for which it will bear the consequences). Increased costs or delays caused by the government are considered as country risks (for example, political, restraint of prices, or legal risks) rather than project risks. In particular, this is the case when the functional definition of the project is modified or when, subsequent to signature of the contract, constraints are introduced concerning the choice of technical solutions.

Hedging of excess cost increases and completion delay risks by the operator are generally undertaken simultaneously. A common method of managing these risks is to transfer them to the construction company or equipment supplier. When the project includes a major construction phase, the financial package generally requires the inclusion of the primary construction company among the project sponsors. The construction risk (and design risk where applicable) is then allocated to the shareholding construction company, enabling the non-construction company shareholders to avoid bearing a risk for which they have little or no control. Transfer of the risk to the shareholding construction company is achieved via the construction contract or the design and build contract. From the operator's perspective, then, the objective is to bind the construction company in a lump-sum design and build a turnkey contract that incorporates a performance guarantee and appropriate penalty clauses. This makes it possible to convert the construction risk of the project promoter into a credit risk for the construction company.

Careful selection of a technically competent and financially sound construction company makes it possible to reduce both construction and credit risks because of the assumed capacity of the construction company to honour its contractual, technical, and financial commitments.

It should also be noted that the sponsors of the project (future shareholders) and lenders to the project do not always carry the construction risk in the same way. The lenders will often call on the sponsors for a credit guarantee covering the construction phase, since the lender is protected by limited recourse for the operating period.

Hand-Over Risks

Hand-over risks arise when the operator takes over the management of existing infrastructure and facilities, including operation and maintenance, and in some cases must first begin rehabilitation work. The general rule is that the operator takes over the existing facilities at its own risk and peril. The operator is authorized to carry out prior inspection of the facilities to assess their condition and estimate the rehabilitation and maintenance costs to which it will be exposed.

Even with the ability to inspect facilities, it is desirable to include a clause in the concession contract to safeguard the private sector partner against recourse relating to events and conditions existing prior to the contract, thereby exempting the operator from resulting liabilities.

Operating Risks

The private sector partner operates the facilities necessary to meet its contractual obligations at its cost, risk, and peril. Consequently, operating risk is allocated entirely to the operator. Operating risk principally comprises:

- Non-performance risk, which can lead to payment of penalties to the government and adversely affect commercial operations (for example, cause turnover levels to fall below expectations) and result in financial losses.
- Risk of operating cost overruns stemming from underestimating operating costs in the bid proposal (for example, omitting a cost category or making a defective calculation) or inefficient management of the project by the operator.
- Risk of loss of revenue not associated with a drop in grain turnover; for example, as a result of the non-collection of revenue, fraud, or theft in a case where the operator has not complied with the procedures demanded by the insurers, and claims by customers or local residents.

Non-performance risks can be minimized by selecting an operator with recognized experience in grain storage and trading. Cost overrun and loss of revenue risks can be transferred to the operator through use of a fixed-price contract between the master private sector partner and operator (which may provide for escalation by application of an indexing formula), with the possible inclusion of a variable component designed to reward better-than expected commercial performance.

Like the project construction company, the operator may become one of the project sponsors. This then makes it possible to associate the operator at the outset with the definition of the operating system and its cost, thus making the operator fully responsible for the aspects of the project for which it will subsequently carry the risks.

Such measures, however, do not eliminate the operating risk completely. The responsibility of the operator is necessarily capped. Furthermore, this approach in fact converts the operating risk into a credit risk for the operating company. The latter generally has limited initial capital, which will not exceed its working capital requirement because it has no investment expenses. The responsibility of the operating company can then be covered by shareholder guarantees or a bond system.

In any case, the private partner should have the resources to manage this endogenous operating risk, and it is therefore logical that this risk be allocated to the private sector partner in full.

Procurement Risks

Procurement risks arise due to the potential unavailability of critical goods and services and unforeseen increases in the cost of external resources necessary for the project.

Two approaches can help the operator to reduce or eliminate this procurement risk. The operator can choose to produce the critical resource itself. For example, the installation of a dedicated generator in a refrigerated container park or refrigerated warehouse makes it possible to reduce the cost of the resource in some cases and limit the risk of power cuts (which, in addition to simple interruption of the service, can cause damage to the merchandise). This solution often requires specific authorization from the local authorities. Furthermore, providing such goods and services oneself may not always be possible or financially feasible for the operator.

Alternatively, the operator can sign a long-term purchase contract with the producer of the resource. This makes it possible to set the purchase cost using a predetermined price escalation formula, and to limit the risk of a unilateral price adjustments or restrictions on supply. Further, the contract may

include a clause to indemnify of the operator against losses incurred in the event of interrupted supply of a critical resource. This is referred to as a put or pay contract.

The private sector partner may require the assistance of the government to be able to conclude a put or pay contract with the public monopolies concerned. This usually can be justified in cases where the project has a substantial public service dimension.

Where the procurement of imported supplies is concerned, the procurement risk can stem from customs-related problems; thus, it becomes a component of the country risk. In such cases, the government may reasonably bear a portion of the risk. This should not be applicable to the silo complexes, barring requirements for imported machinery/vehicles necessary to operate the silo complex.

Financial Risks

These risks relate the cost and availability of capital to finance the upfront investment and ongoing funding requirements relating to the asset.

The operator bears all risks associated with raising the shareholders' equity or obtaining loans required for funding the project. Likewise, the operator carries all risks associated with formation of the project company (the special purpose company or SPC). Contractual documents define the relationships among the various private players involved in the project (for example, the shareholders' pact and loan agreement). Apart from raising the initial tranche of shareholders' equity and loans, the establishment of standby credit loans should also be considered because it makes it possible to fund any excess costs with which the project company may be confronted.

Likewise, the debt interest rate fluctuation risk is carried exclusively by the operator. This risk arises when loans used to fund the project are based on floating rates (for example, Nigerian Interbank Offered Rate [NIBOR] plus margin). An increase in the reference rate consequently increases the amount of interest to be paid, and hence the project costs. This risk can be hedged by means of appropriate financial instruments (for example, rate caps, ceilings on variable rates, or rate swaps).

When projects are built or operated with the aid of subsidies, there is the risk that the government will fail to make good on its subsidy payments. This risk is relatively small where investment subsidies are concerned, as the construction phase covers a relatively short period. However, international agreements (for example, the Marrakech Accords) or the dictates of internal law can still intervene to prevent the payment of subsidies.

Social Risk

The social risk is generates when operators have to restructure the workforce and bear the cost of severance payments, retraining, and other employee issues and or change how local communities access resources (land, water, power). The risks of strikes or civil disturbances country are frequently classified as cases of force majeure (see country risk), which means that they are often only partially covered by the protections afforded in the contract. Additional insurance can be obtained to cover residual social risks.

6.3.3 Relationship of Risk to Transaction Type

Different types of PPP transaction allow for the allocation of these risks to the different parties. For each potential transaction, analysis is then required to identify which transaction structure optimises

the allocation of risks to the parties best able to manage them. While this is discussed further in the section on PPP transaction types below, the main observations are that risks are allocated as follows for different PPP strategies:

Risk Type		Government Procurement	Management Contract	Lease	Concession BOT
A Preparatory Phase					
A.1	Delays in Land Acquisition				
A.2	External Linkages				
A.3	Financing Risk				
A.4	Planning				
B Construction Phase					
B.1	Design Risk				
B.2	Approvals Risk				
B.3	Approvals				
B.4	Additional Site Risk				
C Operations Phase					
C.1	Technology Risk				
C.2	O & M Risk				
C.3	Demand Risk				
C.4	Payment Risk				
C.5	Financial Risk				
D Handover Risk Events					
D.1	Handover Risk				
D.2	Terminal Value Risk				
E Other Risk Events					
E.1	Change in Law				
E.2	Force Majeure				
E.3	Sponsor Risk				
E.4	Concessionaire Default Event				
E.5	Government Default Event				

Legend

- Private Sector
- Public Sector
- Shared
- Not Applicable

Source: http://toolkit.pppinindia.com - modified by CPCS

Figure 26: Risk Allocation for PPP Contract Types

6.3.4 Risk Identification and Allocation for the Silo Transaction

The table overleaf describes in more detail the key risks associated with the silo projects and the mitigating factors that can be applied within the structure of the transaction.

Risk	Allocation	Example	Government Mitigation	Private Sector Mitigation
Country Risks				
Legal Risk	Shared	Challenge on legality of private partner's right to operate silo complex	- Execute transaction in compliance with PPP legislation - Ensure complex legal status is robust and free from all encumbrance	- Contractual allocation to negotiated jurisdiction - Contractual compliance with local legislation - Incorporation into discount rate
Monetary Risk	Private Sector	Devaluation of the naira reducing returns for international investors	- Payments pegged to national monetary indicators - Engage local partners and investors	- Peg payments to national monetary indicators - Currency and interest rate hedging/swaps - Engage local partners and investors - Incorporation into discount rate
Macro-Economic Risk	Private Sector	Grain consumption falls due to shift in consumer preferences	- N/A	- Incorporation into discount rate
Force Majeure	Both	Severe national drought	- Contractual breaks for risk events	- Contractual breaks for risk events
Political Risk	Private Sector	Neighbouring SCPZ site benefits from tax breaks that drive operator out of business	- Transparent and consistent application of incentive policies for agriculture investment - Support to key value chain stakeholders - Create independent grain market regulator	- Co-investment by DFIs - Insurance - Incorporation into discount rate
Project Risks				
Construction/ Handover Risk	Private Sector	Rehabilitation costs for the silo complexes are higher and require longer than expected from bidder due diligence evaluation	- Contractual indemnity - Grace period in payments until construction is complete - Penalties to incentivise rapid completion	- Thorough due diligence by private sector partners during RfP stage - Contracting experienced EPC - Performance payments/caps in EPC contract - Insurance against overruns
Operational/ Demand Risk	Private Sector	Grain trading volumes are lower than expected	- Fixed payments - Profit sharing/variable payments related to complex performance	- Grain trading expertise - Long term offtake agreements
Procurement Risk	Private Sector	Power tariffs/fuel costs are prohibitively expensive	- Import tariff waivers - Minimum utility service guarantees	- Long term supply contracts - Vertical integration/on site utilities
Financial Risks	Private Sector	Interest rates become prohibitively expensive	- Subsidised credit programs (e.g. RSFF, ACGP) to engage lenders	- Fixed interest rate debt - Interest rate swaps
Social Risk	Shared	Local communities encroach on silo complex land or refuse to pay handling tariffs	- Active local stakeholder engagement - Create employment options for staff - Contractually require minimum services to farmers and agreed tariffs	- Active stakeholder engagement - Robust ESMS/CSR policy - Insurance

7. Valuation Methodology and Model

7.1 Purpose of the Section

This section describes the underlying calculations used to estimate the project value and returns to investors. The resulting indicators give a sense of the financial feasibility of each of the silo complexes before and after factoring in potential fee structures to the government.

7.2 Valuation Plan

7.2.1 Model Methodology

The financial analysis is based on the detail guidelines provided in the TORs. We created a set of financial analytical tools that enable us to (i) show the key financial outcomes; (ii) generate certain risk scenarios and sensitivities; and evaluate different concession scenarios according to agreed criteria. The key activities are the following:

- Identify costs, revenues and investment needs of each combination of Silos;
- Develop a base-case for the financial simulation model;
- Assess risks for concessions and develop risk matrix;
- Develop risk-adjusted financial model; and
- Carry out sensitivity analysis.

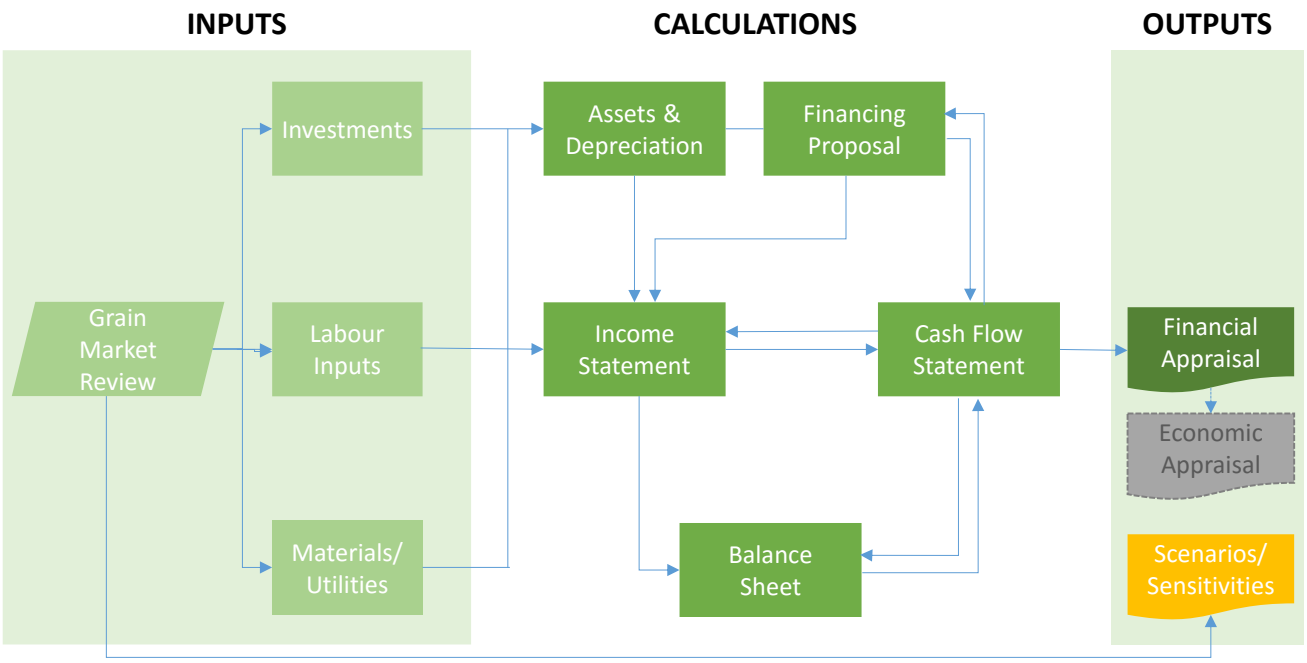
The key outputs of the technical review of silo complexes was a summary of investment requirements in terms of possible upgrades and extension of facilities.

On the basis of this input and additional market data described above, we have developed an Income Statement for each silo complex. Our analysis has been benchmarked against other silo operations in West and East Africa, as well as in comparable emerging markets (e.g. twelve mooted silo complexes in India). In addition to operating expenses, the Capital Expenditure plan describes the costs to be incurred in order to bring each Silo into operation and ongoing maintenance capex to ensure its efficient operation.

- A forecast module, describing silo revenues generated in the domestic grain market
- An operating module, reflecting revenues, operating costs and expenditures as well as capital outlays to bring the silo into production and for ongoing maintenance
- A finance module that reflects the capital structure of each combination of Silos and has the flexibility to reflect different sources of capital available in the market (i.e. equity, term loans versus trade finance).
- A valuation engine that applies the appropriate weighted cost of capital to the cash flows generated by the model; and
- A VFM engine enumerating the financial impact on government in terms of concession fees, investment requirements and wider economic impact.

Because the model is dynamic it provides the flexibility to vary each input parameter based on certain scenarios that developed with the Client.

Sample Financial Statements generated for by the model are provided in the appendices.



7.2.2 Valuation Methodology

There are two different approaches to valuation applicable to the grain silo complexes: projected income valuation models and multiples valuation.

The first approach uses Discounted Cash Flows. A valuation model for projected income (usually Capital Asset Pricing Model) entails using the revenue and cost projections to generate future operating profit, and assuming various financing sources, to assess the cash flows for equity holders. The core financial valuation methodology describes the project and investor cash flows and discounts them against a weighted average cost of capital, which factors in the risk and capital structure of the project or company. In tandem, the same cash flows can be used to calculate the time taken for investors to break even on their commitment.

The second approach that may be applicable to the silo complex operations is in terms of multiples. The silo complexes have low capital expenditure requirements, a high degree of dependence on short term finance, low margins on traded goods and exposure to commodity pricing volatility. In this way they are similar to other grain companies and logistics businesses more broadly. In the trade and logistics sector, traditional approaches to valuation are to use estimate the company/project value relative to i) revenues and ii) operating profit. This allows a clearer insight into the companies trading margins, and does not therefore have extremely volatile valuation.

On the basis of these two overarching valuation methodologies, eight different metrics were chosen to describe the underlying value of operating each silo complex commercially:

- The Net Present Value (NPV) of Project-level cash flows
    - Cash flows are calculated by taking the EBITA less CAPEX, Working Capital funding requirement and tax payments, with a terminal value of the inventory stored in the complex in the final year of operation.
    - These cash flows are discounted at the Weighted Average Cost of Capital for the projects
- The Internal Rate of Return (IRR) of the project level cash flows
- The Internal Rate of Return of equity investor cash flows

  - Calculated by taking the Project cash flows and adding borrowing (net of loan amortization and interest payments), adding back the debt shield created by interest payments and subtracting the return of the Trade Finance component of working capital in the final year
- The Average Debt Service Coverage Ration over the 10 year operating life of the project
  - DSCR calculated by taking the average ratio between EBITDA and interest and amortization payments
- The Minimum DSCR over the 10 year operating life of the project
- The Payback period of the project
  - Payback period calculated by measuring when cumulative project cash flows become greater than zero on a straight line basis.

Calculating the Weighted Average Cost of Capital was calculated on the basis of the debt and equity costing assumptions above and a 70/30 debt/equity ratio and a 30% tax rate. The resulting WACC is 20.0%

In terms of the multiples analysis, ratios for EBITDA to Enterprise Value and Revenues/Sales to Enterprise value were taken from a range of comparators:

EV/Sales		2008	2009	2010	2011	2012	2013	2014	2015
ADM	Global						0.35	0.37	0.4
Bunge	Global						0.28	0.34	0.305
ZAMBEEF	Zambia						1.2	0.94	0.84
Ceylon Grain Elevator Company	Sri Lanka			0.4	1.06	0.4	0.31	0.32	
General Silos and Storage Co	Egypt				0.82	0.55	0.35	0.24	1.08
KAAP Agri	South Africa	0.45	0.4	0.46	0.41	0.25	0.25	0.25	
Afgri	South Africa	0.94	0.85	0.94	0.85	1.19	0.67		
EV/EBITDA									
ADM	Global						11.6	11.8	8.81
Bunge	Global						9.24	19.24	12
ZAMBEEF	Zambia						15.2	11.6	5
Ceylon Grain Elevator Company	Sri Lanka			14.2	11.9	6.63	18.29	6.44	
General Silos and Storage Co	Egypt							3.32	5.77
KAAP Agri	South Africa	5.60	6.82	8.20	7.21	6.82	4.75	4.31	4.31
Afgri	South Africa	8.4	6.2	6.5	6	8.95	7.03		

The ratios for large trading companies (ADM/Bunge) are likely outside the potential for silo operators on the basis that these companies have global operations across a wide range of soft commodities. Focusing on emerging markets companies, there is a large range of different multiples despite similar business models. Key trends are that:

- Multiples are falling/correcting from historic peaks
- These multiples reflect valuation for going concerns rather than greenfield operations.

Conservative multiples were chosen to reflect the fact that there is substantial risk in setting up an operating company to manage the grain storage in Nigeria and the perceived emerging market risk for Nigeria may be higher than that seen in EM comparators. The two remaining metrics are therefore:

- The Revenue multiplier valuation
    - Calculated by multiplying first year revenues by 0.3
- The EBITDA multiplier valuation
    - Calculated by multiplying first year EBITDA by 4.

7.2.3 Model Dashboard

The model dashboard then collates the key financial information from across the financial model into structured and transparent tables for ease of analysis and comparison. These tables are provided in the appendices to this report.

7.2.4 Adjusting for Risk

Risk adjustment for the silo complexes has been calculated in two ways. For country risks, the risk-free rate of return used in preparing the WACC reflects local instability as it relates to political, monetary and economic risk.

For project-specific risks, the impact of risk allocation from the public to the private sector was assessed through a public- sector comparator model for the cash flows generated by each silo complex.

This model incorporates the risks that are absorbed by the private sector by factoring in how the complex would perform were the government to operate the silo complex on the same basis as the private sector.

In order to prepare the public sector comparator, we considered five distinct differences between public and private sector operations:

1) **Construction/Hand-Over risk**: while the majority of the upfront cost for the construction of the silo complexes has already been borne by the government, some additional investment is required. This investment is focused on installing equipment already on site, rehabilitating damaged equipment and structures, and fully equipping the complex with vehicles, tools and other equipment that may be lacking. Historically, private sector operators have been better positioned to manage the costs of making these types of capital expenditures. The base case valuation model takes all CAPEX costs at face value. The expectation is that the equivalent CAPEX costs for the Government would be higher.
2) **Operational/Demand risk**: in terms of operating the silo complexes as commercial enterprises, the private sector has more expertise and incentive to maximise revenues through ensuring high volumes of grain throughput and opportunistic purchasing of grains. The government utilisation and pricing for trading and services would be expected to be lower than the equivalent under private sector operations.
3) **Procurement Risk:** direct and fixed/indirect costs are estimated on the basis of private sector operations. The private sector is incentivised to minimise ongoing costs in order to maximise revenues and returns to shareholders (and ensure timely debt interest and amortization payments). Public sector typically has less incentive and capacity to manage costs and therefore is expected to incur higher direct and indirect costs.
4) **Financial Risks:** private sector capital must generate competitive returns. Debt is priced at the market rate, while equity is priced to reflect the high return expectations for projects in Nigeria and particularly projects in the agriculture sector, given the relative risk profile. Public

sector capital has a lower perceived cost – since the Government interest rate is usually the floor in local capital markets. As such, the risk-adjusted model incorporates financing costs and a discount rate at the rate of return for FGN local currency bond issuances.

In order to capture the impact of these risks on the valuation, the following assumptions were made for public sector operation of the silo complexes:

Risk	Parameter	Base Case	Risk Adjusted
Construction/Hand-Over	CAPEX	100%	120%
Operating/Demand	Sale Price for traded grains	100%	120%
	Utilization	100%	75%
Procurement	Operational Expenditures	100%	120%
Financial	Cost of Debt	22.5%	14%

Other issues

In preparing the risk adjusted model using a public sector comparator, the assumed tax on revenues generated by the Government is zero percent (0%).

While the relative cost of capital is assumed to be lower for the Government, this also assumes no capital constraints – i.e. that the Government can freely borrow funds from the capital markets at the prevailing interest rate. However, in this instance, part of the motivation for engaging private sector partners is that the FMARD does not have sufficient capital to operate the silos. While this weakness in the analysis does not render it irrelevant, it must be considered when determining the extent to which public sector operation of the silo complexes is competitive with private sector operation.

7.2.1 Sensitivity Analysis

Sensitivity analysis describes the impact of changing key assumptions on the valuation for each of the silo complexes. The model is recalculated on the basis of one or more changed variable and the resulting impact on the valuation metrics is recorded. While this approach is similar to the risk-adjusted valuation above, it enables decision-makers to isolate and better understand specific risks.

In this analysis, the key sensitivities in the base case that were tested relate to:

- Construction risks in terms of increases and decreases to:
  - Capital Expenditure;
- Operating risk in terms of increases and decreases to:
  - The proportion of grains traded versus capacity used for services to farmers;
  - Margin earned on traded grains;
- Procurement risk in terms of
  - Increase and decreases in direct and indirect expenses;
- Financial risk in terms of:
  - An increase or decrease in the cost of debt.

7.2.2 Creating a Business as Usual Model

The valuation methodology above assumes that the government adopts a comparable operating model to the private sector – i.e. manages the silo complexes as a principal in the market, trading grains and providing post-harvest handling and storage services.

However, if the government retains operational control of the silo complexes, the operating model that is most likely is to operate the silos as a grain reserve, as has been undertaken to date, though with increased utilization.

To calculate the business as usual/grain reserve cost model, we take:

- Purchase prices for grain at the average minimum level for the last three years;
- the same utilisation rates (i.e. growing over the first three years and in line with the demand profile);
- a three year maximum storage period - which translates to one third of capacity being turned over in each period;
- No sale price – i.e. all grain releases are in the form of grants;
- Operating cost calculations in line with private sector operations;
- All expenses covered through budget allocations rather than specific term loans or trade finance windows;
- A terminal value equal to the discounted value of the total grain inventory held in a given period and the underlying silo complex assets.

8. Financial Valuation Results

8.1 Purpose of the Section

This section describes the results of the valuation exercise conducted on each of the silo complexes and the total potential value of commercial operations across the portfolio of complexes. The section is divided into four parts:

1) Base Case Valuation of commercial operations at the silo complexes on the basis of operating and financial assumptions;
2) Risk-Adjusted Valuation of the relative value of commercial operation undertaken by the private sector compared to the same operating model undertaken by the FMARD; and
3) Sensitivity analysis of the Base Case Valuation to key risk variables; and
4) Cost of managing the silos as a grain reserve.

8.2 Base Case Valuation Results

8.2.1 Total Valuation

The total estimated value of commercial operation of the silo complexes is NGN 25.7 billion. The Average Project IRR for the silo complexes is 57% and the average payback period is 3.5 years. The average debt service coverage ratio over the 10 year assumed operating period is 2.6 times, while the average minimum level of the debt service coverage ratio is 1.8 times.

8.2.1 Silo Specific Valuation

For specific silo complexes, the Net Present Value of the project level cash flows (i.e. before financing) are as follows:

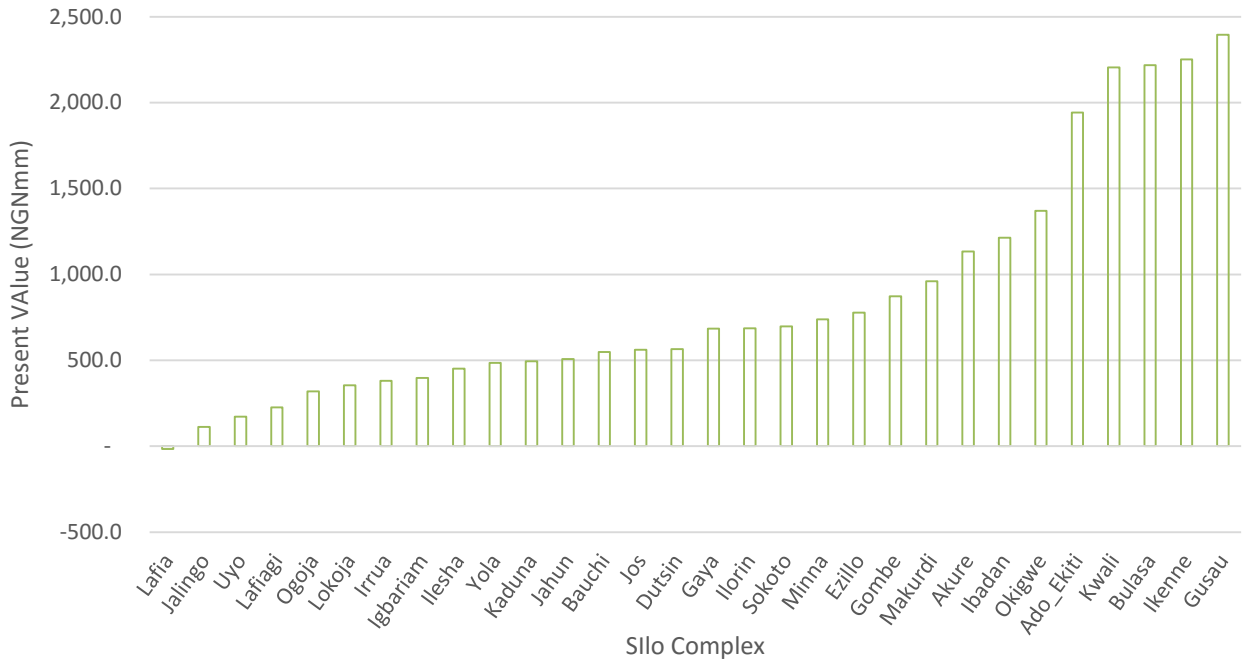


Figure 27: Discounted Net Present Value of Each Silo Complex

8.2.2 Observations

Drivers of Value

There are three key factors driving the value of each silo model: silo capacity, upfront expenditure, and grain type. Larger silo complexes – the size 100,000MT create the highest valuations, since the grain turnover in the complexes is four times higher than in the 25,000 MT silo complexes. As we might expect, the large silo complexes are therefore the most valuable in terms of discounted cash flows.

However, when incorporating the upfront capital required to complete/rehabilitate the silo complexes, the large silo at Okigwe is now on a par with the higher demand, less capital intensive 25,000 MT complexes at Akure and Ibadan. The silo complexes at Lafia, Jalingo, and Uyo are substantially reduced in value due to this requirement. As progress is made towards completing the construction contracts it is likely that valuation for these and other capital intensive complexes will improve.

The remaining key factor is in terms of the type of grain expected to be turned over in each silo complex. Currently, rice prices per MT are over double the average prices for other grain types. Therefore, assuming a constant 10% margin on traded grains, silos with a greater projected allocation of capacity to rice are able to generate higher net revenues.

Project Internal Rate of Return

The project internal rates of return are high at an average of 57%. Traditionally, PPPs tend to be driven by limited public sector capital and unattractive returns for investors. In this case, since the FMARD has already made substantial upfront investment in the complexes, the projects have relatively low CAPEX requirements to unlock revenues. 29 complexes achieve project returns above the blended cost of debt/equity capital to finance them; the outlier is Lafia, for reasons mentioned above.

The silo-specific project IRRs, compared to the 20.0% WACC are as follows:

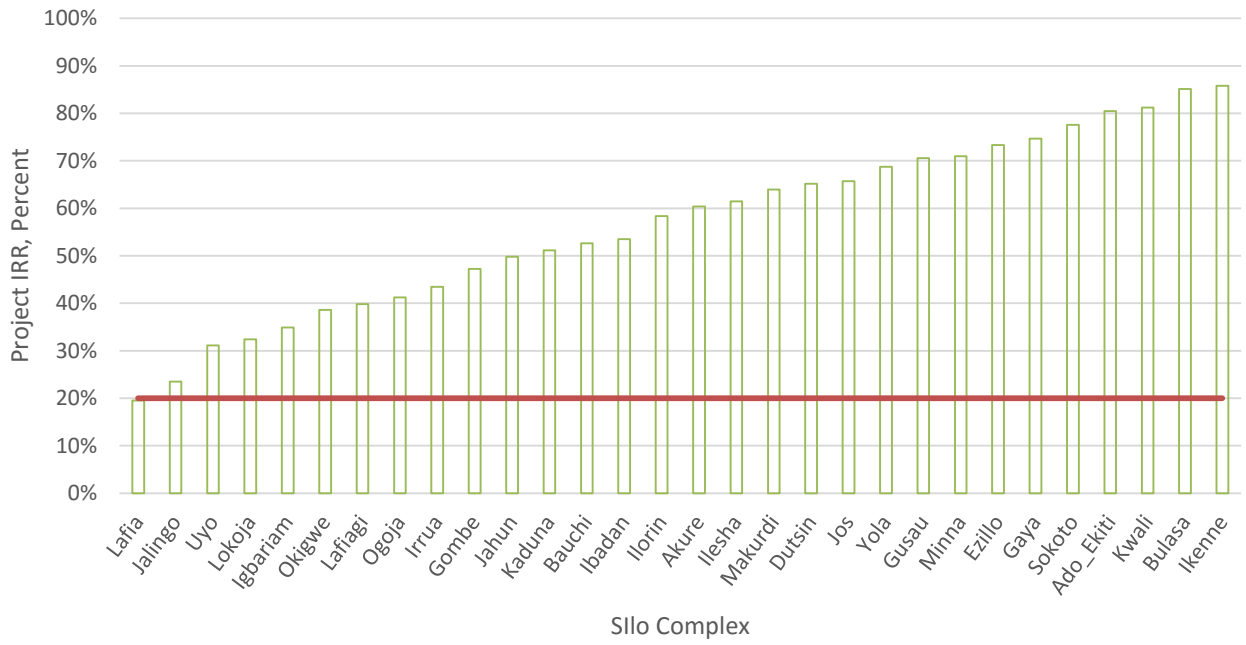


Figure 28: Project IRR across all Silo Complexes

Equity Rate of Return

Returns to equity holders are even higher – to the point of being a less helpful metric in measuring the viability of a project. This is the result of three factors:

1) Project cash flows are high due to the low upfront costs referenced above;
2) The complexes are expected to access debt – at 70% of the CAPEX – which reduces the equity outflows even further;
3) The silo operator is expected to use trade finance backed by inventory receipts in order to finance the majority of the silos' working capital requirements.
4) Despite the high cost of debt, the interest payments reduce the tax burden on the operating company.

Debt Service Coverage Ratio

The average debt service coverage ratio across all projects is well within acceptable levels. However, for some silos the capital intensity of using trade finance to drive grain turnover and term loans to finance capital expenditure creates a debt service level that is higher than the earnings in the same period. Ideally the silo operator would be able to maintain a DSCR of at least 1.5-2 times – 20 of the silo complexes meet this threshold. Notable examples of DSCRs<1 this are in Lafia, Uyo and Jalingo. The minimum DSCR is between 1 and 1.5 for Lokoja, Igbariam, Ogoja, Okigwe, Lafiagi, Irrua and Jahun, suggesting that these silos may also have a lower creditworthiness and increase cost of capital.

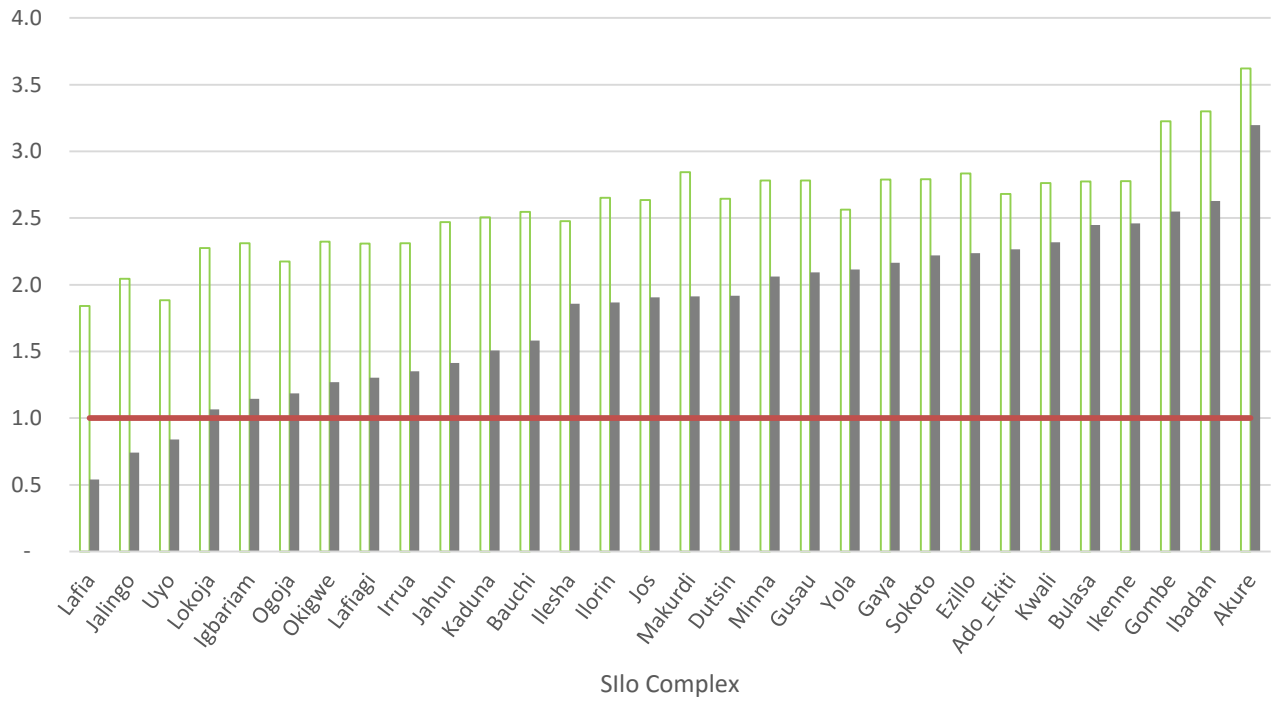


Figure 29: Average and Minimum Debt Service Coverage Ratio for the Silo Complexes

Given the high equity cash flows and return expectations, the cost of any period can easily be covered from future/historic cash flows in the project. In terms of relevance to the transaction structuring, this metric allows us to identify silo complexes that are relatively more exposed to credit default risk and may be challenging to finance, It also highlights that the addition of a concession fee to the project cash flows will further decrease the DSCR – and therefore again have an impact on the availability of capital to finance the project. This issue is mitigated by the fact that the vast majority of the debt is secured against grain inventory – and therefore relatively high credit.

Multiples Analysis

The Multiples valuation method is much cruder, but helps to contextualize the Discounted Cash flow valuation against real world examples and emphasise that all valuation methods are estimates rather than fixed projections. Broadly speaking, the findings from the multiples valuation are in line with the discounted cash flow valuation:

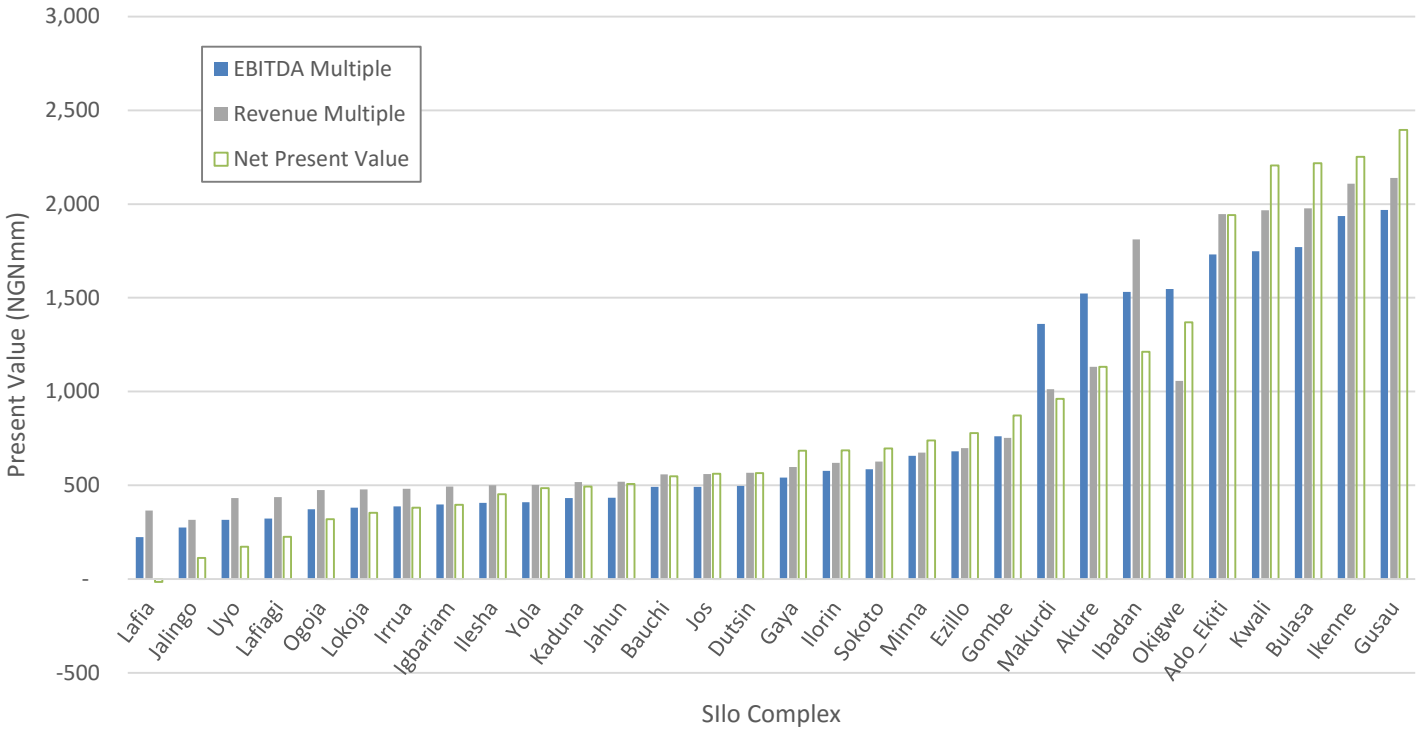


Figure 30: Combined Valuation - DCF and Multiples

The discounted and valuations diverge in two cases:

1) Where there is high upfront investment expected for the silo complex;
2) Where revenues are increased through access to agro-processing facilities

Under the multiples method the total value of the portfolio of silo complexes was estimated to be NGN 26.32bn using a multiple of revenues and NGN 24.8bn using an EBITDA multiplier.

8.3 Risk-Adjusted Valuation Results

The Risk-Adjusted valuation compares the value of undertaking commercial operations at the silo complexes for a private and a public sector operator.

For our model, the PSC generates lower net value (i.e. revenues less direct costs) and incurs higher fixed costs and CAPEX inputs than the private sector equivalent. These reductions in cash flows for each silo complex are balanced by a significantly lower cost of finance and no tax burden.

The net value unlocked through private sector operations at the silo complexes is NGN 4.34bn.

In economic terms, which will be discussed more thoroughly later, the relative impact of private sector engagement to operate the silos is even more pronounced – with a NGN 50bn increase in the Economic Net Present Value.

8.3.1 Income

Given that one of the major assumptions is a reduction in revenues, we see a 20% change in the throughput and consequential impact on the revenues net of direct costs. Under the private sector model, the NPV of all revenues associated with the silo complexes is NGN 651bn versus NGN 526bn for public sector operation. The associated direct costs are NGN 581bn for private operation and NGN 473bn for public sector operations. The NPV of the net operating income created through assigning the silo complexes is our headline figure – NGN 17bn.

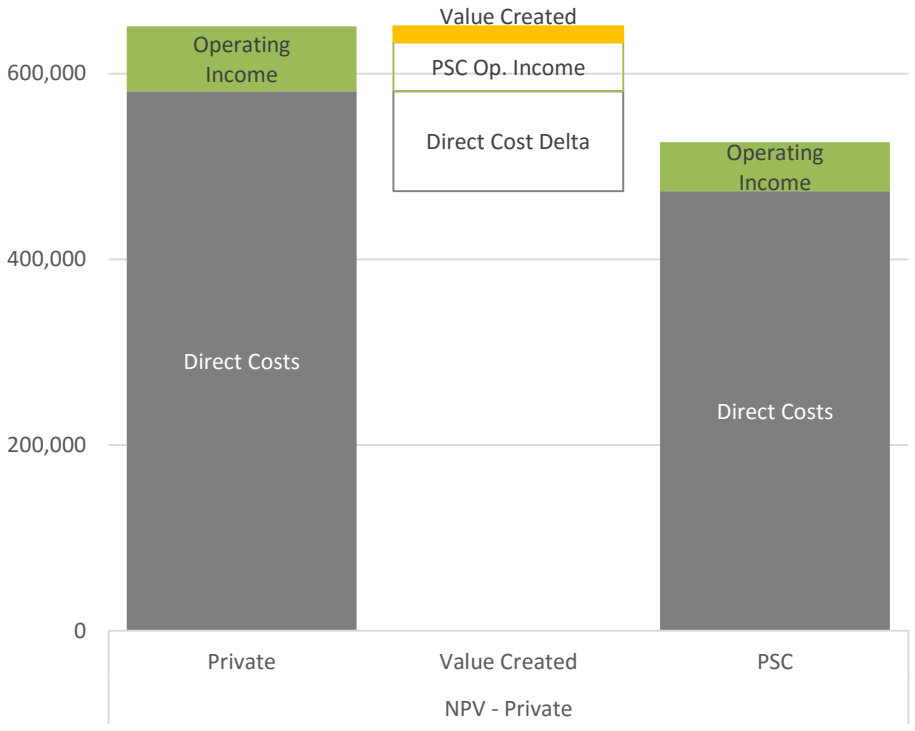


Figure 31: Operating Income: Public versus Private Sector Silo Operation

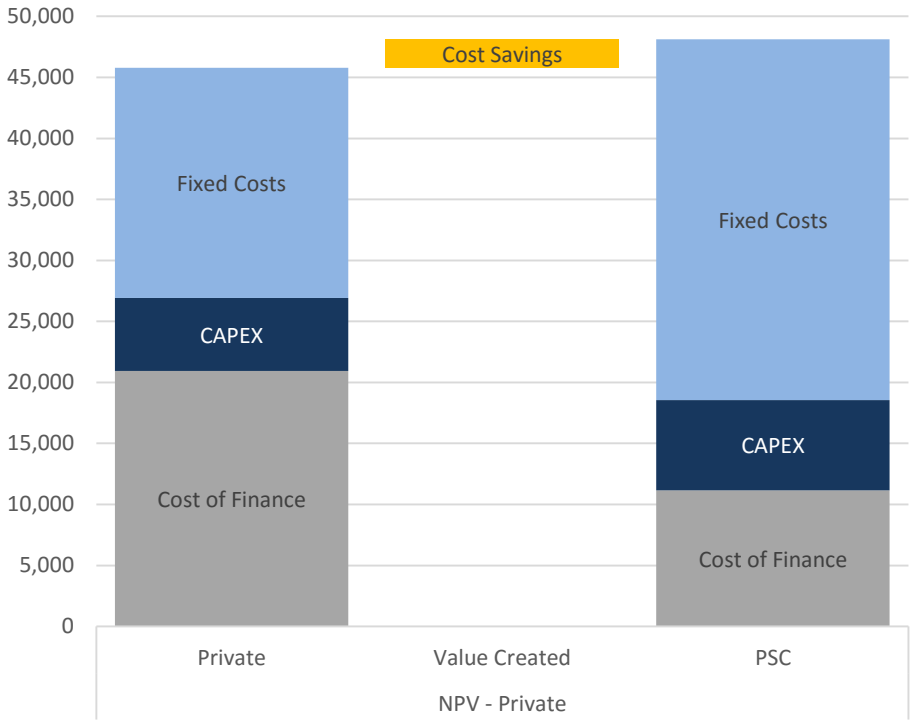
8.3.2 Costs

The hypothesis around private sector engagement for PPPs is that the private sector is better able and incentivised to reduce costs relating to rehabilitating/completing the silo complexes and to

operating the silo complexes. This impact is partially counterbalanced by the fact that the government is able to access capital at a lower cost to the private sector.

In this analysis:

- Direct costs relating to the grain throughput are reasonably in line across both private and public sector operations – with COGS amounting to 89% of revenues for the private sector versus 90% for the public sector equivalent. As noted above, these are netted out relative to revenues to give net income;
- the fixed costs of operating the silo complexes and the capital costs are approximately NGN12bn lower under private sector management and operation;
- The cost of finance (both CAPEX and, more importantly, trade finance) is NGN9.5bn cheaper for the government.
- The net impact is that the cost base is NGN2.34bn lower under the private sector model.



8.3.3 Taxation

From a taxation perspective, the private sector model includes a substantial transfer to the government in the form of taxation – that would not impact the cash flow for a fully ministerial operation of the complexes. This tax transfer amounts to NGN15bn.

8.3.1 Net Value

The NPV of the net income of the operating income less these costs and transfers represents the relative value of each approach. Under the private sector model, net value is NGN 8.76bn; for the PSC, the net value is NGN 4.43bn

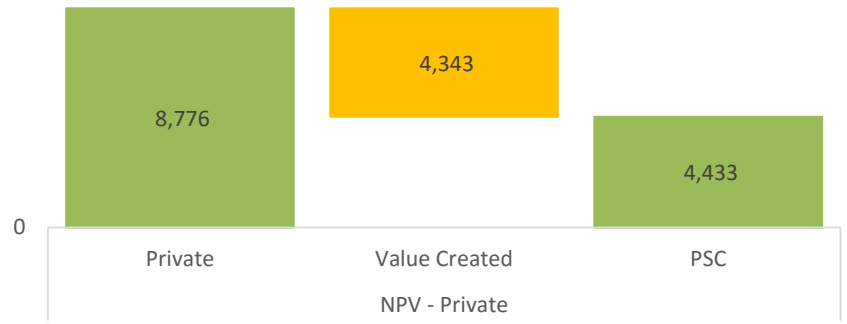


Figure 32: Net Income: PSC versus Private Sector Operation

8.3.2 Silo Specific Valuation

At the silo complex level, the value addition of the base case versus the risk-adjusted public sector comparator makes a clear argument in favour of using a PPP transaction to bring the private sector as operating partners.

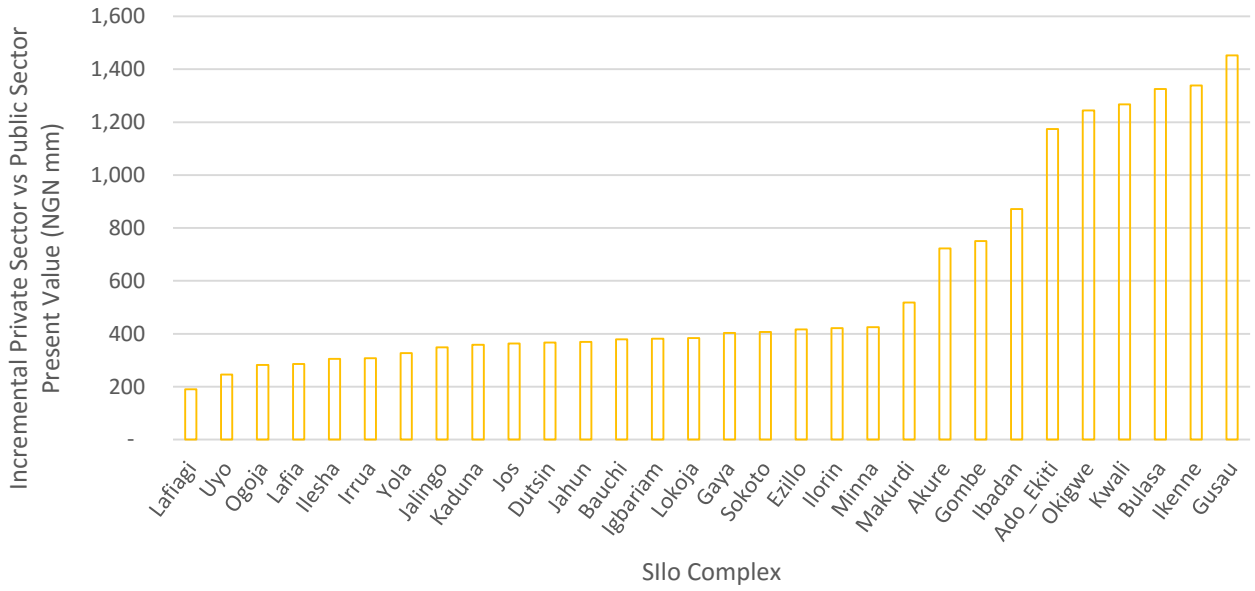


Figure 33: Incremental Value Addition of Private Sector Operation at each Silo Complex versus Public Sector Comparator

8.3.3 Observations

These figures are helpful decision-making tools, but as noted with the valuation outputs above, are not concrete expectations. The figures use the Government cost of debt as the weighted average cost of capital – which create value by allowing future cash flows to have much higher present values. This assumes that the government has unlimited access to capital at this rate.

The impact of removing any tax burden is also very pronounced – creating a NGN 14bn increase for the PSC. This is also not necessarily a fair representation – were the silo complexes to be operated as a state-owned enterprise, some form of tax/payment to government would be expected.

8.4 Sensitivity Analyses on Valuation Results

The Sensitivity Analysis describes the impact on the valuation outputs of variables relating to key project risks. The four risks covered within this analysis are Construction/Handover Risk, Operating Risk, Procurement Risk and Financial Risk.

8.4.1 Construction/Hand-Over Risk

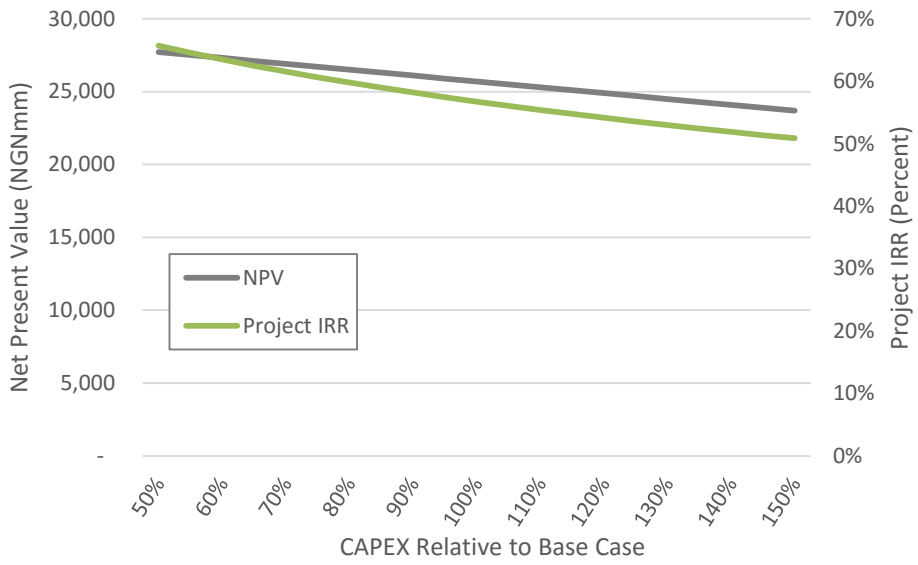


Figure 34: Relationship between Financial Value and CAPEX relative to Base Case Estimates

The silo complexes require only modest capital expenditure to rehabilitate/complete them. As a result, the impact of cost under/over runs do not materially affect the valuation of the portfolio and/or the attractiveness of the silo complexes to third party investors.

8.4.2 Operating Risk

Given that the main driver of the silo complex value is in terms of grain marketing, reductions in the level of trade and profits generated have a substantial impact on the viability of the portfolio of silo complexes.

The silo operator can select the extent to which he/she focuses on grain trading versus providing post-harvest storage and handling services to farmers. Trading is a much more profitable activity – but comes with high risks. Providing services to grain supply chain stakeholders may generate more consistent cash flows over the operating period.

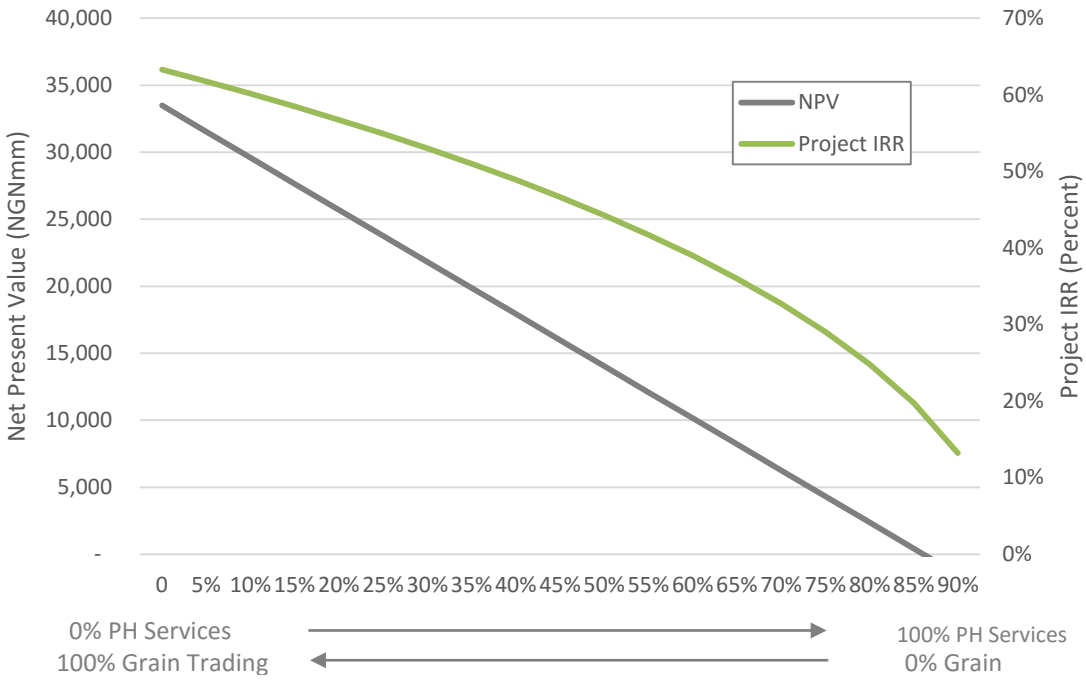


Figure 35: Relationship between Financial Value and Ratio of Grain Trading/PH Services

This graph shows the trade-off for silo complex operators choosing to support third party stakeholders with post-harvest handling and storage services. The main observations are that:

- The silo complexes can accommodate post-harvest handling and be financially viable;
- The operator is likely to choose to focus on trading in order to maximise profits;
- FMARD revenues would be maximised through trading;
- FMARD may want to stipulate minimum allocations to post harvest handling as a condition of the PPP in order to support broader agricultural development objectives.

The second metric of operational risk relates to the ability of the silo operator to earn a margin on grains traded. The value of the silo complexes is highly sensitive to this margin, which generates the highest range of any of the key financial valuation inputs.

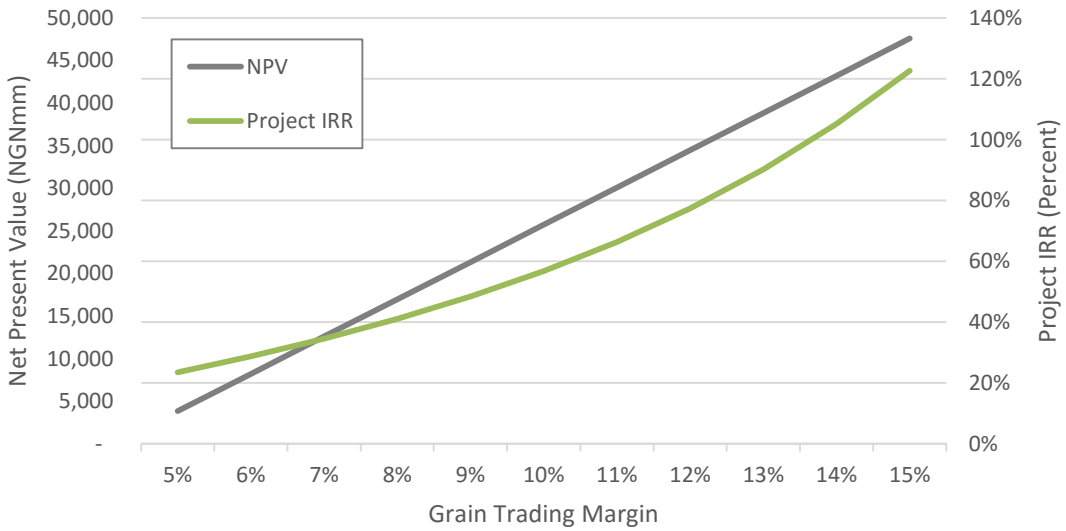


Figure 36: Relationship between Financial Value and Margin on Grain Trading

However, despite this sensitivity, the silo operator can generate positive returns (above 20%) with margins as low as 4% - indicating that silo operators should be able to remain solvent even in scenarios of under-performance.

8.4.3 Procurement Risk

In line with the margin analysis, the silo complexes also incur direct and indirect operating costs associated with handling grains. As with margin volatility, the silo complexes remain commercially viable even in high cost overrun scenarios – generating 40% IRR when costs are increased by 50%.

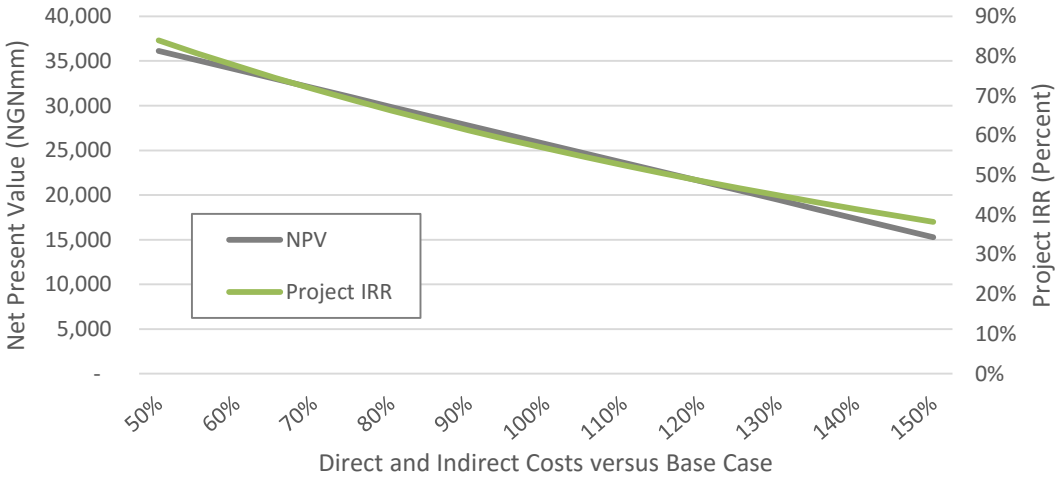


Figure 37: Relationship between Financial Value and Direct/Indirect Costs

8.4.4 Financial Risk

Operating the silo complexes requires access to substantial working capital to finance grain inventories, and to a lesser extent long term debt to finance capital expenditures. Given the high interest rates in Nigeria and the propensity for interest rate volatility in emerging markets, a key sensitivity relates to the cost of debt for the silo operator.

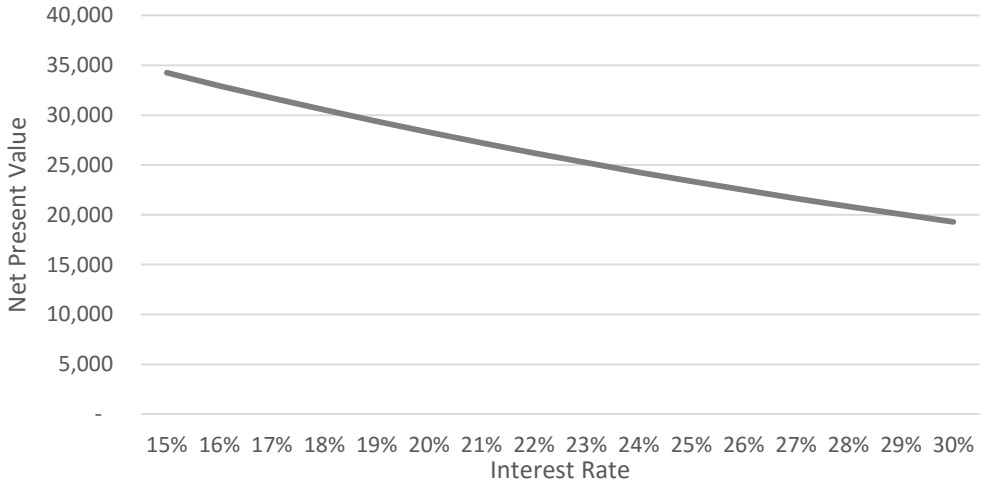


Figure 38: Relationship between the Project IRR and the Cost of Debt

The figure aboveFigure 40 describes the link between the project NPV and the cost of debt. Critically the transaction remains commercially viable on a portfolio basis even with interest rates up to 30%.

8.5 Cost of Operating the Silo Complexes as a Grain Reserve

In order to accurately determine the value of private sector engagement for the silo complexes, it is important to benchmark these models against eh cost to FGN of using the complexes for the grain reserve.

8.5.1 Total Cost

The NPV of the cost of operating the silo complexes as a grain reserve is NGN 206bn on a project cash flow basis. This figure reflects NGN 60bn discounted costs in years 1-2 to build up the stocks at the silo complexes, which is in line with FMARD projections of NGN 100bn to run the silos at maximum capacity.

This entails purchasing substantially more grain on an annual basis than the SGRD has historically committed to. The projects for the volume of grain purchased across all complexes is as follows:

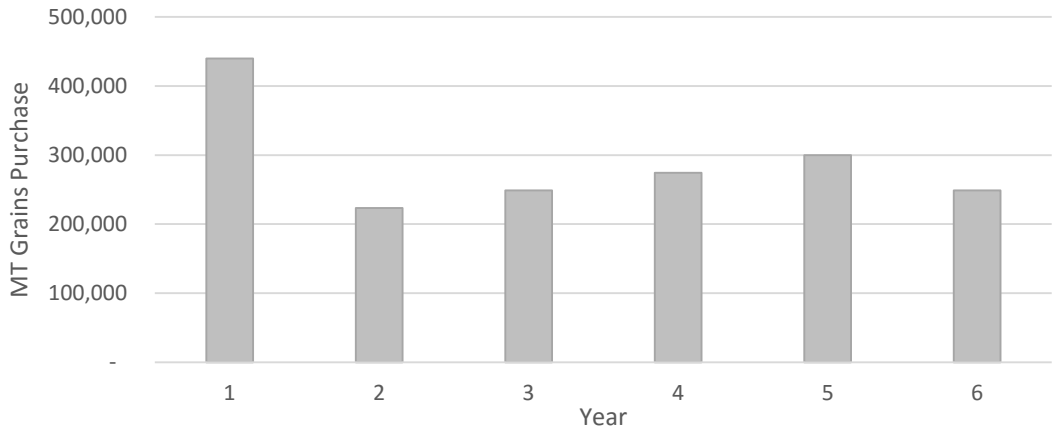


Figure 39: Grain Volumes Purchased over time on for Silo Complexes operated as a Grain Reserve

8.5.1 Silo Specific Cost

As is to be expected, the drivers of costs are the storage capacity at each complex. The highest cost silo complexes to operate on a non-commercial basis are the six silos with the largest storage capacity. The average NPV of costs for these complexes is NGN16bn. For the 25,000 MT silo complexes, the average NPV of costs is NGN4.6bn.

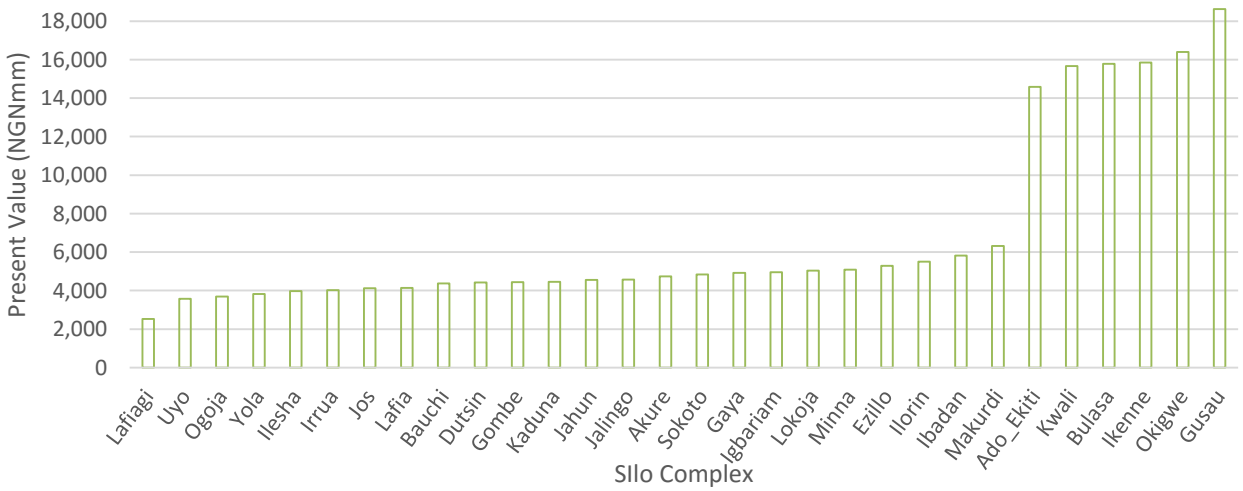


Figure 40: Costs of Operating the Grain Reserve by Silo Complex

The inventory of grain assets are assumed to be held on the government balance sheet – such that the government would only incur a financial loss at the point of release. The current system has grain inventories released at the discretion of the FEC – in order to support communities during periods of price volatility or through contributions to neighbouring/partner countries. This model could continue to operate – but taking it to scale generates a substantial cost to the government.

9. Economic Analysis

9.1 Purpose of the section

The purpose of the economic analysis is to allow decision-makers to evaluate the projects' different scenarios in terms of their economic feasibility, i.e. from the societal perspective of the Nigerian government or the efficiency of use of the nation's resources. This is different than financial feasibility, which considers a project from the particular perspective of the project entity and can be affected by the financial structure of the project (e.g. debt versus equity, PPP versus entirely private, etc.).

The economic analysis requires both financial costs and financial revenues to be adjusted. On the cost side, conversion factors must be used to reflect the opportunity cost of the resources put forward. On the benefit side, the effects of the project on operations' efficiency, production and employment levels, etc. should be considered in addition to revenues. The streams of costs and benefits must then be discounted using a social discount rate (as opposed to a financial discount rate).

Two metrics are used to evaluate the different scenarios:

- The economic net present value (ENPV) of the investment
- The economic internal rate of return (EIRR)

The ranking of scenarios generally differs based on the metric used since each metric reflects a slightly different concept. As with the financial evaluation, it is also important to consider the robustness of the results, i.e. their ability to stand up in sensitivity analysis to reasonable changes in the assumptions.

Of note, we also generally use the benefit cost ratio (BC ratio) to evaluate projects. Given that investments represent only a very small proportion of this project, these ratios are much less relevant (and would be very unusually high). As such, they are not reported.

9.2 Key Concepts

9.2.1 Internal and external costs and benefits

Two types of costs/benefits exist; (1) internal costs, that is those that are borne/captured by the project's entity and (2) external costs (also called externalities), that is those that are not borne/captured by the project's entity. In general, internal costs/benefits are already included in the financial analysis of a project. While these must be adjusted to reflect their real economic value, data requirements generally remain limited.

Externalities, on the other hand, can impose great data requirements on the analyst. Indeed, not only must they be identified and measured (e.g. the impact of storage on price stability), but they must then be 'monetized', that is, transformed into a monetary value based on their economic value. The process of monetization must often rely on assumptions about how individuals value different alternatives which cannot be observed in markets (e.g. living with one versus two legs).

9.2.2 Monetizing externalities: Applying the international experience

A significant amount of research exists on the appropriate values to monetize different types of externalities. This research, however, is generally not specific to Nigeria. The main difference across countries lies in the different capacity to pay (and thus the willingness to pay) to avoid negative externalities (e.g. pollution) and benefit from positive externalities (e.g. lower transit time). In turn, the capacity to pay is closely related to gross domestic product (GDP) per capita.

In order to be able to leverage the significant amount of research available on the subject, it is reasonable to adjust monetary assumptions based on the ratio of GDP per capita of Nigeria and that of the country where the research was completed. For example, this is the approach retained by the EU to adapt EU-wide estimate to particular countries. It is also the approach retained in this study, when necessary.

It is important to note that a number of methodologies exist to monetize the different externalities associated with a logistics project. In this report, and given the significant literature available on the subject, we do not spend a significant amount of time discussing the valuation methodologies and rationale.[2]

9.2.3 Scope and length

Given data limitations, the scope of the economic analysis is restricted to the impacts within Nigeria. In line with the financial analysis, we evaluate the project over 10 years (up to year 2025).

9.2.1 Social Discount Rate (SDR)

The choice of the discount rate can be quite controversial, and rightly so since it can have a significant impact on results. Unlike the financial discount rate, which reflects the opportunity cost of capital,

[2] For example, non-economists often debate whether it is appropriate to attribute a monetary value to a human life. These ethical issues, along with more arcane methodological issues on valuation, are the subject of ample literature and will not be discussed in the context of this report.

the economic discount rate (or social discount rate) should reflect how society value current costs and benefits versus future one.

A consensus is growing around the social time preference rate (STPR) approach. This approach relied on income growth, relative risk aversion and the pure rate of time preference. In general, income growth drives differences across countries. In a 2008 article, Valentim and Prado computed social discount rates for 167 countries.[3] For Nigeria, they estimate a social discount rate between 5.4% and 7.9%, with a mean of 6.6%. Per capita GDP growth is estimated at 3.4% per year based on growth in 2006.

For our analysis, we use a rate close to the upper-bound (8.0 %) given that per-capita GDP growth in Nigeria has been particularly strong over the last decade. This is consistent with a per-capita GDP growth rate of about 4.5% or a higher level of risk aversion (e.g. which could, for example, be explained by higher risk levels). This rate is consistent with STPR generally used in developing countries, but lower than discount rates obtained through alternative approaches (e.g. cost of capital).

9.2.2 Analytical scenarios

It is useful to remind the reader that while a number of transaction scenarios were developed, the different scenarios do not have significant impacts on the economic analysis. Indeed, all the scenarios assumed similar gains in efficiency, impacts on pricing of services and total amount of grains stored and processed. The scenarios do, however, have a potential impact on the 'distribution' of the benefits, i.e. which category of society would benefit most. While we briefly discuss the issue of distribution, it is largely outside the scope of a cost-benefit analysis.

The project is assessed by comparing its impact to the 'no project' baseline. The 'no project' baseline essentially assumes that no storage/processing activity occurs in the facilities. This is a fairly reasonable assumption given that less than 100,000 metric tonnes were officially stored/processed in all the facilities concerned by the project.

9.2.3 Summary Measures

Two metrics are used to evaluate the different scenarios:

- The economic net present value (ENPV) of the investment
- The economic internal rate of return (EIRR)

The ENPV is simply the discounted value of a cost or a benefit. The ENPV of the project is the difference between the discounted total social benefits and costs. Projects with larger ENPV are more valuable to society. It is hard to compare options since ENPV generally grows with the size of the initial investment, i.e. there are no denominator to which reflects the scale of the necessary investments. The ENPV is also sensitive to the discount rate.

Secondly, the EIRR represents the social return on investment of the project. It also represents the discount rate at which the discounted total costs and benefits are equal (ENPV = 0). It can be

[3] See Valemtim, Joice and Jose Mauricio Prado (2008) "Social Discount Rates", Working Paper of the IMT Institute for Advanced Studies Lucca, May. Available online at http://www.imtlucca.biz/_documents/publications/005749-IBKC9-joice_mau.pdf, retrieved September 24, 2013.

compared to a benchmark to evaluate the project performance from a social perspective. The EIRR, however, is insensitive to the discount rate and does not provide much perspective on the timing of the costs and benefits.

9.3 Economic Analysis of Silos PPP Scheme

9.3.1 Direct Costs and Benefits

For the purpose of the economic analysis, financial costs need to be adjusted so that they reflect their actual economic value (i.e. the social opportunity cost of the resources), rather than their market price. Indeed, markets often incorporate significant price distortions created, for example, by market barriers (e.g. tariffs or subsidies), social policies (e.g. minimum wages) or simply due to market imperfection, macroeconomic imbalances or rigidities (e.g. wage rigidities, cost of moving to find a job, etc.). Financial estimates are transformed into economic values by applying appropriate conversion factors. A conversion factor of 1 means that financial costs accurately reflect economic costs, while lower conversion factors suggest that a portion of the financial cost is due to a market distortion.

No conversion factors were available for Nigeria. Based on previous CPCS work in the region and on a cursory analysis of the economic situation, the following conversion factors were retained for this study. As is generally the case, non-traded goods (in particular labour) have much lower conversion factors than goods freely traded (e.g. raw materials). The next sub-sections provide a quick overview of the methods used to derive these conversion factors.

Category	Conversion Factor	Key Assumption
BASIC INPUTS		
Unskilled Labour	0,50	Estimated shadow wage for non-competitive labour market
Skilled Labour	0,85	Estimated shadow wage for semi-competitive labour market
Standard Conversion Factor	0,91	SCF based on average tariffs for Nigeria
DIRECT OPERATIONAL COSTS		
Cost of Grain inputs	1.00	Assumes market prices
Electricity and water	1,00	Assumes market prices
Direct wages	0,68	50% unskilled labour, 50% skilled labour
Fuel	0,93	Based on petroleum tariff
Offloading	0,50	100% unskilled labour
Chemicals, etc	0,93	Based on chemicals tariff
Equipment repairs	0,85	100% skilled labour
INDIRECT OVERHEAD COSTS		
Establishment		
Bank charges and commission	1,00	Assumes market prices
Collateral management fees	1,00	Assumes market prices
Insurance	1,00	Assumes market prices
Repairs and maintenance	0,93	50% skilled labour, 50% market prices
Security expenses	0,68	50% unskilled labour, 50% skilled labour
Sales / Distribution		
Advertisements and sales promotions	0,93	50% skilled labour, 50% market prices
Commission paid	1,00	Assumes market prices
Travelling and transport	0,88	50% skilled labour, 50% SCF
Motor vehicle running expenses	0,86	15% unskilled labour, 50% Petroleum Factor, 35% SCF
Employment		
Directors' remuneration	0,85	100% skilled labour
Mgmt Salaries	0,85	100% skilled labour
Other Staff costs	0,68	50% unskilled labour, 50% skilled labour
General		
Audit/Accountancy fees	0,85	100% skilled labour
Cleaning and pest control	0,68	50% unskilled labour, 50% skilled labour
Consultancy fees	0,85	100% skilled labour
Legal fees	0,85	100% skilled labour

Category	Conversion Factor	Key Assumption
Office expenses	1,00	Assumes market prices
Postage, Printing and stationery	1,00	Assumes market prices
Subscriptions	1,00	Assumes market prices
CAPITAL EXPENDITURE		
Handling and processing equipment	0,94	Based on tariff for non-electrical machinery
Silo Bins	0,88	Based on tariff for other manufactured products
Power and Water	1,00	Assumes market prices
Civil Structures	0,94	30% skilled labour, 20% SCF, 50% market prices
Vehicles	0,89	Based on tariff for transportation equipment
Tools etc	0,94	Based on tariff for non-electrical machinery

Source: CPCS estimates based on various sources cited in the text.

Goods markets

Markets in Nigeria have been significantly liberalized over the last ten years, including the market for fuel. Markets of particular relevance to this study, that is the fuel and equipment markets, are liberalized.

The Standard Conversion Factor (SCF) is based on the average tariff. In 2013, according to the WTO, the trade weighted average tariff was 10.3 % in Nigeria. By comparison, the United States had a trade weighted tariff of 2.2% in the same year. Tariffs differ for different types of goods. For example, in 2016, 'most-favoured-nation' (MFN) tariff rates ranged from 20.0% for clothing (using the WTO definition) to 6.2% for non-electrical machinery. The tariff rate for transport equipment was 12.5%, and the one for other manufactured products was 13.5%.[4]

The average tariff rate for transport equipment (12.5%) seems to most appropriately reflect the rates for capital expenditures on vehicles, non-electrical machinery (6.2%) is most accurate for tools and handling and processing equipment needed, and other manufactured products (13.5%) best reflects silo bins. Petroleum and chemicals, which both faced average tariffs of 7.5%, will also be used. Conversion factors based on these rates will be applied to traded goods to be used in the construction and maintenance phases.

Labour markets

A crucial input to most investment projects is labour. Labour will be used not only in the construction phase, but also in the maintenance and operation phase. In Nigeria, wages do not reflect the social opportunity cost of labour because of macroeconomic imbalances, which translate into high unemployment. According to Nigeria's National Bureau of Statistic, about 26.5% of the economically active population residing in Nigeria was unemployed in Q2 of 2015.[5] Such a high rate of unemployment suggests that the opportunity cost of labour (the wage level at which individuals would be ready to work) is significantly lower than actual wage rates.

Moreover, Nigeria has a segmented labour market, with unemployment higher among unskilled workers than among skilled workers. Given the lack of specific data, we assumed a conversion factor

[4] WTO, "Country Profile: Nigeria", available at (November 2nd, 2015): http://stat.wto.org/TariffProfile/WSDBTariffPFView.aspx?Language=E&Country=NG

[5] This official estimation (see http://www.nigerianstat.gov.ng/nbslibrary/social-economic-statistics/labour) was roughly in line with other unofficial estimates such as the CIA Factbook (https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html). Focusing only on the population actively searching for work (i.e. excluding those not searching for work at all), there was still 18.3% who were considered underemployed.

of 0.5 for unskilled workers. By comparison, a recent study for Egypt, where the unemployment rate in 2009 was below 10%, used a conversion factor of 0.63 for unskilled labour (Ain Sokhna Thermal Power Project: Appraisal Document, African Development Bank, December 2008).[6] Another example is that of the Italian Ministry of Transport, which established a conversion factor of 0.348 in 2001 for railway projects in southern regions.[7]

In the middle and high range, skilled labour also faces some wage regulation through unions. The market is competitive, however, and the unemployment rate among skilled workers is much less significant than among unskilled workers. We assume a conversion factor of 0.85.

Other components

Conversion factors for specific components were derived from labour and goods conversion factors. The detail breakdown of our assumptions for each component is provided in the table above.

9.3.1 Direct Economic Costs

For the purpose of the economic analysis, costs can be separated into capital costs, direct operational costs and indirect operational costs. Shadow pricing based on the conversion factors noted above is applied to obtain economic (rather than financial) costs.

It is important to note than financing costs are not part of the economic analysis. Indeed, financing costs involve a transfer from borrowers to lenders, rather than the use of real physical resources. They are thus excluded from the analysis.

In the base case, the ENPV for all direct economic costs is NGN 1,082 billion.

Capital Expenditure

The infrastructure costs for the project were multiplied by the relevant conversion factors noted in the table above. Based on continuous maintenance over the operational period, it is important to consider the salvage value of the additional infrastructure at the end of the 10-year period.

In this case, we do not consider the salvage value of existing infrastructure, since that value would be identical, or at least very similar, to the value in the 'no project' base case. As such, only the salvage value of additional investments are considered. It is based on linear depreciation with asset lives ranging from 10 to 20 years depending on the category. This is recorded as a negative capital expenditure in year 2025 in the economic model.

In the base case, the ENPV for capital costs is NGN 3.3 billion. The graphic below displays these cost for each silo complex.

[6] The CPCS team had difficulties finding other comparable measures in the region.

[7] From the "Guide to Cost Benefit Analysis of Investment Projects," by the European Union, p. 52.

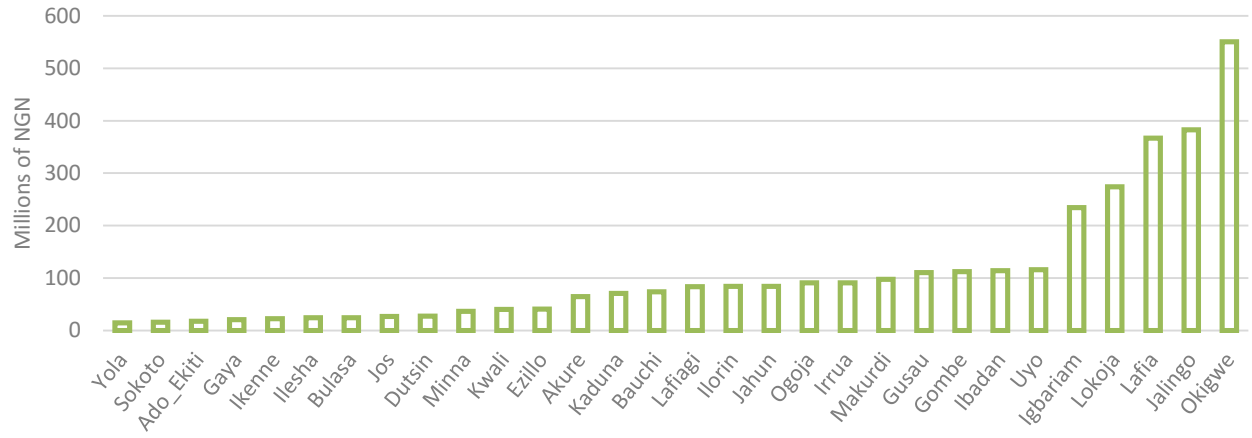


Figure 41: Capital Expenditures (ENPV

Direct Operational Costs

For the shadow pricing of direct operational costs, estimated financial costs were multiplied by the relevant conversion factors noted in the table above. There are no computation of salvage value for these costs. In the base case, the ENPV of direct operational costs is NGN 1,049 billion. The graphic below displays these cost for each silo complex.

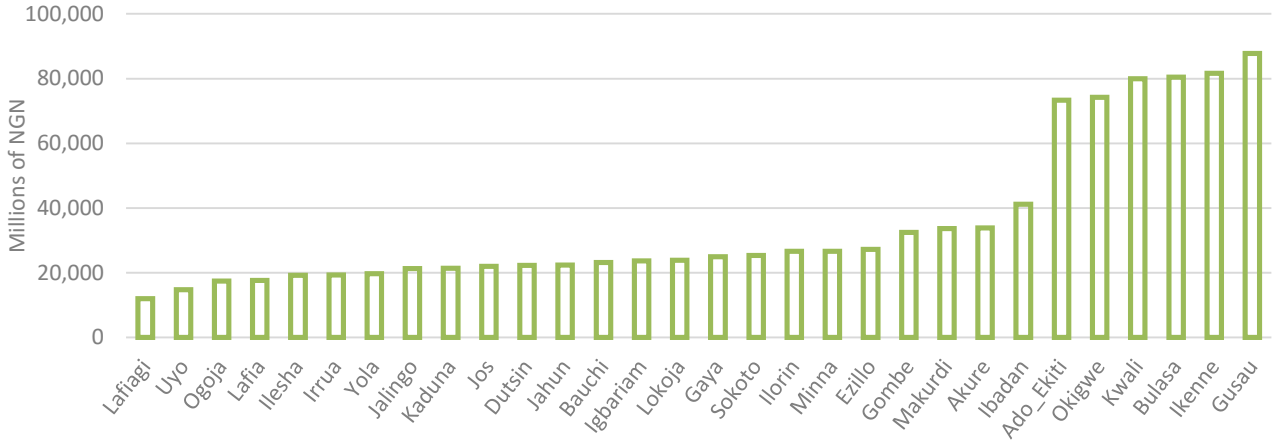


Figure 42: Direct Operational Costs (ENPV)

Indirect Operational Costs

For the shadow pricing of indirect operational costs, financial costs were multiplied by the relevant conversion factors noted in the table above. There are no computation of salvage value for these costs.

In the base case, the ENPV of indirect operational costs is NGN 29.2 billion. The graphic below displays these cost for each silo complex.

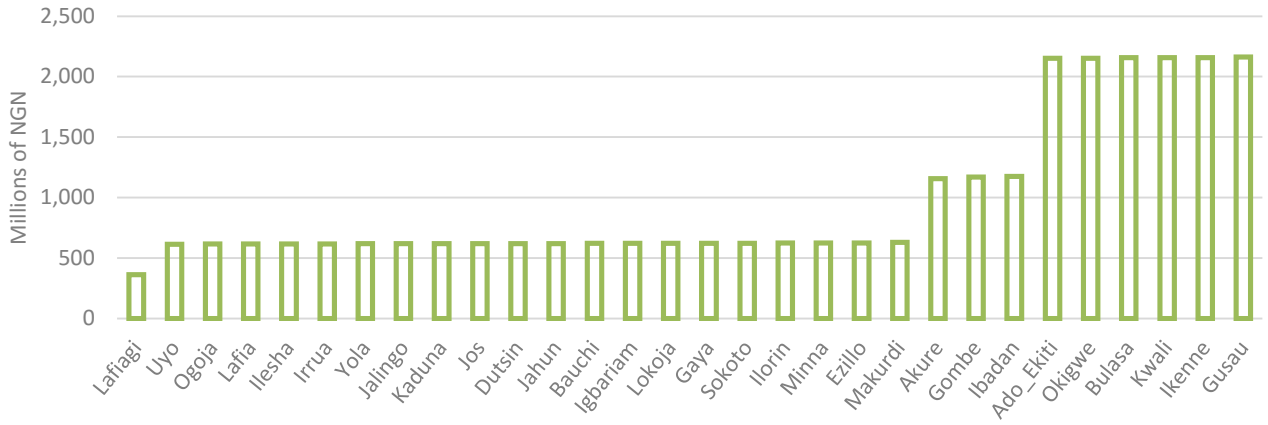


Figure 43: Indirect Operational Costs (ENPV)

9.3.2 Producer Surplus

The gross producer surplus simply reflects project revenues. In the base case, the ENPV of the gross producer surplus is 1,181 billion NGN. The graphic below displays this surplus for each silo complex.

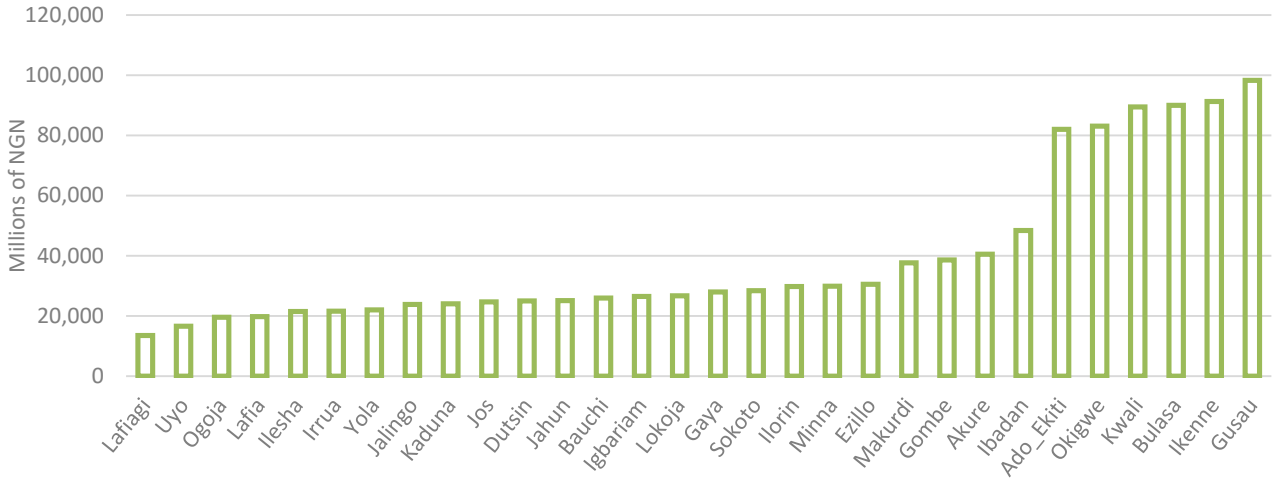


Figure 44: Producer Surplus (ENPV)

9.3.1 Consumer Surplus

Consumer surplus represents actual financial surpluses, or savings, from a users' perspective (in this case farmers).

For existing grain traffic currently stored in other facilities, a consumer surplus could occur if additional competition lowered the cost of storage. In the model proposed, price for storage and post-processing harvest are based on existing benchmark. Any reduction in price would thus also lower project revenues (as price would be below benchmark). As such, no consumer surplus can be assumed for grains that is otherwise stored in other facilities.

Of note, this does not mean that no consumer surplus will be realized. It simply mean that any consumer surplus will reflect a similar reduction in the measured producer surplus. Hence, to avoid double-counting, no consumer surplus is considered for existing grain volumes.

Consumer surplus could also occur in the case of 'induced demand', that is new demand for grain storage due to increased supply. The mechanism through which new demand could be created by

the project remain murky at best. It is possible that increased competition would put downward pressure on prices, thus generating new demand for grain storage.

In any case, it is often more acceptable to assume no induced traffic so as to avoid overoptimistic projections. As such, we adopt this more conservative stance and assume that no consumer surplus will be derived from induced demand.

In short, consumer surplus is assumed to be zero since any consumer surplus would be compensated by a similar reduction in producer surplus.

9.4 Other Impacts

In general, any economic analysis should strive to encompass the complete range of externalities associated with the project. These should include both positive and negative externalities. In this case, there are no obvious quantifiable externality. This doesn't mean that the project does not have major impacts on the markets and the livelihood of farmers, but only that these impacts are either: (1) already captured by markets measures included above, (2) not economic externalities as they concern the distribution rather than total benefits, (3) practically impossible to quantify. As such, we treat these impacts qualitatively.

In the case of a grain storage project such as this one, potential impacts include:

- Through prices and financial management:
  - Access to price premium for deferred delivery
  - Allow for intermittent cashflow for owner of stored grain
  - Help manage income for tax purposes for owner of stored grain
- Through improved accessibility of storage services:
  - Minimize need for on-farm storage, scale economies
  - Lower grain losses
  - More efficient supply chain (e.g. better managed transport logistics)
  - Improved food quality post-harvest
  - Improved agri-dependent industrial productivity
- Through improved food security if used for strategic grain reserve
  - Increased stability in food supply
  - Increased stability in food prices
- Through increased economic activity and related employment

Very few negative externalities are to be considered given the small level of investment and minimal footprint of the facilities, apart from some small potential impact on noise or the environment.

Part of the benefits noted above are already embodied in the producer's surplus calculated earlier. In particular, the benefit related to price premium, cash flow management and tax optimization. On the other hand, the benefits flowing from improved accessibility of service, improved food security and, to a lesser extent, increased economic activity could be considered qualitative externalities. In any cases, they are all impacts worthy of discussion.

We briefly discuss these impacts in the following sections.

9.4.1 Market Impacts

As was just noted, market impacts will be largely reflected through market mechanisms, and particularly prices. It is useful, however, to discuss them to better understand who may benefit and how.

One of the key rationale of storing grain from a trader's perspective (or farmer's perspective for on-farm storage) is to manage crops and obtain better pricing, local or international, later in the season. Higher prices later in the season generate a 'price premium' which should cover storage costs.

Spreading sales over the year can also generate significant benefits to the owner of the stored grain (either a trader, a farmer's cooperative, or farmers themselves), providing for continuous cash flow and allowing for tax optimization across crop years.

In all three cases, it should lead to increased revenues (or lower costs) for grain owners. In a competitive environment, these benefits could translate into higher farm gate prices. If the environment is not competitive, one would expect traders and other intermediaries to capture most if not all these benefits.

9.4.2 Improved Accessibility of Storage Services

One of the key assumption behind the economic rationale of the project is that the public and private provision of grain storage has not, to date, fully met demand. Indeed, either grain storage is in some geographies insufficient, or not sufficiently competitive (i.e. variety of providers). In either cases, additional capacity in specific geographies could ensure the market is better served. The economic impacts of more accessible or competitive grain storage services are numerous and wide-ranging.

First, by providing better accessibility to storage, the project potentially diminishes the need for on-farm storage. With professional storage accessible at competitive prices, farmers may limit investments in on-farm storage, preferring to use professional services. This consolidation would lead to scale economies, and improve the overall efficiency of the storage system.

Second, the increased availability of advanced storage services will undoubtedly reduce grain losses. Indeed, by replacing traditional stores or other storage modes by silos, the project should significantly reduce losses. Accurate estimates of losses are extremely difficult to obtain, but range from up to 50% for traditional stores, between 5% and 13% for modern storage facilities and 1% in silos.[8] This is a clear net benefit for the economy, and participants from the whole supply chain should benefit, with benefits distributed according to the relative market power of the different participants in the specific geographic markets (farmers, traders, transport providers and end-users, including industrial processors).

Similarly, the increase availability of grain storage and the wide dispersion of the new capacity could lead to efficiency gains in the supply chain. Matching the supply of grain storage services to production and consumption areas, should reduce transportation requirements, and thus lower supply chain costs. These benefits, once again, are highly dependent on the current structure of individual supply chains, and as such cannot be accurately estimated. The benefits will most likely accrue mainly to traders, with farmers benefiting if sufficient competition exists amongst traders.

Finally, it should be noted that better storage does not only reduce loss, it also improves the quality (reduces the deterioration) of remaining stores. This should lead to a higher grade of grains, and thus a higher average market price. The availability of better grain and the increased reliability of the system should in turn improve the productivity of major processors who rely on these inputs.

9.4.3 Improved Food Security

A key objective of the silos was to provide necessary storage for the Strategic Grain Reserve. One the pillar of a successful strategic grain reserve is sufficient storage capacity. It is not, however, a sufficient condition. In order to improve food security, the policy must also ensure that:

[8] Eltay, K.O., 2005. The Impact of Strategic Reserve Corporation Activities on Sorghum Agricultural Economics. Prices in Selected Markets in Sudan: A Temporal and Co-integration Approach. M.Sc. Thesis, University of Khartoum, Faculty of Agriculture.

- Purchases are timed appropriately, i.e. right after the harvest. This can be challenging if the purchasing process is not well-oiled, with delays occurring because of a large number of intermediaries for example.
- Releases or distribution are timed appropriately, i.e. during the lean season and when price fluctuations justify it. Similarly, this can be difficult if the process is driven by other factors, such as political or institutional pressures.

Assuming these conditions are met, however, would mean that the new capacity reserved for the strategic grain reserve could play a critical role in improving food safety by improving the stability of prices and of supply.

For farming families, purchases right after harvest ensure that prices are better supported during that period, improving revenues for farmers. Essentially, the government by purchasing more than demand requires at that period increases the price at the time where farmers are most exposed to aggressive pricing behaviour from intermediaries.

The food security of other families is also enhanced by improved price stability throughout the year, since the capacity to top-up supply can ensure more stable prices for grain, but also staple derivatives such as bread. It also provides critical supply, at reasonable prices, in the lean season if significant losses were observed in on-farm stores.

9.4.4 Employment Creation

The impact of the project on employment can take different forms. First, there is the impact on employment from the capital and operating expenditure. The effects of these expenditures on employment are captured through the shadow price of labour. Indeed, a shadow price below one suggests that the project will have beneficial impact on total employment, rather than simply displaced currently employed labour.

In addition to these beneficial impacts on employment stemming from the project expenditures, additional impacts on employment could be realised through new activity generated (induced traffic). Indeed, by making it more easy and appealing for farmers to produce and store grains, the project is generating economic activity that would not otherwise exists (although to be conservative in our quantitative analysis we have considered no induced demand).

Estimating the value of that additional economic activity is extremely difficult. One way is to estimate the number of jobs that will be created based on assumed spending by 'induced' demand. Putting an 'economic value' on these jobs, however, is not necessarily methodologically sound.

In order to provide an order of magnitude, we conservatively estimated the number of jobs created due to induced grain traffic. The estimate is based on the assumption that about 10% of the tonnage treated in the facilities is new induced demand, and will thus generate new employment. Based on staff survey responses, we note that staffing required averages about 1 staff per 1,000 MT of capacity when operating at or near capacity. Since all the silos are assumed to operate near their stated capacity after the project, this should represent a good estimate of incremental jobs.

Based on the capacity of all silos complexes in the project scope, and an average 10% associated to induced demand, we can estimate that about 120 new jobs would be created directly because of new induced demand.

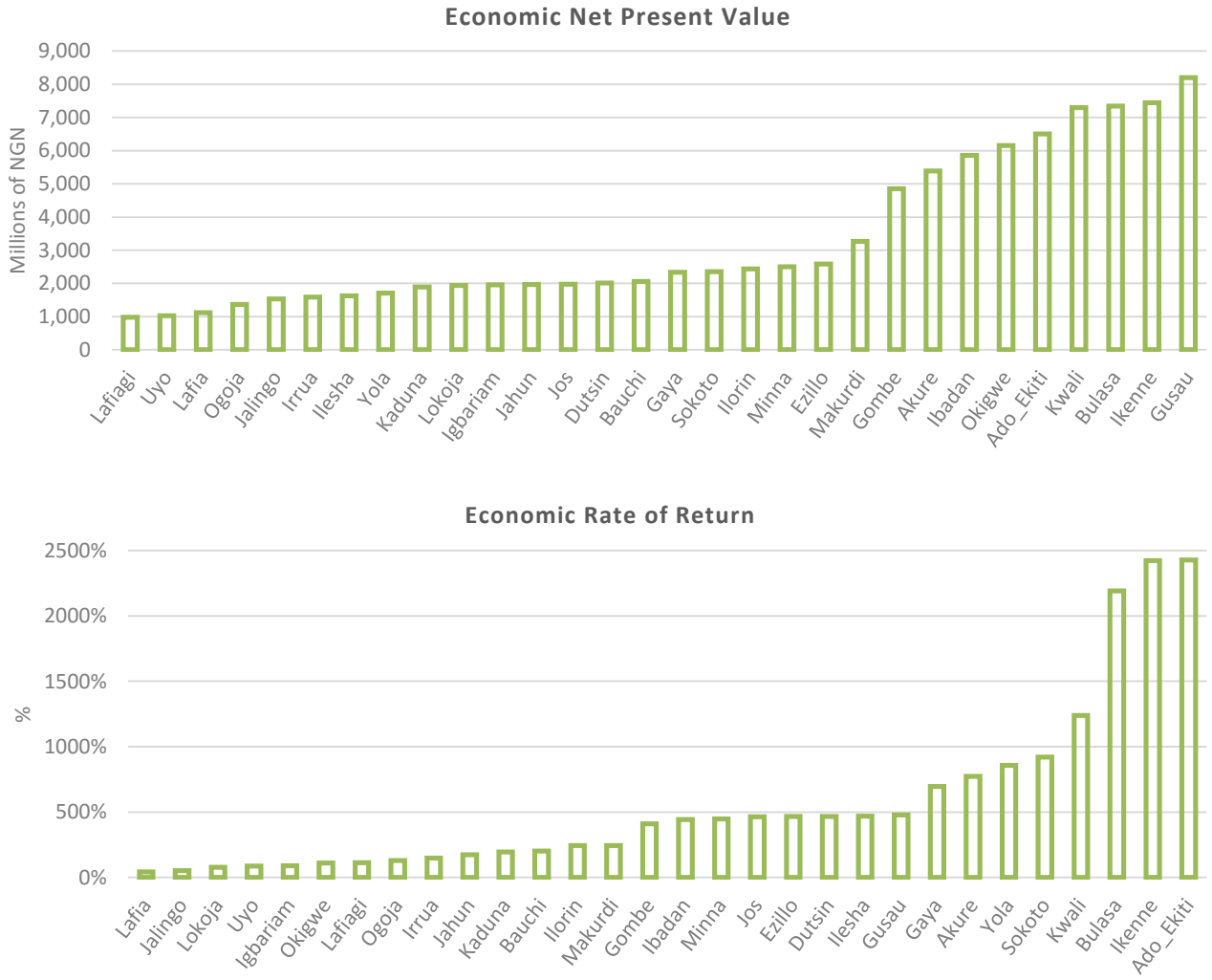
These jobs are in addition to the jobs associated to operations and construction, but do not fully account for the jobs created due to associated activity (production of additional grain, transportation services, etc.).

9.5 Economic Analysis Results

In aggregate, the transaction process and related investment would provide considerable economic returns, and this despite no significant externalities being quantified and included. Indeed, the EIRR of the project as a whole is 240%, with an ENPV of 99.0 billion NGN.

These results reflect the project, which can unlock significant value through putting to economic use heavily under-used assets without requiring significant investments. These economic results suggest a very strong rationale for pushing the project forward.

The economic net present value (ENPV), and economic internal rate of return (EIRR) for each complex is shown in the graphic below.



10. Proposed PPP Models

10.1 Introduction

This section outline the options and analysis for the silo complex public-private partnership.

There are three basic sections:

- Identification of business/units/assets to be included in the PPP transaction;
- Identification and description of relevant PPP transaction strategies;
- Recommended structure for this transaction.

10.2 Identified Business Units

The assets involved in the transaction are the silo complexes described in Section 3.2 above. These 33 complexes have been designed and constructed by FMARD over a 25 year period, distributed across the country.

As discussed above, 30 of these complexes have provisionally been included in the transaction:

Silo Location	State	Year	Size (MT)
Akure	Ondo	1991	25,000
Ezillo	Ebonyi	2012	25,000
Gombe	Gombe	1988	25,000
Ibadan	Oyo	2006	25,000
Ilorin	Kwara	2006	25,000
Irrua	Edo	1994	25,000
Jahun	Jigawa	1998	25,000
Jos	Plateau	2006	25,000
Kaduna	Kaduna	2011	25,000
Lafiagi	Kwara	1988	11,000
Makurdi	Benue	1991	25,000
Minna	Niger	1991	25,000
Ogoja	Cross-River	1991	25,000
Bulasa	Kebbi	2014	100,000
Dutsin-Ma	Katsina	2014	25,000
Ikenne	Ogun	N/A	25,000
Ilesha	Osun	2012	25,000
Kwali	FCT	2012	100,000
Sokoto	Sokoto	2013	25,000
Ado-Ekiti	Ekiti	N/A	100,000
Bauchi	Bauchi	N/A	25,000
Gaya	Kano	N/A	25,000
Gusau	Zamfara	N/A	100,000
Igbariam	Anambra	N/A	25,000
Jalingo	Taraba	N/A	25,000
Lafia	Nasawara	N/A	25,000
Lokoja	Kogi	N/A	25,000
Okigwe	Imo	N/A	100,000
Uyo	Akwa-Ibom	N/A	25,000
Yola	Adamawa	N/A	25,000

10.2.1 Excluded Silo Complexes

Three silo complexes will not be included in the transaction due to ongoing security and construction issues at the sites.

Silo Location	State	Year	Size (MT)	Reason for exclusion
Yenagoa	Bayelsa	N/A	25,000	Construction never initiated – inappropriate site
Damaturu	Yobe	N/A	25,000	Local insecurity
Maiduguri	Borno	N/A	100,000	Requisitioned by FGN; local insecurity

10.2.1 Agro-Processing Facilities

Eight silo complexes include agro-processing facilities. These facilities entail civil structures (warehouse buildings) and processing equipment purchased by FMARD. The construction of the civil structures is complete – there has subsequently been some damage incurred that will require minor rehabilitation. The agroprocessing equipment is on site but not necessarily installed and operational.

The silo complexes that also have agro-processing facilitiesinclude:

Silo Location	State	Feed Mill Capacity	Equipment Cost (NGN)	Building Cost (NGN)	Status relative to Storage Facilities
Akure	Borno	18MT/hr	160,227,117	137,572,284	Cannot be demarcated
Gombe	Gombe	18MT/hr	164,000,000	134,247,497	Cannot be demarcated
Ibadan	Borno	18MT/hr	162,176,352	136,243,861	Cannot be demarcated
Ilorin	Borno	18MT/hr	164,000,000	134,247,497	Can be demarcated
Jahun	Borno	18MT/hr	159,837,270	135,170,741	Can be demarcated
Makurdi	Bayelsa	18MT/hr	162,176,352	136,243,861	Can be demarcated
Minna	Borno	18MT/hr	159,837,270	135,170,741	Can be demarcated
Ogoja	Borno	18MT/hr	160,227,117	137,572,284	Can be demarcated

The Agro-processing Department within FMARD is responsible for managing the concessioning process for these facilities, and therefore it falls outside the mandate of the Silo Concessioning PDT. However, at the request of the FMARD, the transaction will include those agro-processing facilities that cannot be demarcated from the grain storage facilities – on the basis that they share key utilities (e.g. power, water) or facilities (e.g. loading bays, civil structures). The relevant silo complexes are located at Akure, Gombe and Ibadan.

10.3 Review of Potential PPP Models

10.3.1 Brief Overview of PPP

The definitions of a Public Private Partnership (PPP) are many. A PPP can be seen as a form of legally enforceable contract between the public sector and private sector where public benefits anticipated from the partnerships are clearly defined, investment contributions and risk are shared accordingly and roles of all partners at various stages are clearly stipulated.

According to the PPP manual of the Infrastructure Concession Regulatory Commission (ICRC) of Nigeria, “A PPP is defined as a contract whereby the private sector is engaged by the public sector to manage public services and/or to design, build, finance and operate infrastructure to enhance efficiency, broaden access, and improve the quality of public services. The role of the public sector (i.e. ministries, departments, agencies, municipalities, or state-owned enterprises) is to plan and structure projects, while the private sector (i.e. local or international business) directly implements the projects.” PPPs offer the opportunity to tap into private sources of funding, thereby allowing

governments that are subject to fiscal constraints attain an optimal social and economic development. The private investor also benefits from reduced risk of market penetration, and may operate- in an investment protected business with government guarantee. The partnership fosters innovation bringing together efficiency, flexibility and competence of the private sector with the accountability, long-term perspective and social interest of the public sector.

The PPP type adopted is most commonly determined on the basis of the objectives that the PPP desires to achieve, the risk profile of projects, and the ability of parties to take on specific risks.

For a project to be successful as a PPP, it must be structured in a method that is friendly to investors. What this means is that it must allocate a reasonable level of risk to the private sector and produce a return for investors that is aligned with these risks. Finally, the project must be bankable, meaning that it must meet the strict criteria that lenders will require in order to provide debt financing.

To test whether the commercial activity of the infrastructure in question can be justified as a distinct business unit, it must meet a number of criteria:

- Is there a sound economic or operational rationale for locating a specific activity at a particular area?
- Can the activity be financially viable and generate a return not only to the investors but also the public sector?
- Optimal use of the infrastructure: How does the return on the activity in question compare to what could be generated by alternative uses of the space?
- Are there compelling legal or contractual factors that justify creation of a particular business unit?

10.3.2 Main Contractual Forms of PPPs

PPP contracts vary not just in the type of service and asset provision but also in their duration as well as the size of the new private sector investment they attract. The contracts can be as short as a 1 – 5 year service and management contracts to just operate and maintain an existing publicly-owned asset or facility such as existing state farms given to farmers for seasonal cultivation and harvesting, to a 15 – 30 year concession contract to operate an existing grain storage facility or construct-and-operate a new agro-processing facility. There is also the full divesture of the government asset to the private sector in the case of Okomu Palm oil Mill in Imo state of Nigeria.

The main contractual forms of PPP and the allocation of responsibilities particularly relevant to agricultural infrastructure are shown in Figure 45.

Figure 45: Main Forms of PPP

Type of Contract	Contract Duration (Years)	Features				Service / Payments
		Asset Ownership	O&M	Capital Investment	Commercial Risk	
Service Contract	1-2	Public	Public & Private	Public	Public	Government pays fee to private sector for defined services
Management Contract	3-5	Public	Private	Public	Public	Private sector manages government operation for a management fee
Affermage/ Lease	5-10	Public	Private	Public	Private	Private sector manages, operates, repairs and/or maintains public service to specified standards and/or outputs. Fees are charged to users and the service provider pays the government rent for use of facility.

Type of Contract	Contract Duration (Years)	Features				Service / Payments
		Asset Ownership	O&M	Capital Investment	Commercial Risk	
Concession BOT, BOO, etc	10-30	Public & Private	Private	Private	Private	Similar to lease, except private sector may pay concession fee to government. With a BOT the private sector owns the new asset during the concession period and transfers it back to the government at the end.
Divestiture	Indefinite or limited by license	Private or Public & Private	Private	Private	Private	Government sells assets to private sector

As indicated, these forms differ in terms of duration, ownership of assets, responsibility for operations and maintenance, responsibility for commercial risk and nature/basis of payments for service.

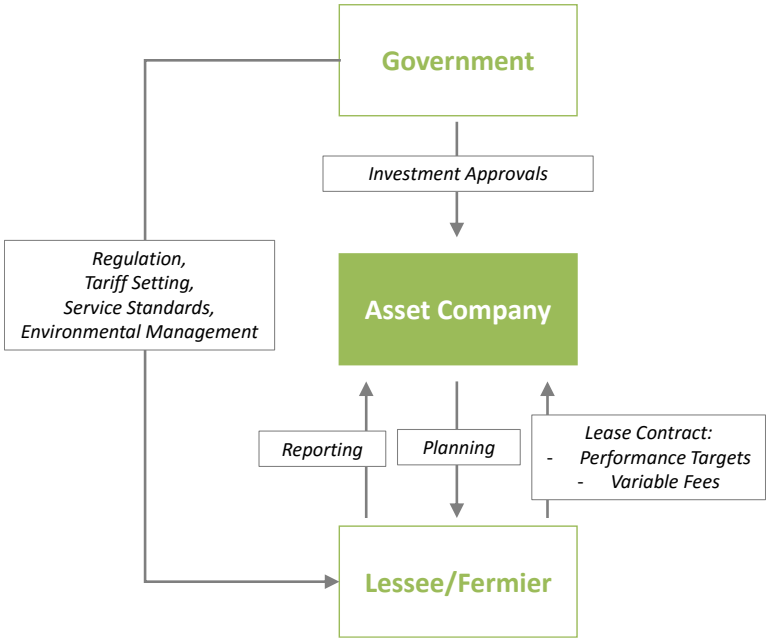
1) **Service and management contracts** are typically used by governments to acquire technical expertise to assist in managing public sector organizations (whether as traditional parastatals or commercialized enterprises). Under management contracts, the private partner operates and manages an existing public asset or network, such as an irrigation network, in exchange for a management fee. The private partner must meet specific performance standards and ensure the asset is available to provide its services, as defined in the contract. This form of PPP can be very effective at ensuring that key assets are properly maintained and that service performance standards remain high. However, this form of PPP requires that the public sector, rather than the private sector, continues to provide the long-term financing for the assets. Under these arrangements, the private sector usually bears no commercial risk, although they may be incentivized if payment is related to achieving specified performance indicators. And while technical and operational experts are likely to advise on investment programmes, these programmes are financed by the state.

   Management contracts have rarely produced positive results as some of the service providers are not strongly incentivised to provide quality work and operation as their remuneration is already assured. However due to insufficient funds usually made available for the required investments, the services of the operators is limited. In India, there are a number of schemes run by government where extension services are contracted out to the private sector.

2) **Affermage/Lease** arrangements can be seen as an alternative approach that pushes more responsibility and incentives towards the private sector participant. Under such arrangements, the private partner leases an existing public sector asset, such as grain terminal under specified terms and pays a lease-fee (or “rent”) to the public sector, as the owner. The private operator now takes on the Commercial risk of the level of demand for the facility’s services from customers including shipping companies, agricultural commodity investors, and others. The private partner is responsible for all operating and maintenance functions, including the replacement of short-term assets. The public sector, as the owner, is responsible for all long-term decisions for the facility, including financing any long-term investments in assets.

Leases can be very effective at improving the commercial performance of specific facilities that have to compete with other service providers Because lease contracts only cover design and building or operation but not financing, they do not bring-in the new long-term financing for new facilities, which many Governments in order to expand the asset base and/or rehabilitation of the existing assets. In Nigeria, for example, some state governments lease state-owned lands to private/rural farmers with payments arranged in the form of cash or the farm product cultivated.

Figure 46: Typical lease structure



3) **Concessions** are basically an extension of the lease concept. Under concessions, the public sector transfers the legal right to the private partner to provide specific public services for end-users (such as irrigated water, the collection of certain wastes, the distribution of electricity or heat, etc.). The Concessionaire is typically responsible for any capital investment required to build/expand or improve the business. Concessions are often the most interesting form of PPPs for Governments, due to the fact that the private partner provides the new long-term financing unlike the lease arrangement, and that it is end-users, and not the public sector, generally pay for the services. However, such concessions are often difficult to structure successfully, as private investors are understandably cautious about taking on such high levels of demand risk and collection. The duration of the concession depends upon a number of factors, the most important being the time required to recover initial investments made by the concessionaire.

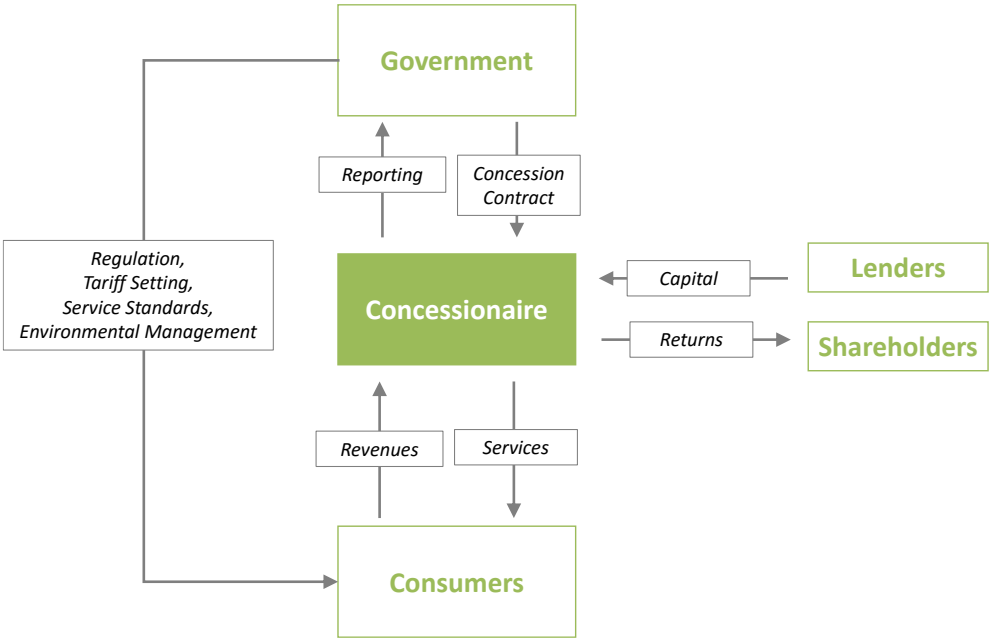


Figure 47: Typical Concession Structure

4) **Build-Operate-Transfer** (BOT) form of concession contracts are designed to bring private investment into the construction of new plants and infrastructure facilities. This is a scheme where governments contract turn-key projects to private companies to build infrastructure. Under a BOT, the private sector finances, builds and operates for example a wholesale market facility or other infrastructure works according to performance standards set by government. The operations period of this form of PPP is long enough to allow the private investor recoup investment and realize a profit. At the end of the contractual period, the government either buys back the completed facility or leases it out to a private entity with the government retaining ownership of the facility.

   BOTs, are generally less commonly found in developing countries because of the lower potential of the private sector to mobilize capital. An example is the BOT contract agreement between the Federal Airports Authority of Nigeria (FAAN) and Bi-Courtney Limited (BCL) signed in 2003

5) **Divestiture** is a form of PPP whereby the government permanently disposes/sells the ownership of either existing or new infrastructure assets. This option offers the most scope for entrepreneurial behaviour from the private sector investor's perspective, but it is very politically sensitive as it can be perceived as giving away national treasure. Seeing as the government usually has the overall responsibility to its citizens for the provision of public services, total divestiture can make this role difficult depending on the regulatory regime in place on divestiture.

Figure 48 illustrates contractual forms of PPP against duration and levels of risk and investment

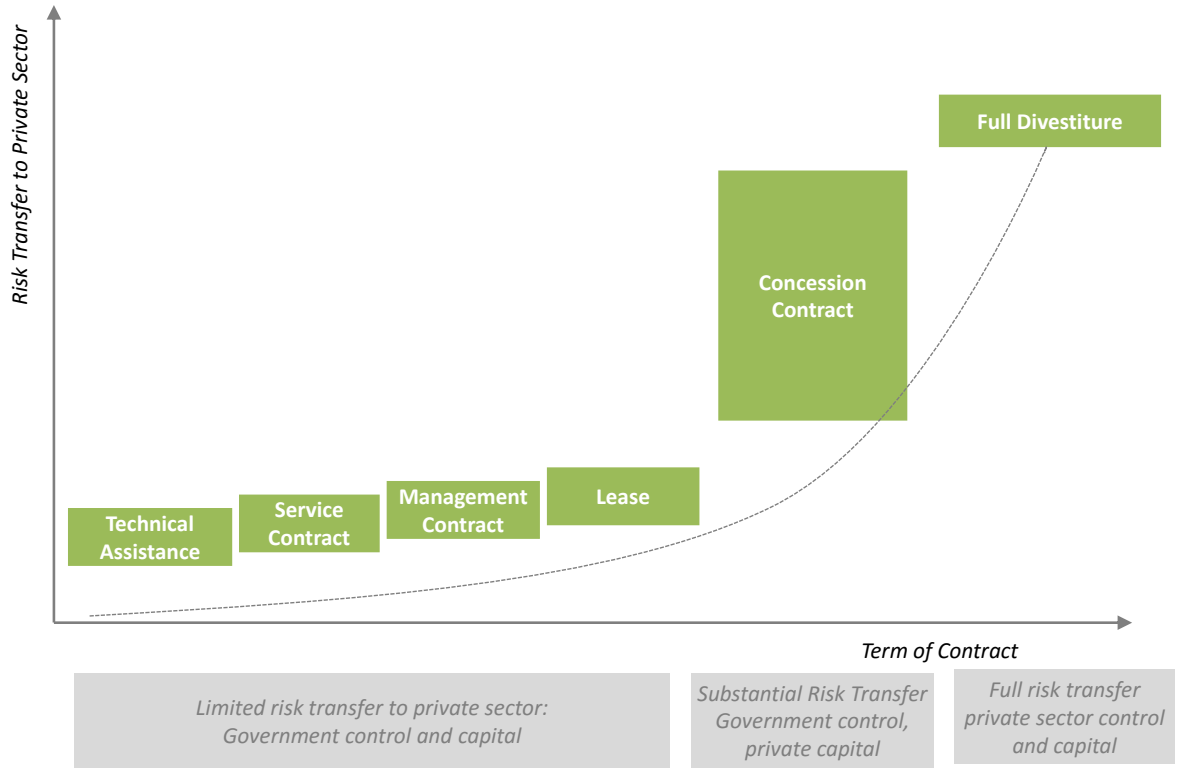


Figure 48: Contractual forms of PPP and Risk Levels

10.3.3 PPPs in the Agriculture sector

There are three common roles that public-private partnerships play in the agriculture sector:

1) **Provision of services to farmers**
    a. Inputs: (fertilizer, seed, equipment);
    b. Training: agricultural best practice, pest management, soil analysis;
    c. Facilities: Transport solutions, storage
    d. Finance: seasonal credit facilities for input purchases, trade finance facilities, banking services, insurance;
2) **Implementation of agriculture/land management projects**
    a. Sustainable land use programs
    b. Outgrower schemes
3) **Provision of infrastructure**
    a. Irrigation
    b. Road construction
    c. Market structures (storage, handling sites, trading sites)
    d. Commodity exchange platforms

The PPP structure adopted depends on the type of activity that is being supported and the objectives of the public sector partner(s). In the case of the silo complexes, the activities include both services to farmers and provision/management of key market infrastructure.

10.4 PPP Schemes for Silos Infrastructure

The form of PPP transactions in the agriculture sector has varied significantly, with concessions playing a dominant role in Africa, whereas other approaches such divestiture or greenfield projects have been more prevalent in other parts of the world.

As stated above, agriculture provides a relatively large share of Nigeria's GDP and is the largest employer of labour. However, despite its success story, the sector is faced with several challenges, and a major one arises from the governments growing budgetary constraints limiting funds for capital projects and the proper operation and maintenance of the existing storage facilities. The facilities are not just to accommodate the large volume of produce but also to ensure food security for the nation and for humanitarian and charity support for food-insecure countries when needed. Budget constraints often result in significant post-harvest wastage. The cost to the government of running and managing the numerous silo complexes across the nation is extremely expensive coupled with the limited resources available. According to the former Minister of Agriculture in the immediate past administration, at the current guaranteed minimum price rate, about NGN 100bn will be required by the Ministry to stock the Silo Complexes – much more than the yearly FMARD budget allocation.

The growing need for food reserves, coupled with the lack of a proper storage and logistics systems are some of the factors why private sector involvement is crucial in the agriculture infrastructure sector. Farmers are having to shift away from certain staple crop cultivation as lack of storage facilities, limited funds and lowering prices continues to cut into their earnings. Under the Agricultural Transformation Agenda, however, the intensified emphasis on food storage lends further credence to the PPP intervention approach, in this case involving infrastructural support for storage.

The use of private participation in grain storage will bring many of the usual PPP benefits experienced in other sectors namely mobilization of private sector efficiencies and innovation together with access to additional sources of finance and the transfer of risk. The following table demonstrates some of the rationale for private participation.

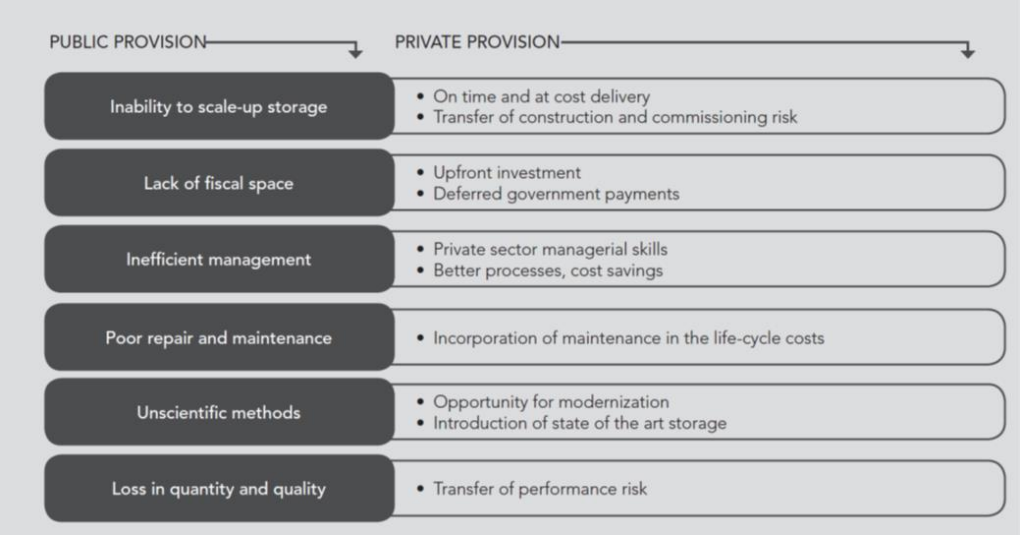


Figure 49: Rationale for Private Participation in Grain Storage[9]

[9] Source: PIQ Grain Storage PPPs
http://www.ifc.org/wps/wcm/connect/e003f400485d33ba894efd299ede9589/PIQ_GrainStoragePPPs_ONLINE.pdf?MOD=AJPERES

Private Participation will help the FMARD:

- Reduce the financial burden required to maximise silo utilization;
- Guarantee an improvement in management, efficiency and profitability of the silo complexes;
- Leverage the strengths of both the public and private sectors.

The extent to which various PPP concepts can be applied depends on the legal framework in each individual country and this sometimes imposes constraints in framing transactions. Options for the procurement and management of infrastructure can be visualized in Figure 50.

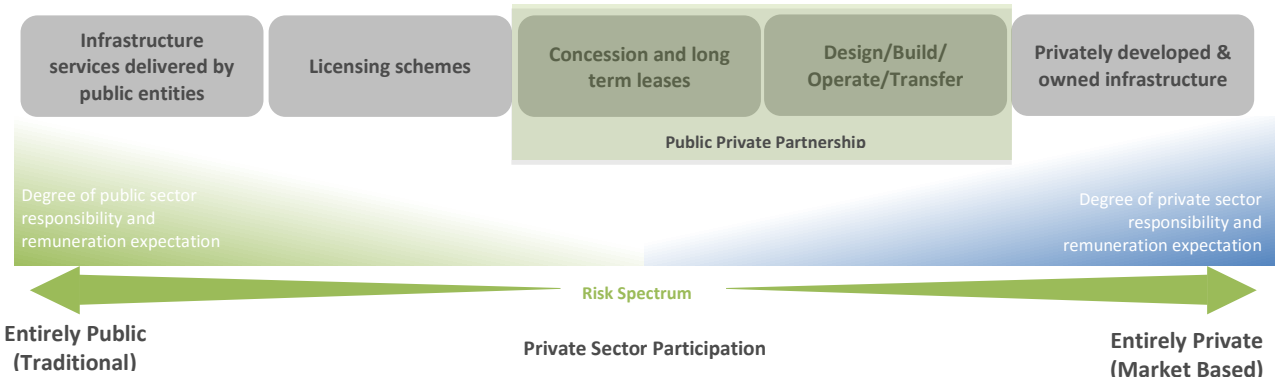


Figure 50: Forms of Public and Private Roles

The figure above demonstrates, in the top row, the possible forms of ownership and management of infrastructure and services, including forms of public private partnership (PPP). In the bottom half of the figure, the relative share of risks and remuneration between the public sector and the private sector is shown. At the left extreme is the traditional archetype, whereby agriculture infrastructure and operations are owned by the public sector. At the other end of the spectrum is where both infrastructure and services are privately developed and owned.

10.4.1 PPP Selection Framework

In order to determine and select the most appropriate PPP framework for a silo business unit, a two-step process was applied, as follows:

- **Step 1:** Determine a) whether there is a strong case for the activity to be recognized as a business unit; and b) whether the business unit can be operated under a PPP arrangement;
- **Step 2:** If a PPP arrangement is justified, determine the most appropriate form of PPP arrangement.

For Step 1, a **decision tree logic**, was applied, as illustrated in Figure 51.

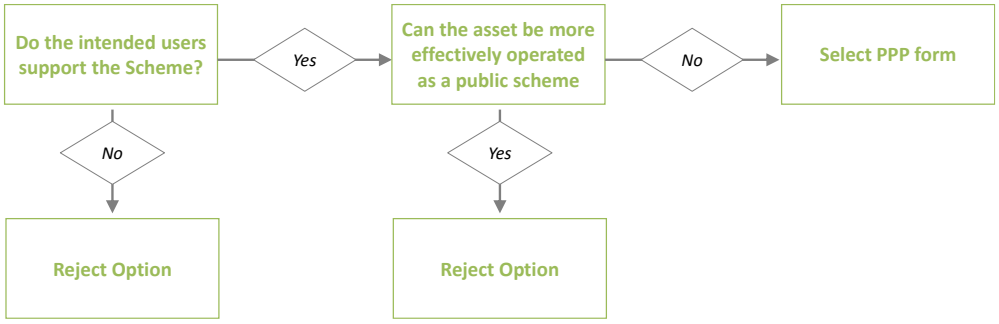


Figure 51: PPP Option Selection Process: Step 1

The first step is a basic screening process to determine if the business unit qualifies for a PPP arrangement. If it is shown that a specific business unit does not respond to a clearly defined user need, or that the scheme can be better delivered through public procurement or operation, then no further analysis is required and the business unit should continue operations under public control.

The second step as seen in Figure 52 is an application of the **multi-criteria framework** to the proposed silo complexes business units, which screens each alternative according to a series of evaluation criteria. The criteria in the framework includes the following factors: investment commitment, anticipated market risk, services required, value/return to FMARD/FGN, disruption to current economic or social activities, etc.

Figure 52: PPP Option Screening for Silos Complex PPP Scheme

Criterion	Assessment	PPP Option		
		Service/Mgmt Contract	Lease	Concession
Services to be provided	Grain handling and storage	✓		✓
MARKET AND OPERATIONAL RATIONALE				
To what extent does the facility/activity meet a demonstrable market need?	High		✓	✓
To what extent does the activity contribute to overall operational efficiency of the silo facility?	High		✓	✓
COMMERCIAL ASSESSMENT				
Investment Requirements	Medium – High			✓
Projected payback period	5 – 10 Years			✓
Revenue Potential	Medium - High			✓
Market Risk	High			✓
Potential Value to FMARD/FGN	High			✓
Financial Viability	Yes			✓
Economic Returns	Yes			✓
SOCIAL AND ENVIRONMENTAL CONSIDERATIONS				
Social impacts (employment, resettlement, etc.)	Net positive social impact			✓
Environmental impact	Mild			✓
OTHER CONSIDERATIONS				
Has incumbent already made significant investments?	Yes			✓
Is lease arrangement already in place?	No			✓
How difficult to break / renegotiate lease?	Easy			✓
OVERALL RECOMMENDATION				
Designate as a Business Unit?	Yes			✓
Recommended Format				✓

Activities that have a medium to high investment requirement, have high revenue potential (and consequently have high potential value to FMARD/FGN), are generally well suited to longer term concession arrangements. Activities that lack a positive longer term commercial perspective or that are currently locked into lease agreements are poor candidates for concessions. Given the significant commercial potential, it is recommended that the silo complexes be developed and operationalized under a long-term concession. There is a strong market need and commercial case for the silo

complexes across the nation. With the high volume of staples production (maize, rice, wheat, millet and sorghum) in Nigeria, the proper operation and maintenance of the silo complexes will undoubtedly generate significant benefits for all economic players, most notably the end users of grain storage facilities within the country. Furthermore, given the extent to which the silo complexes are presently underutilised, the improvement of the facilities, managed by efficient world class storage operators is indeed the most optimal use of the complexes.

In terms of risk allocation the concession model provides the government with the optimum transfer of risks to the private sector who are better equipped to handle them than the public sector. The following table demonstrates the risk profile associated with the key PPP models identified above.

Risk Type		Government Procurement	Management Contract	Lease	Concession BOT
A Preparatory Phase					
A.1	Delays in Land Acquisition				
A.2	External Linkages				
A.3	Financing Risk				
A.4	Planning				
B Construction Phase					
B.1	Design Risk				
B.2	Approvals Risk				
B.3	Approvals				
B.4	Additional Site Risk				
C Operations Phase					
C.1	Technology Risk				
C.2	O & M Risk				
C.3	Demand Risk				
C.4	Payment Risk				
C.5	Financial Risk				
D Handover Risk Events					
D.1	Handover Risk				
D.2	Terminal Value Risk				
E Other Risk Events					
E.1	Change in Law				
E.2	Force Majeure				
E.3	Sponsor Risk				
E.4	Concessionaire Default Event				
E.5	Government Default Event				

Legend

	Private Sector
	Public Sector
	Shared
	Not Applicable

Source: http://toolkit.pppinindia.com - modified by CPCS

Figure 53: Risk Allocation for PPP Contract Types

10.4.2 Recommendation

Essentially, the recommended option is a medium term concession type arrangement to bring the capacity utilisation of the silos, which is currently less than 10% up to full design capacity. The respective private operator will be granted a concession to Rehabilitate/Build, Operate and Transfer (RBOT) an individual or batch of silos over a period of 5-10 years with the payment of an annual concession fee to the government.

Under this model, the already-built silo complexes will be rehabilitated/ refurbished by the private entity and will be put to use for commercial storage. Government owns the assets and new build/refurbished assets will be transferred to the government at the end of the concession.

It is envisaged at this stage that the private entity will take on the demand risk as well as pay government a part of the revenues earned in the form of concession payments.

11. Conclusions and Recommendations

11.1 Purpose of the Section

The purpose of this section is to provide an overview of the Business Case and its implications for the transaction. There are three sections:

- Summary of results;
- Strawman Transaction Structure recommendations;
- Plan for implementing the remaining activities in the transaction.

11.2 Business Case Results

The findings from the Business Case Can be summarised as follows:

11.2.1 Grain Market

- There is an active grain market in Nigeria with supply in excess of 20m MT per annum and demand of 25m MT per annum.
- This market – in terms of supply and demand - is expected to grow by 2.5-3% per annum.
- Market activity is distributed across the country, but climatic and population density drivers create higher demand areas for grain silos.
- The market is populated by increasingly sophisticated and commercial stakeholders
- Grain storage facilities:
    - Have the potential to have a substantial impact in terms of reducing waste and making more efficient supply chains at scale;
    - Are in high demand by farmers and offtakers.
- This demand for storage, handling (and processing) services is sufficiently robust to support operations without government guaranteed utilisation.

11.2.2 The Financial Valuation

- The valuation model used Discounted Cash flow and Multiples analyses to assess the value of the silo complexes.
- The Net Present Value of commercial operation of the silo complexes is **NGN 25.8bn**.
- On a risk-adjusted basis, the private sector will create **NGN 4.34bn** additional financial value.
- The estimated present value of the cost of operating the silo as a grain reserve is **NGN 207bn**.

11.2.3 Risk Analysis

- Key risks relating to the silo complex are in terms of demand profile and access to capital.
- The private sector is best placed to manage these risks.
- The government is able to partially mitigate these risks by:
    - Contractually bearing some of the demand risk;
    - Leveraging concessional/public sector capital to unlock trade finance.

11.2.4 Economic Analysis

- Commercialising the silo complex operations through private sector engagement unlocks **NGN 99.3bn** economic value.

- On a risk adjusted basis, the private sector will create **NGN 51.5bn** additional economic value versus a public sector operator.

11.2.5 Proposed PPP Models

- PPP models allow the government to define how risks and returns are allocated in engagement with private sector partners
- In this case a concession model is the optimal approach.

11.3 Additional observations on Transaction Structure

- The average payback period is 3.5 years. A concession tenor longer than 4 years should generate value for investors. Given some uncertainty around the upfront investment requirement and the desire to incentivize long term market growth, we recommend targeting an 8-12 year concession agreement (i.e. 10 year),;
- There is some impact in terms of how the operating model pursued by the operator creates value. While regulating activities will help ensure that operators support local farmers, it is not commercially viable to pursue a post-harvest handling and storage strategy at the expense of a trading strategy. Furthermore it will be challenging for the government to enforce the compliance with target operations. Therefore we recommend allowing operators the freedom to manage the silo according to their chosen strategy.
- Given the high potential throughput of grains in each silo complex, access to short term trade finance is key. There does appear to be appetite from local financial institutions to participate in the market. The private sector is best placed to channel that appetite to grain markets, but unlocking the quantum of capital associated with the transaction in the long term may require structured engagement under existing or new frameworks for agriculture financing.
- Many of the assumptions are based on the ability of the silo operator to compete in the market on a level playing field. FMARD must be cautious when introducing parallel policy initiatives to incentivize agriculture investment – such as the SCPZs – in order to maintain that level playing field. The same logic applies to efforts to regulate grain pricing for products or services.
- The structure of a transaction fee should be driven by the financial value add and the strategic objectives of FMARD. The underlying payment model focus on upfront versus ongoing payments. Upfront payments are appropriate to ensure the commitment/alignment of the concessionaire in cases where CAPEX is low: for most silo complexes, this is the case. Ongoing payments are either fixed or ongoing.

Fee Type	Year 0 Pmt	Annual Pmt	
100% Upfront	100%	0%	Certainty and Transparency Loss of Gov't control
Fixed Fee	Partial	Fixed	Certainty and Transparency Retention of Gov't control
Variable Fee	Partial	Performance Based	Risk sharing Retention of Gov't control Implementation issues

If the public sector is capital constrained, the additional capital upfront is best; if there are lower immediate capital requirements but long terms budget expectations, ongoing payments are optimal. In this instance, the value of charging fees incrementally lies in the ability of the government to discount at a competitive rate versus the private partner.

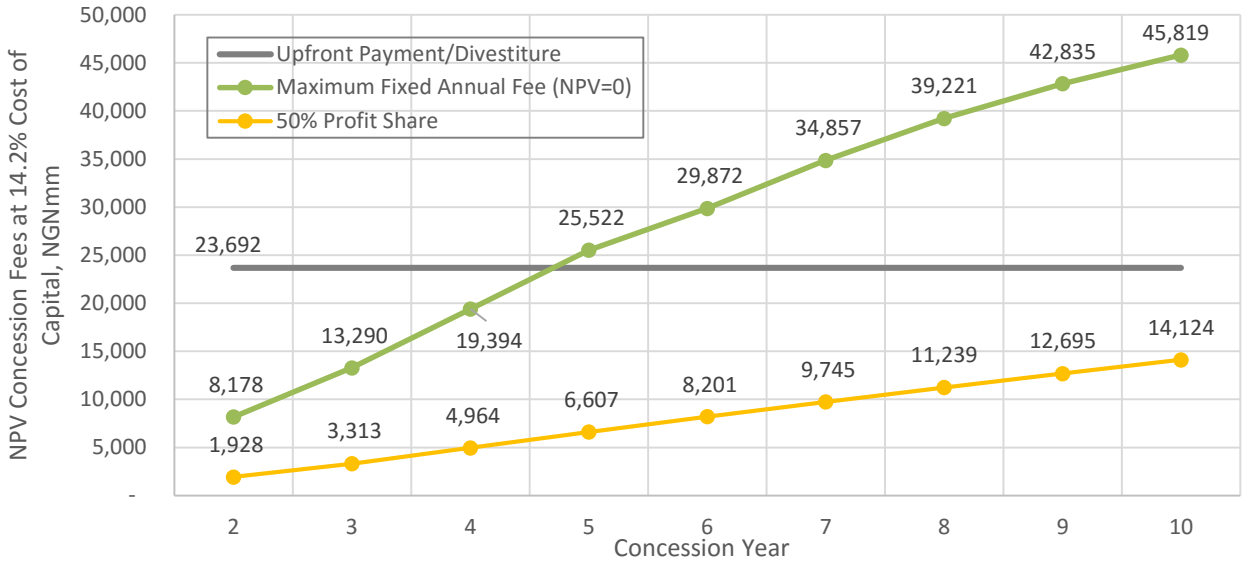


Figure 54: Concession Fee NPVs versus tenor and payment timing

Using a baseline 50% profit share – on the assumption that private partners may not be willing to participate if more than 50% of the financial benefit accrues to the government.

The resulting payments were then discounted at the government cost of capital. These demonstrate that in terms of long term value, concessioning the silos with an annual fixed payment tends to generate higher returns. In terms of execution, this also creates more certainty and clarity, since:

- During the RfP process, bidders can be evaluated on a like-for like basis, and
- During the operating period, payments do not require access to private sector performance data or accounts.

In terms of reporting the government should work with the private partner to establish an achievable set of performance metrics relating to:

- Capital expenditure schedule;
- High level financial performance;
- Grain storage and processing equipment utilisation;
- Number of farmer stakeholders;
- Additional impact on local community.

Introducing a performance-based payment requires the government to access full financial statements and assess the fee in a given period. This incentivises the concessionaire to under report the performance of the silo complex – which is counter to the objectives of the transaction.

11.4 Recommendations

On the basis of the Business Case findings the transaction advisors recommend that:

1) the silo complexes will material create financial and economic value through private sector engagement;
2) Private sector operators would be able to operate the silo complexes in a commercial, financially sustainable manner; and

3) a concession structure best matches risk and return allocations,

We recommend executing a concession transaction with the following attributes as a strawman:

Term	Options	Recommended
Concession Model	1. Lease 2. Rehabilitate/Build, Operate, Transfer (RBOT) Concession	Option 2
Tenor	3. 6 years 4. 11 years 5. 20 years	1 years refurbishment plus [10] years
Concession fees	1. Upfront fee 2. Annual fee 3. Royalty payment/profit sharing	Option 2
Escalation	Inflation-indexing of fees	Required
Handover conditions - FGN obligations	Land title deed issued	Required
	Separation of silo unit from other assets on the same site	Required
	Asset clear of all claims and encumbrances	Required
	ESIA and mitigation measures agreed	Required
	Site ready to occupy by Operator	Required
Handover conditions - Operator obligations	Formation of operating company and/or association contracts (for consortia)	Required
	Provision of agreed investment plan	Required
	ESIA and mitigation	Required
	Provision of performance guarantee	Required
	Payment of Year 1 fee	Required
Performance guarantee	1. No performance guarantee 2. Performance guarantee	Option 2
Operation tariffs	1. Regulated / standardized for all units 2. Set at Operator discretion 3. Published tariffs (annually at beginning of season)	Option 2 and 3
Right to transfer concession	1. Operator change of control or transfer only with FGN approval 2. No restriction on transfer	Option 1
Strategic Grain Reserve / Storage allocation to smallholder farmers	1. Mandate all units to reserve a fixed percentage of storage space for SGR/ farmers 2. SGR/farmers takes storage space as required and subject to availability of space; tariffs paid in accordance with Operator standard tariffs 3. SGR books space at beginning of season; Operator obliged to reserve space up to designated limit; SGR pays for all storage capacity (at published tariff) and pays throughput rate for handling (intake, clean, dry, bag, load out) of its own grain; farmers pay for storage and handling costs if they use the facility. Operator to publish tariffs at the beginning of each season	Option 3
Operational Restrictions	1. Operator explicitly restricted in concession agreement 2. No contractual restrictions	Option 2
Competition	1. Operator has no explicit protection, but benefits from operational asset 2. Operator has geographic monopoly and/or protected for a fixed period 3. Operator has tax and investment incentives equal to FGN-backed agribusiness programs	Option 1 and Option 3

Term	Options	Recommended
Operation Obligations	1. Operator required to provide extension services / financing packages to farmers 2. Operator provides services at own discretion	Option 2
Termination conditions	1. Non-compliance of any operator asset handover conditions 2. Cancellation of performance guarantee 3. Change of control without FGN approval 4. Provision of investment plan 5. Non-payment of annual concession fee 6. Minimum performance	All options
Dispute resolution	1. By agreement between the parties 2. By arbitration	Either option
Condition of asset at transfer	3. No condition requirement 4. Condition requirement 5. Deposit (annual accumulating, taken from annual payment) against costs of reaching minimum standard at handover (subject to independent technical auditor)	Option 2 and Option 3

In addition to agreeing these transaction terms, there are a number of outstanding issues relating to the transaction that need to be resolved before proceed further. The actions still to be taken include:

- **Silos to be excluded from the transaction**: identify/select 4 silo complexes to be retained by FMARD for grain reserve operations on the basis of:
  - This Business Case;
  - Strategic and policy objectives;
  - Response to Request for Proposals
- **Formalising land title documentation**: Four silo complexes have land titles, but these are in the incorrect legal format and need to be updated. The remaining 26 silo complexes have no formal land titles, but have land granted by state governors following correspondence with the FMARD;
- **Resolving outstanding construction contracts**: the legal advisor identified 13 construction contracts from 2009-10 that are not yet complete and which relate to the installation of new silo complexes;
- **Encroachment**: six silo complexes currently have encroachment within the boundary of the complex by local communities, for habitation or agriculture activities.

11.5 Transaction Implementation Plan

There are three core outstanding t stages remaining in the transaction process:

- Market Outreach
- RfP Documentation Preparation
- RfP Process

In terms of Market Outreach, the goal is to hold 6 meetings with stakeholders across the country, in each of the geopolitical zones. The logic behind this is to ensure all parties involved in grain management – both regional and local public and private sector actors – are able to learn about the transaction and provide feedback on their concerns. The current travel plan anticipates holding stakeholder meetings over a 3-4 week period in the following locations:

Region	Member States	Silo Complexes	Proposed Location
North Central	*Benue, FCT, Kaduna, Kogi, Kwara, Nassawara, Niger, Plateau*	1x 11,000 MT silo 6x 25,000 MT silos 1x 100,000 MT silo	Abuja, FCT
North East	*Adamawa, Bauchi, Borno, Gombe, Jigawa, Taraba, Yobe*	6x 25,000 MT silos 1x 100,000 MT silo	Gombe, Gombe
North West	*Kaduna, Kano, Katsina Kebbi, Sokoto, Zamfara*	4x 25,000 MT silos 2x 100,000 MT silos	Sokoto, Sokoto
South East:	*Anambra, Imo, Ebonyi Enugu, Imo*	2x 25,000 MT silos 1x 100,000 MT silo	Owerri, Imo
South South	*Abia, Akwa-Ibom, Bayelsa, Cross-River, Delta, Edo, Rivers*	3x 25,000 MT silos 1x 100,000 MT silo	Benin City, Edo
South West	*Ekiti, Lagos, Ogun, Ondo, Osun, Oyo*	4x 25,000 MT silos 1x 100,000 MT silo	Ibadan, Oyo

FMARD has taken responsibility for reaching out to local managers in order to find out about appropriate staging locations and logistical considerations and will work with the Transaction advisor to refine this proposal for execution after the approval of this report.

In addition to the broad stakeholder engagement, it would be prudent to hold a bidders conference when the Request for Proposals is issued. This bidders' conference will:

- Describe the proposal preparation and evaluation process
- Describe the proposed concession terms to bidders;
- Allow for questions concerning the silo complexes and assets.

This event should be conducted in Abuja in order to access expertise from the FMARD and FMOF regarding the operation of the silo complexes.

RfP Documentation will be prepared by CPCS and Benchmac and Ince in line with Nigerian PPP legislation, global and local best practice and through iteration with legal representatives from the FMOF and FMARD.

Once the RfP documentation has been drafted and agreed, the RfP process can commence. There are three basic activities associated with the RfP process:

Region	Member States
RfP Process Management	- Issue RfP documentation to bidders - Allow bidders to access information on the silo complexes - Allow bidders to conduct site visits of the silo complexes - Provide input on specific questions relating to the transaction - -Collect proposals

Bidder Evaluation	- Evaluate proposals transparently and consistently according to
	  - Technical feasibility
	  - Financial best offer
	- Name approved bidders for each of the silo complexes

Contract finalisation	- Negotiate standard contract deviations with each successful bidder - Confirm government commitments in concession contracts - Achieve and conditions precedent - Sign contracts.

Implementation Timeline

Given the Presidential Pre-approval of concessioning the silo complexes, and the FMARD eagerness to execute the transaction swiftly, we propose the following timeline for implementation:

Deliverable	Activity	Time to Complete	Est. Date
Market outreach	Regional Stakeholder Meetings	4-6 weeks	15th Mar - 4th Apr
	Bidder Conference	6-8 weeks	18th April
	Report	8 weeks	25th April
RfP Documentation	Submitted for Approval	8 weeks	25th April
RfP Process	Proposal Launch	9-12 weeks	2nd May
	Submission Deadline	17-22 weeks	27th June
	Proposal Evaluation	1-2 weeks thereafter	4th July
	Approved Bidders Named	2 weeks thereafter	11th July

12. Appendices

12.1 CAPEX Schedules

	Equipment and Machinery	Silo bins	Power and Water	Civil Structures	Vehicles	Tools etc	**Total CAPEX Required**
Ado Ekiti	2,090,170	1,193,600	1,150,000	3,500,000	8,000,000	3,409,590	19,343,360
Akure	9,476,314	673,347	20,100,000	21,412,592	6,100,000	1,374,390	59,136,642
Bauchi	1,525,764	7,043,170	20,000,000	38,500,000	8,000,000	3,409,590	78,478,524
Bulasa	715,590	-	150,000	15,099,285	8,000,000	2,544,000	26,508,875
Dutsin	715,590	8,194,330	6,500,000	3,500,000	8,000,000	2,544,000	29,453,920
Ezillo	715,590	11,035,024	670,000	21,177,592	8,000,000	2,794,000	44,392,206
Gaya	1,021,188	2,235,666	150,000	8,856,970	8,000,000	2,544,000	22,807,824
Gombe	1,325,590	21,652,655	26,650,000	21,802,592	6,200,000	10,000,000	87,630,836
Gusau	16,032,880	1,193,600	35,150,000	53,010,454	8,000,000	2,544,000	115,930,934
Ibadan	740,590	18,196,800	37,900,000	21,727,592	8,000,000	2,544,000	89,108,982
Igbariam	64,570,922	81,721,442	31,550,000	63,457,710	8,000,000	3,409,590	252,709,664
Ikenne	715,590	-	150,000	3,500,000	8,000,000	11,919,000	24,284,590
Ilesha	6,827,550	-	100,000	8,856,970	8,000,000	2,544,000	26,328,520
Ilorin	11,857,680	7,190,000	2,210,000	21,602,592	6,000,000	9,544,000	58,404,272
Irrua	7,457,382	28,523,340	12,200,000	21,552,592	6,050,000	22,544,000	98,327,314
Jahun	6,150,803	1,500,000	20,150,000	21,152,592	6,000,000	2,544,000	57,497,394
Jalingo	162,807,060	153,263,460	15,150,000	64,349,734	8,000,000	12,544,000	416,114,254
Jos	5,081,730	-	2,150,000	21,152,592	-	200,000	28,584,322
Kaduna	39,708,550	12,836,068	400,000	21,752,592	250,000	1,250,000	76,197,210
Kwali	9,961,503	3,697,280	500,000	17,820,685	8,000,000	3,459,590	43,439,058
Lafia	178,151,470	137,203,460	16,000,000	55,095,019	8,000,000	3,409,590	397,859,539
Lafiagi	22,900,620	-	32,500,000	22,452,592	6,300,000	3,094,000	87,247,212
Lokoja	153,049,638	12,284,060	19,100,000	95,678,827	8,000,000	3,409,590	291,522,115
Makurdi	19,844,640	7,752,840	20,000,000	21,402,592	1,600,000	507,795	71,107,867
Minna	50,000	8,502,840	300,000	21,602,592	-	400,000	30,855,432
Ogoja	14,306,290	132,000	39,650,000	22,352,592	-	865,590	77,306,472
Okigwe	178,151,470	255,809,040	57,750,000	95,678,827	8,000,000	3,409,590	598,798,927
Sokoto	-	1,848,640	-	3,925,000	8,000,000	3,509,590	17,283,230
Uyo	21,337,978	500,000	47,750,000	39,874,588	8,000,000	3,409,590	120,872,156
Yola	719,073	596,800	-	3,500,000	8,000,000	3,259,590	16,075,463

12.2 Sample Financial Statements: Income Statement

Complex	Ado_Ekiti
State	Ekiti

INCOME STATEMENT NGN Financial year end	*year*		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Revenue													
Grain Trading	*NGN*			5,913,600,000	7,434,240,000	9,199,872,000	11,244,288,000	12,368,716,800	13,605,588,480	14,966,147,328	16,462,762,061	18,109,038,267	19,919,942,094
Post-Harvest Services	*NGN*			121,660,000	152,944,000	189,268,200	231,327,800	254,460,580	279,906,638	307,897,302	338,687,032	372,555,735	409,811,309
Grain storage for FMARD	*NGN*			0	0	0	0	0	0	0	0	0	0
Agroprocessing Revenues				0	0	0	0	0	0	0	0	0	0
Total revenue	*NGN*			6,035,260,000	7,587,184,000	9,389,140,200	11,475,615,800	12,623,177,380	13,885,495,118	15,274,044,630	16,801,449,093	18,481,594,002	20,329,753,402
Direct Costs													
Grain Trading Purchases	*NGN*			5,322,240,000	6,690,816,000	8,279,884,800	10,119,859,200	11,131,845,120	12,245,029,632	13,469,532,595	14,816,485,855	16,298,134,440	17,927,947,884
Handling and Storage Costs	*NGN*			86,240,000	108,416,000	134,164,800	163,979,200	180,377,120	198,414,832	218,256,315	240,081,947	264,090,141	290,499,156
Agroprocessing Costs	*NGN*			0	0	0	0	0	0	0	0	0	0
Total direct costs	*NGN*			5,408,480,000	6,799,232,000	8,414,049,600	10,283,838,400	11,312,222,240	12,443,444,464	13,687,788,910	15,056,567,801	16,562,224,582	18,218,447,040
Total Indirect Costs	*NGN*			243,947,867	269,032,644	296,694,898	326,364,387	359,000,826	394,900,909	434,391,000	477,830,100	525,613,110	563,383,864
EBITDA	*NGN*			382,832,133	518,919,356	678,395,702	865,413,013	951,954,314	1,047,149,745	1,151,864,720	1,267,051,192	1,393,756,311	1,547,922,499
Interest on Trade Finance	*NGN*			179,625,600	225,815,040	279,446,112	341,545,248	375,699,773	413,269,750	454,596,725	500,056,398	550,062,037	605,068,241
Interest on LT Debt	*NGN*			2,817,686	2,190,961	1,564,237	937,512	154,116	0	0	0	0	0
Interest on cash balance	*NGN*			0	0	0	0	0	0	0	0	0	0
Amortisation	*NGN*			154,747	154,747	154,747	154,747	154,747	154,747	154,747	154,747	154,747	154,747
Depreciation	*NGN*			2,932,763	2,932,763	2,932,763	2,932,763	2,932,763	3,776,778	3,776,778	3,776,778	3,655,522	3,655,522
EBT	*NGN*			197,301,337	287,825,845	394,297,844	519,842,743	573,012,915	629,948,470	693,336,469	763,063,269	839,884,005	939,043,989
Deferred loses				0	0	0	0	0	0	0	0	0	0
Income for Tax purposes				197,301,337	287,825,845	394,297,844	519,842,743	573,012,915	629,948,470	693,336,469	763,063,269	839,884,005	939,043,989
Tax		30%		59,190,401	86,347,754	118,289,353	155,952,823	171,903,875	188,984,541	208,000,941	228,918,981	251,965,201	281,713,197
Net Income	*NGN*			138,110,936	201,478,092	276,008,491	363,889,920	401,109,041	440,963,929	485,335,528	534,144,288	587,918,803	657,330,792
Available for Dividend				138,110,936	270,533,560	342,219,803	468,788,510	530,604,706	576,770,616	637,914,149	700,522,742	771,801,720	859,348,736
Dividend		50%		69,055,468	135,266,780	171,109,901	234,394,255	265,302,353	288,385,308	318,957,075	350,261,371	385,900,860	429,674,368
Retained earnings	NGN			69,055,468	66,211,312	104,898,590	129,495,665	135,806,688	152,578,621	166,378,454	183,882,917	202,017,943	227,656,425
Cumulative RE	NGN			69,055,468	135,266,780	240,165,369	369,661,035	505,467,722	658,046,343	824,424,797	1,008,307,714	1,210,325,657	1,437,982,082

12.3 Sample Financial Statements: Balance Sheet

Complex	Ado_Ekiti
State	Ekiti

BALANCE SHEET NGN Financial year end *year*	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Current Assets											
Cash and overdraft		228,541,453	336,027,631	488,802,259	673,685,644	825,866,006	1,015,702,972	1,222,672,454	1,450,812,349	1,699,878,442	1,980,138,933
Accounts Receivable		73,920,000	92,928,000	114,998,400	140,553,600	154,608,960	170,069,856	187,076,842	205,784,526	226,362,978	248,999,276
Inventory - trade		1,330,560,000	1,672,704,000	2,069,971,200	2,529,964,800	2,782,961,280	3,061,257,408	3,367,383,149	3,704,121,464	4,074,533,610	4,481,986,971
Inventory - equipment and supplies		40,040,000	50,336,000	62,290,800	76,133,200	83,746,520	92,121,172	101,333,289	111,466,618	122,613,280	134,874,608
Total Current Assets		1,673,061,453	2,151,995,631	2,736,062,659	3,420,337,244	3,847,182,766	4,339,151,408	4,878,465,733	5,472,184,956	6,123,388,310	6,845,999,788
Fixed Assets											
Gross fixed assets		19,343,360	19,343,360	19,343,360	19,343,360	34,973,030	34,973,030	34,973,030	34,973,030	36,093,146	36,093,146
Less: Accumulated depreciation	-	2,932,763	- 5,865,525	- 8,798,288	- 11,731,050	- 14,663,813	- 18,440,592	- 22,217,370	- 25,994,149	- 29,649,670	- 33,305,192
Pre-operating costs (amortising)		618,988	464,241	309,494	154,747	-	- 154,747	- 309,494	- 464,241	- 618,988	- 773,734
Net Fixed Assets		17,029,585	13,942,076	10,854,566	7,767,057	20,309,217	16,377,691	12,446,166	8,514,640	5,824,488	2,014,220
TOTAL ASSETS		1,690,091,039	2,165,937,707	2,746,917,226	3,428,104,300	3,867,491,982	4,355,529,099	4,890,911,899	5,480,699,597	6,129,212,798	6,848,014,007
Current Liabilities											
Accounts payable		805,522,667	1,012,657,067	1,253,163,120	1,531,643,813	1,684,808,195	1,853,289,014	2,038,617,916	2,242,479,707	2,466,727,678	2,713,400,446
Trade finance		798,336,000	1,003,622,400	1,241,982,720	1,517,978,880	1,669,776,768	1,836,754,445	2,020,429,889	2,222,472,878	2,444,720,166	2,689,192,183
Total Current Liabilities		1,603,858,667	2,016,279,467	2,495,145,840	3,049,622,693	3,354,584,963	3,690,043,459	4,059,047,805	4,464,952,585	4,911,447,844	5,402,592,628
Long term debt		9,737,607	6,952,163	4,166,719	1,381,275	-	-	-	-	-	-
Shareholders Funds											
Equity	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128	6,035,128
Retained Earnings		69,055,468	135,266,780	240,165,369	369,661,035	505,467,722	658,046,343	824,424,797	1,008,307,714	1,210,325,657	1,437,982,082
Total Shareholders Funds		75,090,596	141,301,908	246,200,498	375,696,163	511,502,851	664,081,471	830,459,925	1,014,342,842	1,216,360,786	1,444,017,210
TOTAL LIABILITIES AND EQUITY		1,688,686,870	2,164,533,538	2,745,513,057	3,426,700,131	3,866,087,814	4,354,124,930	4,889,507,730	5,479,295,428	6,127,808,629	6,846,609,838

12.4 Sample Financial Statements: Cash flow Statement

Complex	Ado_Ekiti
State	Ekiti

CASHFLOW STATEMENT
NGN

Financial year end	*year*	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Cash Inflows	Assumption											
Equity	30%		6,035,128									
Long-term loans / sub loans	70%		13,927,219									
Trade finance			798,336,000	205,286,400	238,360,320	275,996,160	151,797,888	166,977,677	183,675,444	202,042,989	222,247,288	244,472,017
Revenue			6,035,260,000	7,587,184,000	9,389,140,200	11,475,615,800	12,623,177,380	13,885,495,118	15,274,044,630	16,801,449,093	18,481,594,002	20,329,753,402
Less: change in accounts receivable		-	73,920,000	- 19,008,000	- 22,070,400	- 25,555,200	- 14,055,360	- 15,460,896	- 17,006,986	- 18,707,684	- 20,578,453	- 22,636,298
Total Cash In			6,779,638,348	7,773,462,400	9,605,430,120	11,726,056,760	12,760,919,908	14,037,011,899	15,440,713,089	16,984,784,398	18,683,262,837	20,551,589,121
Cash Outflows												
Capital expenditure			19,343,360	-	-	-	15,629,669	-	-	-	1,120,116	-
Pre-operational expenses			773,734	-	-	-	-	-	-	-	-	-
Operating expenses			330,187,867	377,448,644	430,859,698	490,343,587	539,377,946	593,315,741	652,647,315	717,912,046	789,703,251	853,883,019
Grain purchases			5,322,240,000	6,690,816,000	8,279,884,800	10,119,859,200	11,131,845,120	12,245,029,632	13,469,532,595	14,816,485,855	16,298,134,440	17,927,947,884
Less: change in accounts payable		-	805,522,667	- 207,134,400	- 240,506,053	- 278,480,693	- 153,164,381	- 168,480,819	- 185,328,901	- 203,861,792	- 224,247,971	- 246,672,768
Plus: changes in inventory			1,370,600,000	352,440,000	409,222,000	473,836,000	260,609,800	286,670,780	315,337,858	346,871,644	381,558,808	419,714,689
Principal repayments on LTD			2,785,444	2,785,444	2,785,444	2,785,444	1,381,275	-	-	-	-	-
Interest on LTD			2,817,686	2,190,961	1,564,237	937,512	154,116	-	-	-	-	-
Trade finance interest			179,625,600	225,815,040	279,446,112	341,545,248	375,699,773	413,269,750	454,596,725	500,056,398	550,062,037	605,068,241
Interest on cash balance			-	-	-	-	-	-	-	-	-	-
Tax payments			59,190,401	86,347,754	118,289,353	155,952,823	171,903,875	188,984,541	208,000,941	228,918,981	251,965,201	281,713,197
Dividends paid			69,055,468	135,266,780	171,109,901	234,394,255	265,302,353	288,385,308	318,957,075	350,261,371	385,900,860	429,674,368
Total Cash Outflows			6,551,096,894	7,665,976,223	9,452,655,491	11,541,173,376	12,608,739,546	13,847,174,933	15,233,743,607	16,756,644,503	18,434,196,744	20,271,328,630
NET CASH FLOW			228,541,453	107,486,177	152,774,629	184,883,384	152,180,362	189,836,966	206,969,482	228,139,895	249,066,093	280,260,491
OPENING CASH BALANCE			-	228,541,453	336,027,631	488,802,259	673,685,644	825,866,006	1,015,702,972	1,222,672,454	1,450,812,349	1,699,878,442
CLOSING CASH BALANCE			228,541,453	336,027,631	488,802,259	673,685,644	825,866,006	1,015,702,972	1,222,672,454	1,450,812,349	1,699,878,442	1,980,138,933
Minimum cash			0	0	0	0	0	0	0	0	0	0

12.5 Silo Specifications

Silo Complex		Reference Market	Size	Demand	Silo Bins	Size	Silo Bin Allocation				Weigh-bridge	Dry Intake	Wet Intake	Dryer	Cleaner	Bagging	Feed Mill
Location	*State*	*Location*	*MT*	*Level*	*No.*	*MT*	*Maize*	*Sorghum*	*Rice*	*Millet*	*MT/hr*	*MT/hr*	*MT/hr*	*MT/hr*	*MT/hr*	*MT/hr*	*(MT/hr)*
Ado_Ekiti	Ekiti	Bodija	100,000	Low	20	5,000	15	-	5		60	50	50	30	50	80	-
Akure	Ondo	Bodija	25,000	Medium	10	2,500	8		2		50	30	30	15	30	24	18
Bauchi	Bauchi	Gombe	25,000	High	10	2,500	4	3	1	2	59	44	30	30	30	39	-
Bulasa	Kebbi	National	100,000	Medium	20	5,000	4	8	3	5	60	50	50	50	50	60	-
Dutsin	Katsina	Dawanau	25,000	High	10	2,500	3	4	1	2	60	50	50	34	50	39	-
Ezillo	Ebonyi	National	25,000	Low	10	2,500	1	-	9		50	50	50	30	50	60	-
Gaya	Kano	Dawanau	25,000	High	10	2,500	3	4	2	1	80	50	50	30	70	39	-
Gombe	Gombe	Gombe	25,000	Medium	10	2,500	3	3	2	2	50	50	50	34	50	30	18
Gusau	Zamfara	Kaur aNamuda	100,000	High	20	5,000	1	13	2	4	60	50	50	50	50	100	-
Ibadan	Oyo	Bodija	25,000	High	10	2,500	7	1	2		50	30	30	12	30	70	18
Igbariam	Anambra	National	25,000	Medium	10	2,500	5	1	4		59	44	43	34	40	39	-
Ikenne	Ogun	Mile12	100,000	Medium	20	5,000	18		2		60	50	50	50	50	60	-
Ilesha	Osun	Bodija	25,000	Low	10	2,500	7		3		60	50	50	30	30	24	-
Ilorin	Kwara	Bodija	25,000	Medium	10	2,500	3	2	4	1	50	30	30	30	30	20	18
Irrua	Edo	National	25,000	Low	10	2,500	6		4		50	50	50	12	50	30	-
Jahun	Jigawa	Gujungu	25,000	High	10	2,500	1	4	1	4	50	40	40	40	40	30	18
Jalingo	Taraba	Gombe	25,000	Medium	10	2,500	4	2	3	1	59	44	43	60	40	39	-
Jos	Plateau	Saminaka	25,000	High	10	2,500	5	3	1	1	60	50	50	45	50	60	-
Kaduna	Kaduna	Dandume	25,000	High	10	2,500	4	3	2	1	50	30	30	30	30	40	-
Kwali	FCTAbuja	National	100,000	Low	20	5,000	5	4	8	3	60	50	50	50	50	200	-
Lafia	Nassarawa	Dodoru	25,000	Low	10	2,500	3	3	3	1	135	44	43	34	40	39	-
Lafiagi	Kwara	National	11,000	Medium	12	917	3	2	7	-	50	30	30	30	30	20	-
Lokoja	Kogi	National	25,000	Medium	10	2,500	4	1	4	1	59	44	43	50	40	39	-
Makurdi	Benue	Dodoru	25,000	High	10	2,500	2	2	5	1	60	60	60	34	15	30	18
Minna	Niger	National	25,000	High	10	2,500	4	3	2	1	60	30	30	30	30	60	18
Ogoja	CrossRiver	Dodoru	25,000	Low	10	2,500	7		3		50	50	50	30	50	30	18
Okigwe	Imo	Aba	100,000	Medium	20	5,000	16		4		60	52	50	46	50	100	-
Sokoto	Sokoto	National	25,000	High	10	2,500	1	4	1	4	50	50	50	50	50	30	-
Uyo	Akwalbom	Aba	25,000	Low	10	2,500	9		1		50	44	43	30	30	30	-
Yola	Adamawa	Gombe	25,000	Medium	10	2,500	4	3	2	1	50	50	50	50	50	60	-

12.6 Valuation Metrics by Complex (NGNm)

Silo Complex		NPV	Project IRR	Equity IRR	DSCR (Avg)	DSCR (Min)	Payback Pd	Multiples	
Location	*State*	*Percent*	*Percent*	*Percent*	*Ratio*	*Ratio*	*Years*	*Revenues*	*EBITDA*
Ado_Ekiti	Ekiti	1,941.9	80%	3891%	2.4	2.1	2.7	1,811	1,531
Akure	Ondo	1,132.5	60%	266%	3.3	2.9	2.9	1,056	1,547
Bauchi	Bauchi	548.2	53%	216%	2.3	1.5	3.5	519	433
Bulasa	Kebbi	2,218.1	85%	3509%	2.5	2.2	2.5	2,109	1,936
Dutsin	Katsina	565.6	65%	609%	2.4	1.8	3.1	499	407
Ezillo	Ebonyi	777.9	73%	681%	2.6	2.1	2.6	674	657
Gaya	Kano	685.1	75%	994%	2.5	2.0	2.8	560	492
Gombe	Gombe	872.6	47%	131%	3.0	2.4	3.5	1,012	1,360
Gusau	Zamfara	2,395.3	71%	665%	2.5	1.9	2.9	1,967	1,749
Ibadan	Oyo	1,212.7	53%	181%	3.0	2.4	3.3	1,133	1,523
Igbariam	Anambra	396.5	35%	66%	2.1	1.1	4.4	620	577
Ikenne	Ogun	2,252.0	86%	3910%	2.5	2.2	2.5	2,140	1,968
Ilesha	Osun	452.2	61%	642%	2.3	1.7	3.2	474	372
Ilorin	Kwara	686.3	58%	397%	2.4	1.7	3.0	698	680
Irrua	Edo	380.7	43%	135%	2.1	1.3	4.1	477	380
Jahun	Jigawa	507.6	50%	218%	2.3	1.3	3.7	502	410
Jalingo	Taraba	112.9	23%	29%	1.9	0.7	5.8	558	491
Jos	Plateau	561.6	66%	614%	2.4	1.7	3.1	493	398
Kaduna	Kaduna	493.5	51%	196%	2.3	1.4	3.6	481	387
Kwali	FCTAbuja	2,205.0	81%	1971%	2.5	2.1	2.6	1,976	1,770
Lafia	Nassarawa	-15.5	19%	20%	1.7	0.5	6.7	436	323
Lafiagi	Kwara	225.7	40%	100%	2.1	1.2	4.1	316	275
Lokoja	Kogi	353.9	32%	56%	2.1	1.0	4.6	626	585
Makurdi	Benue	960.7	64%	388%	2.6	1.8	2.9	753	761
Minna	Niger	738.9	71%	720%	2.5	1.9	2.8	597	541
Ogoja	CrossRiver	318.6	41%	125%	2.0	1.1	4.2	431	316
Okigwe	Imo	1,369.5	39%	88%	2.1	1.2	4.1	1,947	1,730
Sokoto	Sokoto	696.5	78%	1348%	2.5	2.0	2.7	567	497
Uyo	Akwalbom	171.8	31%	55%	1.7	0.8	5.3	366	223
Yola	Adamawa	485.0	69%	1246%	2.3	1.9	2.9	517	432

12.7 Net Present Values of Cash Flow Line Items by Silo Complex

Silo Complex	State	Revenues	Direct Costs	Indirect Costs	EBITDA	Capex	Financing Cost	Taxes	Terminal Value	NPV
Location	*State*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*
Ado_Ekiti	Ekiti	45,976	41,201	1,420	3,355	28	1,374	1,007	722	1,942
Akure	Ondo	23,045	19,805	724	2,516	77	744	755	365	1,132
Bauchi	Bauchi	14,430	12,933	416	1,082	89	449	325	231	548
Bulasa	Kebbi	50,716	45,460	1,423	3,834	35	1,515	1,150	784	2,218
Dutsin	Katsina	13,887	12,444	415	1,028	38	419	308	222	566
Ezillo	Ebonyi	17,120	15,323	417	1,380	54	524	414	270	778
Gaya	Kano	15,575	13,953	416	1,205	31	468	362	250	685
Gombe	Gombe	21,980	19,025	732	2,223	135	727	667	348	873
Gusau	Zamfara	54,704	49,016	1,426	4,262	130	1,651	1,279	874	2,395
Ibadan	Oyo	27,252	23,754	736	2,762	135	886	828	441	1,213
Igbariam	Anambra	14,912	13,356	416	1,141	278	513	342	231	396
Ikenne	Ogun	51,458	46,143	1,423	3,892	36	1,537	1,168	796	2,252
Ilesha	Osun	12,037	10,786	414	837	35	366	251	189	452
Ilorin	Kwara	16,788	15,044	417	1,327	105	528	398	261	686
Irrua	Edo	12,122	10,856	414	852	117	388	256	190	381
Jahun	Jigawa	13,962	12,511	415	1,035	101	441	311	223	508
Jalingo	Taraba	13,426	12,026	415	986	464	513	296	208	113
Jos	Plateau	13,704	12,279	415	1,010	30	414	303	219	562
Kaduna	Kaduna	13,373	11,971	415	987	85	416	296	213	493
Kwali	FCTAbuja	50,183	44,949	1,423	3,811	54	1,507	1,143	789	2,205
Lafia	Nassarawa	11,080	9,924	413	742	443	438	223	174	-16
Lafiagi	Kwara	7,588	6,794	241	553	100	250	166	118	226
Lokoja	Kogi	15,054	13,484	416	1,155	330	528	347	233	354
Makurdi	Benue	20,947	18,759	420	1,769	113	655	531	337	961
Minna	Niger	16,604	14,879	417	1,308	42	505	392	266	739
Ogoja	CrossRiver	10,949	9,807	413	729	101	353	219	172	319
Okigwe	Imo	46,826	41,943	1,420	3,463	652	1,552	1,039	722	1,369
Sokoto	Sokoto	15,782	14,149	417	1,216	26	474	365	253	697
Uyo	Akwalbom	9,295	8,331	412	552	136	309	166	146	172
Yola	Adamawa	12,426	11,133	414	879	24	373	264	192	485

12.8 Risk Adjusted Net Present Values of Cash Flow Line Items by Silo Complex

Silo Complex	State	Revenues	Direct Costs	Indirect Costs	EBITDA	Capex	Financing Cost	Taxes	Terminal Value	NPV
Location	*State*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*
Ado_Ekiti	Ekiti	36,369	32,769	2,183	1,417	36	686	-	722	1,303
Akure	Ondo	21,872	19,355	1,314	1,203	95	455	-	441	678
Bauchi	Bauchi	11,463	10,344	639	480	109	232	-	231	343
Bulasa	Kebbi	40,029	36,097	2,187	1,744	44	755	-	783	1,601
Dutsin	Katsina	11,032	9,957	638	437	47	212	-	222	363
Ezillo	Ebonyi	13,537	12,156	642	739	66	265	-	270	650
Gaya	Kano	12,370	11,152	640	578	39	236	-	249	511
Gombe	Gombe	21,033	18,828	1,313	892	166	452	-	425	291
Gusau	Zamfara	43,460	39,224	2,193	2,043	159	836	-	874	1,777
Ibadan	Oyo	25,277	22,650	1,319	1,307	166	533	-	517	703
Igbariam	Anambra	11,768	10,592	639	537	341	278	-	231	170
Ikenne	Ogun	40,611	36,635	2,188	1,788	46	766	-	795	1,642
Ilesha	Osun	9,521	8,576	636	309	45	185	-	189	245
Ilorin	Kwara	13,245	11,921	641	682	132	272	-	260	524
Irrua	Edo	9,588	8,630	636	322	144	202	-	190	158
Jahun	Jigawa	11,091	10,010	638	443	125	229	-	223	292
Jalingo	Taraba	10,596	9,545	638	414	572	293	-	207	-183
Jos	Plateau	10,887	9,826	638	423	37	209	-	219	359
Kaduna	Kaduna	10,626	9,582	638	406	105	215	-	213	274
Kwali	FCTAbuja	39,693	35,727	2,187	1,779	67	755	-	788	1,630
Lafia	Nassarawa	8,766	7,896	635	235	547	255	-	174	-332
Lafiagi	Kwara	5,987	5,383	370	234	123	132	-	118	99
Lokoja	Kogi	11,879	10,692	639	548	409	289	-	233	113
Makurdi	Benue	16,630	14,959	646	1,024	139	338	-	337	856
Minna	Niger	13,185	11,886	641	658	50	256	-	266	580
Ogoja	CrossRiver	8,662	7,803	635	225	124	185	-	172	82
Okigwe	Imo	36,967	33,329	2,183	1,456	798	827	-	722	561
Sokoto	Sokoto	12,533	11,307	640	585	33	238	-	253	525
Uyo	Akwalbom	7,356	6,638	633	85	167	165	-	145	-101
Yola	Adamawa	9,808	8,842	637	330	31	187	-	192	274

12.9 Economic Net Present Value by Line Item and Silo Complex

Silo Complex		Revenues	Direct Costs	Overhead	CAPEX	Total Cost	Net ENPV	EIRR
Location	*State*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	*NGNmm*	
Ado_Ekiti	Ekiti	81,974	73,301	2,152	18	75,470	**6,504**	**2427%**
Akure	Ondo	40,506	33,896	1,156	64	35,116	**5,390**	**773%**
Bauchi	Bauchi	25,923	23,170	621	74	23,864	**2,059**	**202%**
Bulasa	Kebbi	89,988	80,467	2,157	24	82,648	**7,340**	**2191%**
Dutsin	Katsina	24,948	22,292	620	27	22,939	**2,009**	**467%**
Ezillo	Ebonyi	30,525	27,280	624	41	27,945	**2,581**	**466%**
Gaya	Kano	27,979	25,002	622	21	25,645	**2,334**	**696%**
Gombe	Gombe	38,616	32,484	1,170	112	33,765	**4,851**	**410%**
Gusau	Zamfara	98,271	87,800	2,163	110	90,073	**8,198**	**478%**
Ibadan	Oyo	48,357	41,208	1,176	114	42,499	**5,858**	**444%**
Igbariam	Anambra	26,460	23,649	621	234	24,504	**1,956**	**89%**
Ikenne	Ogun	91,305	81,680	2,158	22	83,860	**7,445**	**2424%**
Ilesha	Osun	21,462	19,191	618	24	19,833	**1,629**	**469%**
Ilorin	Kwara	29,789	26,645	623	84	27,352	**2,437**	**243%**
Irrua	Edo	21,612	19,315	618	91	20,024	**1,588**	**148%**
Jahun	Jigawa	25,081	22,412	620	84	23,116	**1,965**	**175%**
Jalingo	Taraba	23,822	21,289	619	383	22,291	**1,532**	**53%**
Jos	Plateau	24,619	21,996	620	27	22,642	**1,976**	**463%**
Kaduna	Kaduna	24,023	21,442	619	71	22,132	**1,891**	**194%**
Kwali	FCTAbuja	89,475	79,983	2,157	40	82,180	**7,294**	**1239%**
Lafia	Nassarawa	19,755	17,655	616	367	18,638	**1,117**	**43%**
Lafiagi	Kwara	13,464	12,034	363	84	12,481	**983**	**114%**
Lokoja	Kogi	26,712	23,876	621	274	24,771	**1,941**	**79%**
Makurdi	Benue	37,630	33,635	629	97	34,361	**3,269**	**245%**
Minna	Niger	29,827	26,666	623	36	27,325	**2,502**	**448%**
Ogoja	CrossRiver	19,522	17,445	616	91	18,152	**1,370**	**130%**
Okigwe	Imo	83,086	74,228	2,152	551	76,931	**6,155**	**110%**
Sokoto	Sokoto	28,351	25,355	622	16	25,993	**2,358**	**920%**
Uyo	Akwalbom	16,573	14,814	614	116	15,544	**1,029**	**87%**
Yola	Adamawa	22,048	19,705	618	15	20,338	**1,710**	**858%**

END OF REPORT