



ECONOMIC ANALYSIS OF CHILLI PEPPER PROCESSING IN KANO STATE, NIGERIA

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ABSTRACT

The study was carried out in Kano State, Nigeria to determine the economic analysis of chilli pepper processing as a means of improving livelihoods in the study area. The researcher randomly selected 36 market processors and 33 home processors making a total of 69 sample size for the study. Descriptive statistics and gross margin model were used for the analysis. The result revealed that the age bracket of between 37-43 years (29%) dominated the chilli pepper processing enterprise and 34.8% had 6-10 years of experience. All the respondents were female and most (81.2%) had formal education. Gross margin analysis indicated that market processors along the value chain recorded a return of ₦180 per 0.4 kg of chilli pepper processed. The home chilli pepper processors added more value than their market counterparts with profits of ₦255 and ₦270 per 0.4 kg using modern and manual processing methods, respectively. Constraints encountered by chilli pepper processors in the study area include seasonality, high cost of other inputs used in processing, inadequate capital, health reasons and lack of patronage. The study concluded that chilli pepper processing was profitable. It was recommended that, in order to increase the revenue earnings of the processors which will thus improve their livelihoods, credit facilities should be made available to processors. Also, the chilli pepper processors' cooperative groups should be formed to provide processing inputs at a subsidized rate to the processors.

Keywords: Chilli pepper, Gross margin, Livelihood, Processing, Spices.

INTRODUCTION

Spices play a major role in our meals by providing the piquancy flavour, good aroma and taste which are acceptable to consumers. There are over thousand and one spices used in the world, of which chilli pepper is one of the important spices. Chilli pepper can trace their history to Central and South American region whose cuisines are renowned for their hot and spicy flavours. Chilli peppers have being cultivated in these regions for more than 7000 years, first as a decorative item and later as a food stuff and medicine. Explorer Ferdinand Magellan is credited with introducing chilli peppers into Africa and Asia (Bosland and Votava, 2000). These continents have since incorporated chilli pepper into their cuisines and pharmacopoeias. Chilli pepper contains a substance called capsaicin which gives pepper their characteristics pungency. *Capsaicin* is a potent inhibitor of substance P, a neuropeptide associated with inflammatory processes. The hotter the chilli pepper, the more *capsaicin* it contains. Chilli peppers' bright red colour signals its high content of beta-carotene or pro-vitamin A. Two teaspoons of red chilli pepper provides about 6% of the daily value of vitamin C coupled with more than 10% of the daily value for vitamin A which is often called the anti-infection Vitamin, Vitamin A is essential for healthy mucous membranes, which line the nasal passages, lungs, intestinal tract and urinary tract and serves as the body's first line of defence against invading pathogens (Ahuja *et al.*, 2006). Chilli pepper could also help reduce risk of hyperinsulinemia (high blood level of insulin) a disorder associated with type-2 diabetes (Maurya, 1995).



The vast majority of West Africa's pepper is sold in local or regional markets in Senegal, Gambia, Liberia, Sierra Leone and Mali, and international markets (Europe and North America). The crop therefore constitutes a source of income for resource poor households in rural and urban areas. Women are the main processors, traders, buyers, and users in West African cuisine. They can benefit from the cash income potential of chilli pepper. They are suitable for use in poverty reduction programs targeting resource poor households, including women in developing countries (Dagnoko *et al.*, 2013). The use of chilli ranges from salads preparation, adding flavour to cook dishes and adding pungency when used as powder (Bosland and Votava, 2000). It has now dominated the world's spices market as demand is growing for value added products such as chilli paste, chilli powder and chilli oleoresin for convenience of the food industry.

Furthermore, the chilli processing industry is small scale which converts dry chilli to chilli powder in order to meet the dietary needs of the people (Nigerian Stored Products Research Institute [NSPRI], 2000). It provides gainful employment not only to skilled but to unskilled labour. However, the industry is facing hardship because of use of old traditional culture of processing. These methods are often laborious, time consuming and inefficient.

Profit is a major indicator of viability of any business. The amount of revenue realized and operating cost of a business enterprise determines how much gain or loss an enterprise can achieve within a certain period. The quantity and amount of revenue realized by the processors are usually under estimated mainly due to inadequate recording and improper accounting procedures. The level of gross margin of the chilli pepper processors is influenced by determinants which include: cost of chilli pepper, cost of other processing ingredients and labour among others. These determinants are crucial because the survival of the enterprise is highly dependent on these important variables. The main objective of the study was to conduct an economic analysis of chilli pepper processors in Kano State, Nigeria. The specific objectives include to;

- (i) describe the socio-economic characteristics of the processors;
- (ii) describe the processing method;
- (iii) determine the profitability of processing chilli pepper; and
- (iv) describe the constraints encountered by the processors.

MATERIALS AND METHODS

The Study Area

The study was carried out in Kano State which is situated in the Sudan Savannah agro ecological zone of Nigeria. The state lies between latitude 13⁰N in the North and 11⁰N in the South and longitude 8⁰E in the West and 10⁰E in the East. The total land area of the State is 20,760 square kilometres and has a projected population of 13,076,892 (National Bureau of Statistics [NBS], 2018). Annual rainfall ranges between 787 and 960 mm (Kano State Agricultural and Rural Development Authority [KNARDA], 2001). These provide a comparative advantage for the growth, development, marketing as well as the processing of chilli pepper in the study area. Farming is among the major occupation of the people who are predominantly Hausa/Fulani. Many of the citizens are involved in production of crops such as millet, sorghum, soybean, groundnut, pepper and onion as well as animal husbandry, fishery, processing and marketing of agricultural products.

Sampling Procedure and Sample Size

Three (3) markets were purposively selected based on high concentration of chilli pepper processing. The markets were Sabon Gari market, Yan Kaba market and Tarauni market. Nineteen (19) processors were randomly selected from Sabon Gari market, 10 from



Tarauni market, seven (7) from Yan Kaba market and 33 as home Chilli pepper processors. Thus, the study sample size was 69 chilli pepper processors (Table 1).

Table 1: Sampling Frame and Size Selection Plan of the Study

Study Markets	Sample Frame	Sample Size
Sabon Gari	48	19
YanKaba	17	7
Tarauni	25	10
Home Processors	82	33
Total	172	69

Source: Survey Data, 2015

Method of Data Collection

Data for chilli processors were collected in metropolitan Kano from 69 market and home processors. The primary data was obtained by an interview schedule with the help of trained enumerators.

Analytical Techniques

Descriptive statistics and gross margin model were used to analyse the data. Gross margin was used to determine profitability as well as to determine actual performance of the enterprise. Gross margin refers to the total income derived from an enterprise less the total variable cost incurred in the enterprise. It is total sales less total variable cost of processing or production and is specified as:

$$GM = \text{Total sales} - \text{Total variable cost} \dots(1)$$

$$\text{Total variable cost} = C_1 + C_2 + C_3 + C_4 + C_5 \dots(2)$$

where;

C₁ = Cost of chilli pepper to be processed

C₂ = Cost of seasoning and other spices

C₃ = Cost of transportation

C₄ = Cost of packaging

C₅ = Cost of processing

C₆ = Cost of labour

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Chilli Pepper Processors

Results in Table 2 revealed that 29% of the respondents were within the age group of 37-43 years while 26.1% are within the age of 30-36 years. The mean age of the processors was 39 years. This implies that the processors are within their active age. This could ensure sustainability and growth of the processing enterprise although young adults were not involved in chilli pepper processing. Also, 39.2% of the processors had household size of 5-7 members while 31.9% have a household size of 2-4. The respondents further reported a household size of 8-10 members (18.8%) and 11-13 members (10%). The mean household size was 7. The members of the household often contribute to labour needed in processing activities. Most of the respondents (34.8%) had 6-10 years' experience in processing chilli pepper while 27.5% have 1-5 years' experience. Only 8.7% have 16-20 years' experience and 29.0% have 11-15 years' experience. This implies that the respondents are well experienced and also encourage sustainability.



Table 2: Socio-economic Characteristics of the Chilli Pepper Processors

Variables	Frequency	Percentage	Mean	Std. Dev.	Std. Error
Age:					
23-29	9	13.0	39	8.3	0.9
30-36	18	26.1			
37-43	20	29.0			
44-50	15	21.8			
51-57	7	10.1			
Household size:					
2-4	22	31.9	7	2.12	0.3
5-7	27	39.2			
8-10	13	18.8			
11-13	7	10.1			
Experience (years):					
1-5	19	27.5	9	6.0	0.7
6-10	24	34.8			
11-15	20	29.0			
16-20	6	8.7			
Sex:					
Female	100	100			
Educational status:					
Quranic/Non-formal	15	21.7			
Primary	15	21.7			
Secondary	26	37.8			
Tertiary	13	18.8			
Sources of capital:					
Friends/family	22	31.9			
Personal savings	47	68.1			

Source: Field survey, 2015

Chilli processing is an activity that is dominated by women as revealed in Table 1b where 100% of the respondents were female. This is in line with the findings of Mbah (2008) who stressed the vital role women play in processing of agricultural processing. Education improves productivity and ensures utilization of resources. The result from Table 2 revealed that 78.3% of the processors have formal education with 21.7%, 37.8% and 18.8% having primary, secondary and tertiary education respectively. Only 21.7% have informal education. This could be because the processors are in urban areas. Most of the respondents (68.1%) source capital from personal savings while 31.9% of the processors sourced capital from friends and family. This implies that none of the processors obtained loan from formal sources.

Source of Information on Availability and Inputs

Table 3 revealed that 43.5% of the processors source information on availability of chilli pepper from friends and family while 33.3% source information on chilli availability from traders. On the other hand, 23.2% of the processors source information on availability from processors. The major input used was chilli pepper itself. Others include garlic, ginger, curry, and seasoning. Table 3 also revealed that 55.1% of the respondents' sourced chilli and



other inputs used in processing in urban markets while 20.3% sourced from rural markets and 36.2% sourced from local stores and supermarkets. Only 8.7% sourced from the farmers directly. This agrees with the findings of Adio *et al.* (2016) where farmers obtained information from other farmers, relations and colleagues. Since information is an indispensable factor in the development of any business, Choo (2012) agrees with the findings of this current study by affirming that people use information to create knowledge, but not just in the sense of data and facts but the form of representations that provide meaning and the context for purposive action.

Table 3: Sources of Information available to Chilli Pepper Processors (n = 69)

Source	*Frequency	Percentage
Source of information on availability:		
Friends and Family	30	43.5
Traders	23	33.3
Other Processors	16	23.2
Source of inputs:		
Rural Market	14	20.3
Urban Market	38	55.1
Farmers	6	8.7
Local stores/Supermarkets	25	36.2

*Multiple responses existed

Source: Field survey, 2015

Skill Acquisition Sources of the Chilli Pepper Processors

The chilli pepper processors revealed that skill acquisition was from three (3) sources; either it was acquired from family/friends, other processors or acquired because of regular use. Table 4 showed that 42% of the respondents acquired the skill from family and friends, 39.1% learnt the skill by themselves while 18.9% were taught by other processors. This implies that the processors are aware that agricultural transformation is crucial to economic transformation and for it to happen, upgraded skill sets are needed. This agrees with the findings of Maiga and Kazianga (2016) which states that developing skills in agriculture may help curb the productivity issue, which in turn would make agriculture more profitable. Indeed, processing of agricultural products, packaging as well as marketing of the products are opportunities that await both skilled and unskilled individuals.

Table 4: Skill acquisition Sources of the Respondents

Source	Frequency	Percentage
Family/Friends	29	42.0
Acquired	27	39.1
Other Processors	13	18.9

Source: Field survey, 2015

Reasons for Processing Chilli Pepper

Chilli processors gave different reasons for engaging in processing. Majority (46.4%) revealed that income generation is the reason for going into chilli processing. This helped in eliminating redundancy in the family as well as reduces complete dependence on the household head (Mustapha *et al.*, 2012). The respondents as indicated in Table 5 gave skill utilization

(39.1%) and provision of employment (59.4%) as the major reasons for processing chilli pepper.

Table 5: Reasons for Processing Chilli Pepper (n = 69)

Reason	*Frequency	Percentage
Skill Utilization	27	39.1
Income generation	32	46.4
Provision of employment	41	59.4

*Multiple responses existed

Source: Field survey, 2015

Method of Chilli Pepper Processing

Processing is the conversion of a commodity from its raw state to a form more acceptable to the buyers. Ofoh (2009) stated that processing of agricultural commodities stabilizes the produce and facilitate its handling, availability and utility. Processing chilli was dominated by women with a few numbers of men engaging in the activity. Chilli processing business was usually operated at the household level. Chilli processing is a simple method which involves grinding dried chilli pepper into powdered form using mortar and pestle or machines. When mortar and pestle are used, sieving is sometimes required to remove seeds. Figure 1 shows an illustration of methods/stages of processing chilli pepper to *yaji*.

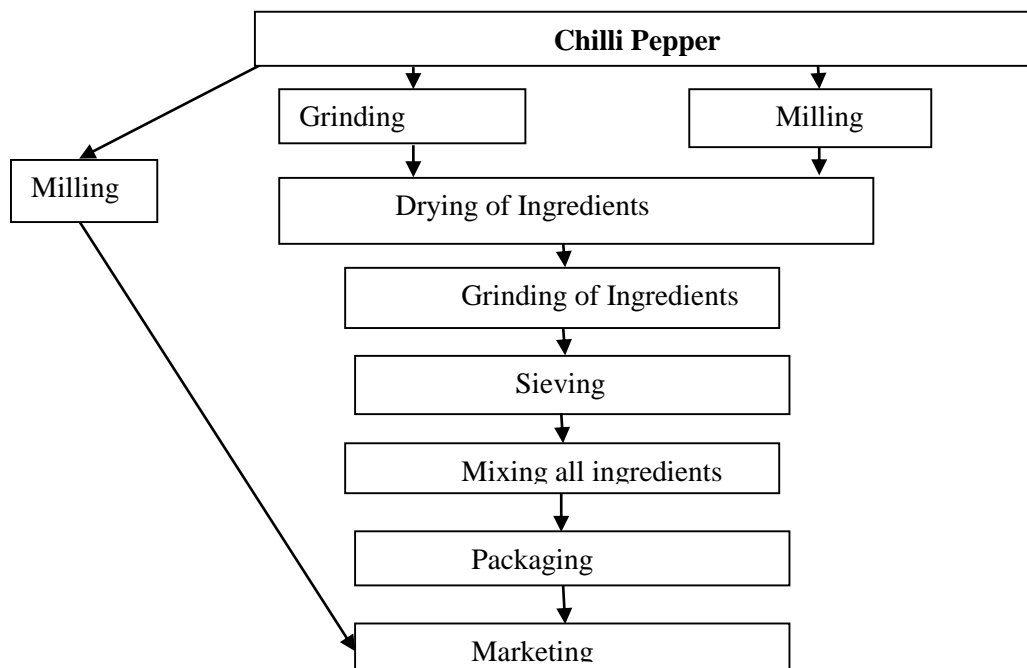


Figure 1: *Chilli pepper processing methods*

Food and Agriculture Organization (FAO, 2003) defines process standards as criteria for the way products are made. The following variables were measured to provide a standardized weight for the variables used in processing 0.4 kg of chilli pepper powdered blend. Market processors used 0.4 kg of chilli and 0.1 kg of more pungent chillies. Home processors unlike their market counterparts further add other spices such as ginger, garlic, curry, *daddawa*, cardamom, cloves and seasoning to create a range of different flavored chilli pepper powdered



blend known as *yaji*. The home processors produced various flavours of chilli pepper with garlic flavoured chilli blend being the most common. The garlic flavoured chilli powder is also flavoured with ginger, cardamom and curry. The weights of the components used are as follows: 0.4 kg of chilli pepper, 0.25 kg of garlic, 0.05 kg of ginger, 0.05 kg of cardamom, 0.05 kg of Curry powder and 0.4 kg of seasoning.

Method of Processing Chilli Pepper

There are two (2) types of method used in processing and these are the traditional method which involves pounding chilli pepper into powdered form using mortar and pestle or the modern form which involved use of electric or gas powered machines. The chilli pepper is milled to a degree of fineness as required by the consumer (Panda, 2010). Table 6 indicated that only 8.7% of the respondents use traditional method only. Other processors use only modern method (71%) and 20.3% used both the traditional and modern method. All the processors using traditional method revealed that they find the method laborious and only use it because some consumers prefer it.

Table 6: Type of Processing Method used by Chilli Pepper Processors

Method	Frequency	Percentage
Traditional	6	8.7
Modern	49	71.0
Both Traditional & Modern	14	20.3

Source: Field survey, 2015

Quantity Processed

This refers to the quantity of chilli pepper processed per month by the processors. An important question is how much should be processed. Majority (59.5%) processed about 4.1-6.1kg while 18.8% processed 6.2-8.2kg. Also, 11.6%, 7.2% and 2.9% processed 2.0-4.0 kg, 8.3-10.3 kg and 10.4-12.4 kg, respectively.

Table 7: Quantity of Chilli Pepper Processed per Month (n = 69)

Quantities (kg)	*Frequency	%	Mean	Std. Dev.
2.0-4.0	8	11.6	5.7	1.8
4.1-6.1	41	59.5		
6.2-8.2	13	18.8		
8.3-10.3	5	7.2		
10.4-12.4	2	2.9		

*Multiple responses existed

Source: Field survey, 2015

Still in Table 7, the mean quantity processed in a month was 5.7 kg (Table 7). According to FAO (2012), the decision on how much to process depends on a number of different factors among which include the amount that is available for processing in relation to the demand for the processed commodity. This depends on market demand estimates made and if the processor has the capacity to meet this demand or whether to team up with other processors to meet the demand for the processed commodity.



Packaging of Processed Chilli Pepper

The primary objective of packaging is to put products in containers for easy handling, for effective storage and to protect them from damages while in transit. Not only is packaging convenient but it also provides some means of identification for the products (Olukosi, 2005). Processors of chilli pepper package in plastic containers of different sizes to attract attention and sometimes even brand the product Table 8 revealed that 48% of the processors package chilli pepper while 52% do not package.

Table 8: Packaging of Chilli Pepper

Variable	Frequency	Percentage
Package	33	48
Do not Package	36	52

Source: Field survey, 2015

Marketing of Processed Chilli Pepper in the Study Area

Result from Table 9 indicated that 52.2% of the processors sold in urban markets while 43.5% sold at home. Also, 26.1% sold in supermarkets and other local stores close to them. Euro monitor (2015) indicated that markets are the primary distribution channel in Nigeria followed by small neighborhood stores. These channels offer greater convenience in terms of shopping as well as a different range of packaged products.

Table 9: Marketing of Processed Chilli Pepper

Variable	*Frequency	Percentage
Home	30	43.5
Market	36	52.2
Supermarket & Local Stores	18	26.1

*Multiple responses existed

Source: Field survey, 2015

Profitability of Chilli Pepper Processing

The benefit of processing is not only for improved food security but for income generation (FAO, 2012). Table 10 present the average cost and return incurred in processing 0.4 kg of chilli pepper by processors in markets and home processors using modern and manual methods. Purchase price of chilli pepper accounted for the highest cost (55.6%) for processors in markets. However, for home processors, purchase price of chilli pepper, cost of seasoning and other spices accounted for the highest cost of processing chilli pepper. Result from gross margin analysis revealed that processors in the selected market received a margin of ₦180 per 0.4 kg of chilli pepper processed. Home processors received a profit of ₦255 when modern processing methods are used for processing and ₦270 per 0.4 kg of chilli pepper when manual method is used. Since majority of chilli pepper producers were women, this enterprise can serve as an opportunity to significantly improve their livelihoods by their raising incomes and improving their living standard.



Table 10: Gross Margin of the Processors for 0.4 kg of Chilli Pepper

Variable	Processors' markets (₦)	%TC	Modern home processors (₦)	%TC	Manual home processors (₦)	%TC
Purchase price of Chilli	400	55.6	280	20.8	280	19.9
Transportation	200	27.8	200	14.9	200	14.2
Milling fee	70	9.7	75	5.6	140	9.9
Packaging			240	17.8	210	17.0
Seasoning and other ppices used			450	33.5	450	31.9
Labour	50	6.9	100	7.4	100	7.09
Total	720	100	1345	100	1410	100
Selling price	900		1600		1680	
Gross margin	180		255		270	

Source: Field survey, 2015

Constraints Associated with Chilli Pepper Processing

Table 11 reveals the constraints to chilli pepper processing to include seasonality (96%), high cost of other inputs used in processing (20.3%), inadequate capital (73.9%), health reasons (30.4%) and lack of patronage (58%). The constraints were ranked according to importance with seasonality been the major problem while high cost of other processing inputs was the least constraint. Result of this study is similar to the findings of Ekunwe and Alator (2007) who found the major constraint of plantain processors to include financial, labour and marketing challenges.

Table 11: Constraints associated with Chilli Pepper Processing (n = 69)

Constraints	*Frequency	Percentage	Rank
Inadequate Capital	51	73.9	2nd
Seasonality	66	96	1st
High Cost of other processing inputs	14	20.3	5th
Health Reasons	21	30.4	4th
Lack of Patronage	40	58	3rd

*Multiple responses existed

Source: Field survey, 2015

CONCLUSION AND RECOMMENDATIONS

The study concluded that chilli pepper processing in Kano State was profitable. Processing was dominated by females (100) and carried out at household level. Majority of the processors had formal education. Chilli pepper and other inputs used in its processing were sourced from both rural and urban markets and also from local stores and supermarkets. Main source of capital was from personal savings. Source of information on chilli availability was from family and friends (43.5%), traders (33.3%) and other processors. Some of the processors also package in containers to ease handling and storage. Gross margin indicated that market processors along the value chain recorded a return of ₦180 per 0.4 kg of chilli pepper processed. Home processors add more value than their market counterparts and obtained a profit of ₦255 and ₦270 per 0.4 kg of chilli pepper when modern and manual processing methods are used respectively. Constraints in processing chilli pepper include; seasonality,



high cost of other inputs used in processing, inadequate capital, health reasons and lack of patronage. It was recommended that:

1. Processors should be linked with financial institutions to facilitate access to credit.
2. Processors' cooperative groups should be formed to provide processing inputs at a subsidized rate to the processors.
3. Training workshops should be organized by government agencies, NGO's, private individuals on best practices and management of small scale chilli processing enterprises in the study.

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