Domestic and Cross Border Trade in Traditional Cassava Food Products in Nigeria

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Outline

- Introduction
- Methodology
- Cassava Production systems
- Domestic market and market integration
- Cross border trade
- Agribusiness market
- Conclusions

Introduction

In Nigeria, cassava is a staple food because nearly all cassava output (95%) is consumed as human food

Several cassava products are traded in various forms following informal (basic) commodity chains in Nigeria's rural and urban markets

Initiatives to improve the traditional cassava commodity chain and regional trade requires understanding of the basic cassava food commodity chain

What are these products, where are they sold (place), what are their price behaviour, what volumes are traded relatively and who are the key actors ?

Methodology

Phase 1

- Survey of major city (27) markets in Nigeria (60 urban markets visited)
- Key informants provided information about source markets for cassava products
- Information obtained with questionnaire include cassava products traded, major source markets, relative volumes by market source, distance of source markets to destination (urban) markets, etc

Phase 2

- Survey of all listed rural markets from the urban survey (500 rural markets visited)
- Key informants provided information about destination markets for cassava products
- Other information obtained include cassava products traded, major destination markets, relative volumes by market destination, distance to urban markets, frequency of market days
- All locations were geo positioned with GPS equipment
- Supplementary information from rapid appraisal of cross border trade market in Dawanau, Kano
- Price information obtained from www.cassavabiz.org

Market Integration Analysis

We specified a model relating prices of cassava products in rural or peripheral markets to their respective prices in a central market based on the central market hypothesis of geographical markets. The basic assumption is that rural/peripheral market prices are driven by the prices, which prevail in the central market

Tested for unit roots between rural and urban (demand) markets using the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests (non-stationarity indicators).

Tested for cointegration, using the vector error correction model following Johansen (1991) method. The method uses the reduced rank regression procedure to estimate α and β, the trace test and maximal-eigen value test statistics. The interest here is in testing for the presence of a valid cointegrating vector which gives a unique long-run equilibrium relationship.

All the estimations were performed using the Standard Version of Eviews Econometric Software.

Production Systems

The Central region of Nigeria is best adapted to cassava production but is subject to competition from high value alternative crops (grains, legumes, tubers, etc)

Principally small farmer dominated production systems

Yield has remained stagnant in the last 15 years

Production increase result from area expansion and not yield increases per capita

Labour costs and wage rates increased four times in real terms in last 15 years

Labour costs are cheapest in central Nigeria and most expensive in southern Nigeria

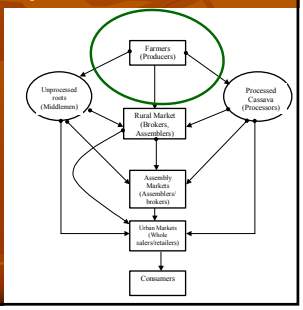
Yields are highest in Central Nigeria (15.3t/ha) than anywhere else

The Cassava Market in Nigeria

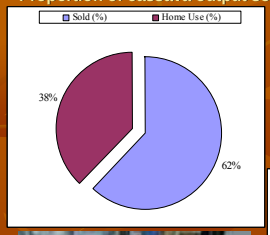
The market for cassava can be categorised broadly into two:

- The traditional food oriented market
- The emerging market for industrially processed cassava

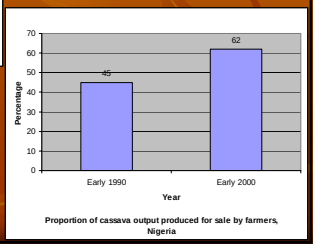
Traditional Cassava products marketing chain in Nigeria



Proportion of cassava output sold by farmers has increased



The proportion of cassava output produced for sale by farmers increased by 38% between early 1990 and 2004.

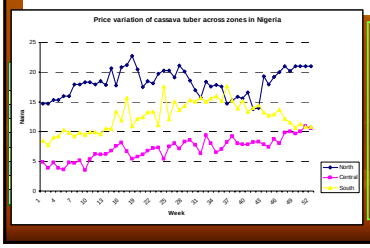


Proportion of cassava output produced for sale by farmers, Nigeria

Cassava Products Traded in Nigerian Markets

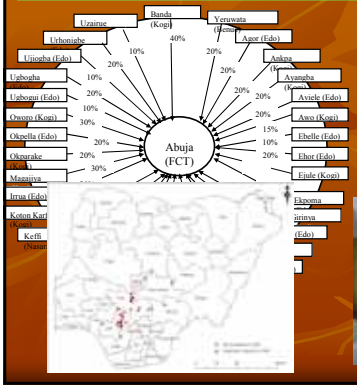
Urban Markets

Dry Products	Percentage	Wet Products	Percentage
Gari(white or yellow)	100	*Fresh Roots*	33
Fermented flour (Lafun/elubo)	68	*Fufu paste*	22
Chunks/strips	78	*Prepared fufu*	35
Abacha	42	*Edible Starch*	18



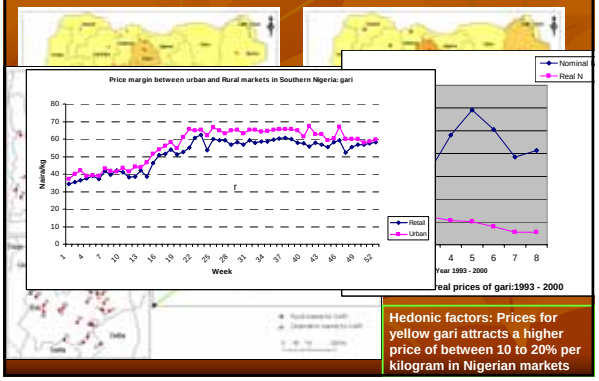
1. Eight principal cassava products are traded in wet and dry forms in rural and urban markets in Nigeria
2. The gari market is the largest because of its characteristics as a convenience food
3. Product prices differ by region being most expensive in the north & south and least expensive in the central region

Traditional Market Networks



The traditional cassava food market responds easily to local demand through the price mechanism and established networks

The Gari trade network and dynamics



Hedonic factors: Prices for yellow gari attracts a higher price of between 10 to 20% per kilogram in Nigerian markets

Cassava chips

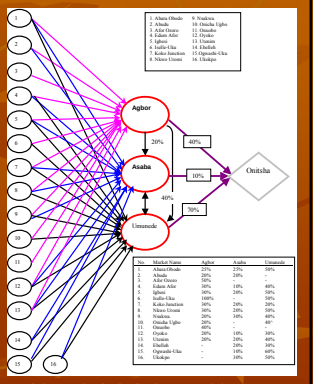
The major cassava chips supply and demand markets in Nigeria

Gboko: an important assembly market for cassava chips/chunks in central Nigeria

Cassava *fufu*

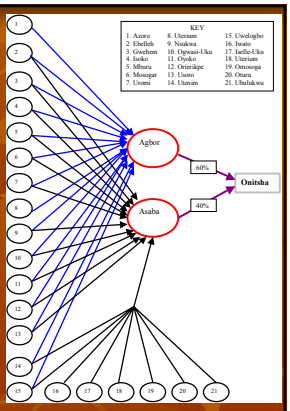
Rural *fufu* supply markets in Nigeria

Fufu destination markets in Nigeria



Onitsha: a major destination for cassava fufu

Wet cassava starch



Onitsha: a major destination for wet cassava starch

Market integration (Gari and Cassava chips)

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test for Prices of Cassava Chips, Chunks, White Gari and Yellow Gari in Kano (K), Taraba (T), Benue (B) Nasarawa (N) and Edo (E)

Variable Level	ADF statistic	Critical value	Variable First Difference	ADF statistic	Critical Value
Cassava Chips					
LnChipsK	-2.040	-2.895*	ΔLnChipsK	-12.770	-2.895*
LnChipsT	-2.346	-2.895*	ΔLnChipsT	-9.595	-2.895*
LnChipsB	-4.405	-2.895*	ΔLnChipsB	-9.770	-2.895*
Cassava Chunks					
LnChunksK	-2.7668	-2.8959*	ΔLnChunksK	-5.8495	-2.8963*
LnChunksT	-2.4592	-2.8967*	ΔLnChunksT	-6.1420	-2.8972*
LnChunksB	-0.0324	-2.8959*	ΔLnChunksB	-8.0092	-2.8959*
LnChunksN	-1.8008	-2.8951*	ΔLnChunksN	-11.6742	-2.8955*
White Gari					
LnWgariK	-1.4926	-3.5073**	ΔLnWgariK	-13.8704	-3.5083**
LnWgariT	-3.2175	-3.5073**	ΔLnWgariT	-9.2802	-3.5073**
LnWgariB	-3.0423	-3.5083**	ΔLnWgariB	-10.2915	-3.5092**
LnWgariN	-1.4906	-3.5073**	ΔLnWgariN	-11.3992	-3.5083**
LnWgariE	-2.7184	-3.5073**	ΔLnWgariE	-11.6559	-3.5083**
Yellow Gari					
LnYgariK	-2.1968	-3.5073**	ΔLnYgariK	-10.3526	-3.5083**
LnYgariT	-3.2064	-3.5073**	ΔLnYgariT	-9.2797	-3.5073**
LnYgariB	-1.7433	-3.5092**	ΔLnYgariB	-10.3808	-3.5092**
LnYgariN	-1.6711	-3.5073**	ΔLnYgariN	-12.7729	-3.5083**
LnYgariE	-1.9311	-3.4956**	ΔLnYgariE	-5.5467	-3.5014**

Critical values of ADF tests are based on MacKinnon (1996) one-sided p-values. Lag length selection is automatic based on Eviews' Schwarz Information Criteria.
(*) (**) denote 5% and 1% critical values respectively

The ADF test indicates that all the price variables are integrated to the order 1 suggesting that there is a possibility for their linear combination to be stationary or cointegrated for cassava gari and chips in the domestic market.

Table 2: Bivariate (Pair-wise) Cointegration Tests between Kano and each of the satellite markets

Null Hypothesis	Trace statistic	5% critical Value	1% Critical Value	Max-eigen statistic	5%*	1%*
Chips						
Kano and Taraba						
r=0	16.447	12.53	16.31	16.362	11.44	15.69
r≤1	0.0850**	3.84	6.51	0.0850**	3.84	6.51
Kano and Benue						
r=0	9.8814	15.41	20.04	9.5309	14.07	18.63
r≤1	0.3504	3.76	6.65	0.3504	3.76	6.65
Chunks						
Kano and Taraba						
r=0	22.425	15.41	20.04	18.842	14.07	18.63
r≤1	3.584**	3.76	6.65	3.584**	3.76	6.65
Kano and Benue						
r=0	21.508	15.41	20.04	21.506	14.07	18.63
r≤1	0.0019**	3.76	6.65	0.0019**	3.76	6.65
Kano and Nasarawa						
r=0	29.635*	25.32	30.45	27.099**	18.96	23.65
r≤1	2.536	12.25	16.26	2.536	12.25	16.26
White Gari						
Kano and Taraba						
r=0	15.8277	15.41	20.04	12.109	14.07	18.63
r≤1	3.718*	3.76	6.65	3.7186	3.76	6.65
Kano and Benue						
r=0	24.0049	15.41	20.04	21.588	14.07	18.63
r≤1	2.4162**	3.76	6.65	2.4162**	3.76	6.65
Kano and Nasarawa						
r=0	8.9167	15.41	20.04	6.6799	14.07	18.63
r≤1	2.2367	3.76	6.65	2.2367	3.76	6.65
Kano and Edo						
r=0	23.303**	15.41	20.04	21.565**	14.07	18.63
r≤1	1.737	3.76	6.65	1.737	3.76	6.65
Yellow Gari						
Kano and Taraba						
r=0	21.006**	15.41	20.04	15.21	14.07	18.63
r≤1	5.7869	3.76	6.65	5.7869	3.76	6.65
Kano and Benue						
r=0	14.934	15.41	20.04	9.21	14.07	18.63
r≤1	5.723	3.76	6.65	5.723	3.76	6.65
Kano and Nasarawa						
r=0	22.603**	15.41	20.04	19.931**	14.07	18.63
r≤1	2.6722	3.76	6.65	2.6722	3.76	6.65
Kano and Edo						
r=0	12.7809	15.41	20.04	9.856	14.07	18.63
r≤1	2.9244	3.76	6.65	2.9244	3.76	6.65

* = denote cointegration at 5% and 1% significance levels respectively

Test for Co integration

Results of the trace and maximal-eigen value test indicate that co integration exist among all the bivariate co integration equations modelled except for certain trade routes

This implies that since the prices are co integrated, the system can be expected to respond to exogenous shocks and return to equilibrium after a while.

Price Elasticities

Table 3 Summary Results of the Estimates of the Long-run Parameters (Price Transmission Elasticities and Speed of Price Transmission Coefficients)

	Estimated β_1	Estimated α_1 (ECMs)	Constant
Chips			
T/K	-1.0448** (-3.837)	-0.1146* (-2.1197)	1.0457
B/K	-3.4694** (-4.5479)	-0.0278 (-1.0170)	10.430
Chunks			
T/K	-1.124** (-6.5487)	-0.2678** (-3.0663)	1.1087
B/K	-0.4348** (-6.5433)	-0.4619** (-4.6303)	-2.1942
N/K	-1.0823 (-1.5559)	-0.1012 (-1.5100)	0.4212
White Gari			
T/K	-0.4301 (-1.1830)	-0.1457** (-3.4749)	-1.625
B/K	-0.5282* (-2.6911)	-0.4715** (-3.8746)	-1.3347
N/K	-1.5809** (-5.8231)	-0.1578* (-2.4165)	2.4804
E/K	-0.5627** (-3.4862)	-0.1645** (-4.0705)	-1.4295
Yellow Gari			
T/K	-0.4376* (-2.011)	-0.1625** (-3.5357)	-1.5164
B/K	-0.8753** (-3.633)	-0.1553** (-2.7352)	0.1196
N/K	-1.051** (-11.2913)	-0.3287** (-4.0032)	1.4004
E/K	-1.0396** (-4.7108)	-0.1166* (-2.5751)	0.7192

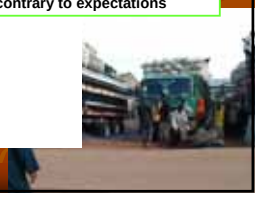
Results of price transmission elasticities and speed of price transmission coefficients for each of the pair-wise vector error correction equations indicates variations in the speed of response to price changes between rural and urban markets for gari and chips suggesting that local market information systems may not be efficient

Cross Border Trade

	Gari		Cassava chips	
Date	**Quantity (t)**	**Value (₦)**	**Quantity (t)**	**Value (₦)**
07/03/2005	240	12000000	246	861000
08/03/2005	300	15000000	222	7770000
09/03/2005	135	6750000	282	9870000
10/03/2005	285	14250000	465	16275000
11/03/2005	150	7500000	189	6615000
12/03/2005	120	6000000	276	9660000
13/03/2005	225	11250000	54	1890000
Total	**1455**	**72,750,000**	**1734**	**52,941,000**

1.`The Kano-Katsina-Maradi axes is a major cassava cross border trade route in West Africa

2. Gari and chips (flour) are the most important products traded across borders and the volumes traded may be large (551,100t or 1.5% of Nigeria's total production in 2004) contrary to expectations



The agro industrial market for cassava (Market size Potential)

Sector	Current domestic demand	Substitution	Potentials (MT/product)	Fresh root
Starch	230,000 MT	50 %	115,000 MT	1,150,000 MT
Flour	330,000 MT	10 %	330,000 MT	1,320,000 MT
Ethanol E10	1.1billion L	50 %	550,000 MT	4,400,000 MT
Ethanol Industrial/ Beverage	160,000,000 L	10 0%	160,000 MT	1,040,000 MT
Animal Feed	1,200,000 MT	20%	240,000 MT	960,000 MT
Total required				8,870,000 MT

Source: varied sources

Implications and challenges

Implications

Domestic industrial demand for cassava requires more than 400,000 ha additional land to be put under cultivation

Consistent supply of large volumes to meet industrial demand requires a shift to large scale farms

Nucleus farming is the way to kick start commercial farming to eliminate raw material supply inconsistencies and facilitate cost reductions to achieve efficiency and competitiveness

Challenges

Internal and external economies of scale

Energy cost: (20 –30% of processing costs)

Raw material costs: At current market prices, raw material costs account for over 50% of total production/ processing cost for starch, ethanol or flour enterprise in Nigeria

Limited capacity and management skills

Lack of organised markets that meet local and international demand

Institutional support

Policy shift/summersault

Conclusions

Demand for traditional food commodities from cassava is unlikely to decline given the current rate of population growth, urbanization, and food preferences that is driven by culture and poverty

The traditional cassava food market is established, vibrant and responsive to price changes

The absence of well developed organizations implies that small farmers and processors have very little organized marketing power or negotiating ability with product buyers

Local traders play an arbitrage role between rural and urban markets and implicitly govern the basic cassava commodity chain

Conclusions

Cross border trade in cassava products may even out food shortages arising from drought in the Sahelian countries but the volume of trade may be cyclical rather than seasonal

Multiplication and distribution of improved disease resistant varieties should target major cassava producing areas in order to encourage trade

Industrial markets may compete with local markets if dependent on the same source of raw material

This may distort the local economy and increase food prices

The need for a dual system of development involving commercial nucleus and cluster farming to meet the consistent supply needs of agribusiness ventures