Analysis of Value Addition of Cassava Products in Nasarawa State, Nigeria

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KEYWORDS

Cassava,
Differentials
Income,
Processors,
Products,
Value,

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ABSTRACT

The study examined cassava products value addition in Nasarawa state, Nigeria. Data were collected from 1,360 respondents and analysed using general linear model statistics. The result showed that boiled cassava root, cassava bread, cassava chips, cassava flakes, garri, High Quality Cassava Flour (HQCF) and meat pie had mean incomes of N555.00, N3,429.17, N225.00, 642.86, N3,642.86, N119.00, 127.66, N121, 288.37 and N1,490.00, respectively. The mean incomes from cassava chips, HQCF, and garri were significantly (p<0.05) higher than mean incomes of the backed Cassava products (Cassava flakes, meat pie, Cassava bread and boiled Cassava roots). Also, the mean income differential of cassava flakes, garri, HQCF and meat pie were significant at P<0.05. Processors that produce only boiled cassava roots, cassava bread, chips, flakes, garri, HQCF and meat pie (level 1) had mean incomes of N555, N3, 429.17 N 196,666.67, N3, 642. 86. N 172,319.15 N 108, 683.72 and N 1, 490, respectively. Those of them that processed cassava roots into cassava chips and HQCF or garri (level 2) recorded mean income of N 147,102.33 and those that processed cassava roots into cassava chips, garri and HQCF (level 3) settled with mean income of N 222,441.86. Comparatively, mean income of level 1 is significantly (P<0.05) lower than the mean incomes of levels 2 and 3 (with differences of N 58018.89 and N 98,955.89). However, the mean income differential between levels 2 and 3 is not significantly different. Processors should concentrate on processing chips, garri and or HQCF for better economic gain.

INTRODUCTION

With increasing globalization of agro-food systems and liberation of developing countries' economics, rural communities are facing great challenge to secure and improve their livelihood (Leo and Chukwu, 2015). The capacity of the small farmers according to Umeh (2013) to market their agricultural products is one of the major challenges as liberation generates a competitive environment not only for products but also food crops supplying major urban centres within. The confrontation of agro-food products locally produced with similar products produced and processed abroad with more advanced technologies and the related capacity of consumers and end-users to select their procurement from different sources give more emphasis on product organoleptic and sanitary attributes; norms, traceability, freshness, all becoming key elements of the competitiveness of competing agro-food systems (Abba, 2009). Many rural households, the poorest, are not able to benefit from new market opportunities or to maintain their position in the market exchange and therefore marginalized.

Approximately 70 percent of cassava processing occurs at small and medium size centers near villages. In 2012, there were 75,000 total small and medium processing centers that employed roughly 3 million people—most of which were small scale and generated less than 5 tonnes of high-quality cassava flour per day. Medium and large-scale processors struggle to stay afloat due to high transportation costs, mainly due to the poor condition of rural Nigerian roads. As a result, these larger processors tend to operate far below their capacity, as product struggles to reach processing plants within its two-day shelf-life. The government, as a part of its efforts to strengthen cassava value chains, has announced its intention to set up several large-scale, commercial plants across the country. But without improvements to roads and other critical aspects of market access, it is unclear what kind of an impact such plants might have.

Knowledge of market orientation by traders in terms of consumers' behaviour helps suppliers and traders to decide on the products to handle which have consumer market face. A comparison of incomes from the cassava products gives an idea of the value differentials of the cassava products. This also informs the participation of value chain actors on the line of value addition and marketers of the cassava products to trade on.

The economic value of a product is adjudged by its market price (Olumola, 2007). It is determined by cost of production, utility it gives the consumer, availability of substitutes and its ability to been further used as a capital or raw material for production of other products. The concept of processing is central to value addition. Lawal and Jaiyeola, (2007) opined that value addition improves the shelf life of agricultural products and generates income for participants. Since most government interventions and policies are aimed at integrating the rural poor into the mainstream of the economy, one of the ways of achieving this is by adding value to their produce.

METHODOLOGY

The study was conducted in Nasarawa State, located between North Latitudes 7° and 9° and 7° and 10° East Longitudes (Nuhu and Amed, 2013) covering land area of about 27, 137.8sq Km representing 2.98% of the Nigeria land mass (www.tradingeconomics.com, 2014). It has an estimated population of 1,863,275 people (National Population Commission, 2006). Nassarawa State is characterized by a tropical sub-humid climate with two distinct seasons: the wet and dry with annual rainfall ranging from 1100 mm and 2000mm (NADP, 2013) and temperature of between 74^oF and 95^oF (https://weatherspark.c, 2020)

Stratified random sampling method was used in the three agricultural zones (Nasarawa north, made up of Akwanga, Nasarawa Eggon and Wamba LGAs; Nasarawa west, encompassing Karu, Keffi, Kokona, Nasarawa and Toto LGAs; and Nasarawa south housing Awe, Doma, Keana, Lafia and Obi LGAs of the State) to draw up 1,400 sample from the universal population comprising of cassava producers, processors and product marketers. Data were collected via questionnaire and analyzed using descriptive statistics for means and General Linear Model (GLM) for multiple means comparison of the cassava products prices.

GLM has features through univariate analysis of variance for multiple paired means comparison of samples (Nanjiang, 2016). The model according to Nanjiang (2016) is as

$$g(\mu_m) = \mu_m = \beta_0 + X_1\beta_1 + \cdots + X_p\beta_p + \gamma_2 = \gamma_m + \eta_1 + \gamma_2 + \cdots + \gamma_m$$

Where μ_m =P(Y≤m) and it provides regression analysis and analysis of variance for one dependent variable by one or more factors and/or variables (univariate ANOVA). The factor variables divide the population into groups; investigate interactions between factors as well as the effects of individual factors; used for factorial ANOVA with between-subject design. For multivariate ANOVA, it provides regression analysis and analysis of variance for multiple dependent variables by one or more factor variables or covariates. The modified and adopted Nanjiang, (2016) GLM model for the study was as:

$$g(\mu_m) = \mu_m = \beta_0 + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5\beta_5 + X_6\beta_6 + X_7\beta_7 + \varepsilon$$

Where; μ_m= mean price (income) of a cassava product, η_m= sample size, β_0= constant assumption, $\beta_1 - \beta_7$= Coefficients of means variations, X_1= income from boiled cassava, X_2= income from cassava bread, X_3= income from cassava chips, X_4= income from cassava flakes, X_5= income from Garri, X_6= income from High Quality Cassava Flour (HQCF), X_7= income from cassava meat pie, ε = estimation error.

Post Hoc multiple comparison tests, once it has been established that differences exist among means, post hoc range tests and pairwise multiple comparisons can determine which means differ. These tests are used for between subjects' factors only.

RESULTS AND DISCUSSION

Mean income differentials of cassava value added products

In this analysis, seven cassava value added products were captured. These included boiled cassava root, cassava bread, cassava chips, cassava flakes, garri, High Quality Cassava Flour (HQCF) and meat pie. They had mean incomes of N555.00, N3,429.17, N225.00, 642.86, N3,642.86, N119.00, 127.66, N121, 288.37 and N1,490.00, respectively (Table1).

The position of the result may be informed by the value consumers attached to the various products which determine their prices in the market. Also, the value derived from each of the products varies and so the market demand. The result of this study confirms the findings of Aniedu *et al*., (2012) that cassava product which has large demand generates more income than the one with lesser market demand; hence significant variation may occur in their profit levels. Furthermore, Anyiro *et al*, (2016) explained this assertion that investors skew to products enterprise with larger market demand.

Table 1 showed that cassava chips, garri and HQCF had higher mean incomes than boiled cassava roots, cassava bread, meat pie and cassava flakes. This result reflects the findings of Ndirika (2011), PIN (2011) who reported higher figures for garri and HQCF over tapioca, fufu and abacha, and said products which can further be processed into other finished goods has more market value and attracts patronage than final products. Mbanasor (2012) said because HQCF can be used directly to prepare food, bake bread, meat pie

and other snacks, it commands higher market value. Similarly, cassava chips are considered as raw material for animal feed and which can further be processed into cassava flour has greater value and demand in the market. Azogu (2010) said if a commodity is used for many purposes, it tends to have wider consumers and so its market value.

Mean incomes of boiled cassava roots, cassava bread, meat pie and cassava flakes were lower. This perhaps is the fact that they are final consumable products. They cannot be further processed, therefore, the demand for them are smaller than those of cassava chips, HQCF and garri. Also, cassava bread and meat pie are predominant in urban markets. Their demands are therefore limited. However, cassava flakes are obvious in rural markets than in urban markets, hence limiting its market demand. The implication of these is that processors of cassava roots into various products will always have market for their products. Table 1 is therefore important to intending investors who wish to invest in cassava value addition, they are informed of which cassava product(s) has large market demand and attracts more income.

Table 1: Mean Income of Cassava Value Added Products

Products	N	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Std. Error
Boiled cassava	10	100	1200	555.00	106.575
Cassava bread	6	200	5000	3429.17	698.224
Chips	42	40000	2000000	225642.86	49631.436
Flakes	14	100	6000	3642.86	461.926
Garri	94	12000	370000	119127.66	8135.555
HQCF	215	10000	2000000	121288.37	15030.568
Meat pie	7	80	5350	1490.00	790.542

Source: Field survey, 2018

It was observed in this study that cassava processors were engaged in varied value addition lines. Some process cassava roots into only one product, others do so into multiple products based on the available technology to them. The study translates these numbers of processing activities into levels of value addition. Those that process cassava into only one product were at level 1. Those of them that do so into two and three products were at levels 2 and 3, respectively. The mean income of these categories of cassava processors were estimated (Table 2).

Actors who processed cassava roots into only one product appeared to have lesser income compared to those who processed cassava roots into two and three products depending on the product combination. Specifically, however, actors that produce only boiled cassava roots, cassava bread, chips, flakes, *garri*, HQCF and meat pie had mean incomes of ₦555, ₦3, 429.17 ₦ 196,666.67, ₦3, 642. 86. ₦ 172,319.15 ₦ 108, 683.72 and ₦ 1, 490, respectively. Those of them that processed cassava roots into cassava chips and HQCF recorded mean income of ₦ 147,102.33 and those that processed cassava roots into cassava chips and *garri* settled with mean income of ₦ 222,441.86.

Table 2: Mean Income of Cassava Processors by Levels of Value Addition

Descriptive Statistics						
Products	**Level**	**N Statistic**	**Minimum Statistic**	**Maximum Statistic**	**Mean Statistic**	**Std. Error**
Boiled cassava	1	10	100	1200	555.00	106.575
Bread	1	6	200	5000	3429.17	698.224
Chip/HQCF	2	215	10000	993000	147102.33	11845.789
Chip/HQCF/*Garri*	3	215	10000	2360000	222441.86	20472.987
Chips	1	42	40000	800000	196666.67	25650.462
Chips/*Garri*	2	94	12000	2275000	260191.49	37582.792
Flakes	1	14	100	6000	3642.86	461.926
Garri	1	94	12000	2275000	172319.15	35571.252
HQCF	1	215	10000	818000	108683.72	9818.070
Meatpie	1	7	80	5350	1490.00	790.542

Source: Field survey, 2018

Comparison of the mean incomes of the levels of cassava value addition (Table 3) indicates significant (P<0.05) difference between levels 1 (actors that processed cassava in to only one product), and levels 2 (actors that processed cassava in to two products) and 3 (actors that processed cassava in to three products). However, mean income differential of levels 2 and 3 of the cassava value addition were not significantly different. This means that processing cassava roots into multiple products especially those with large market demand is more economical.

Table 3: Mean Income Differential of Cassava Processors by Level of Value Addition

Multiple Comparisons					
Dependent Variable: Income					
	(I) Level	**(J) Level**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
Tukey HSD	2	1	58018.89*	18779.522	.006
	3	1	98955.89*	20940.489	.000
		2	40937.01	21874.112	.148

Based on observed means. The error term is Mean Square (Error) = 60663366416.219. * The mean difference is significant at the 0.05 level. Source: Field survey, 2018

CONCLUSION AND RECOMMENDATIONS

The study concluded that the various forms of cassava products demonstrates different value regime in the market with the processors having varied incomes depending on level of value addition and product combination. Therefore, it was recommended as follows:

Intending investors into cassava processing in the study area can do so into garri and HQCF. This is because they give higher return on investment than other products. Furthermore, there is large market (demand) for garri and HQCF as found in this study.

Processors are advised to process cassava roots into more than one product. It was found out that actors who processed cassava roots into two and three various products make more net income than those that do so into only one product.

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